

» MARKING AND TRACEABILITY

# Make your mark

Manufacturers are discovering new ways of using Datamatrix 2D codes to add traceability and protection to their products. Peter Woods, programme manager at GB Innomech, reports

Printed QR barcodes and Semacodes are becoming a standard reader response mechanism in print advertising and on posters. They provide easy links to company websites and promote an immediate dialogue between the seller and its customers. But the emergence of affordable industrial marking and reader systems is now encouraging manufacturers to exploit these Datamatrix 2D codes in different ways: to add product value, increase component traceability and ultimately to protect their brands.

Applications for these reliable, compact and effective codes include: large supermarket chains demonstrating that they are supplying their premium food products, such as meat joints, from a named farm local to each outlet; pharmaceutical companies verifying that shipments of medicines supplied at reduced prices to third-world countries are not diverted to first-world users; and medical device manufacturers improving quality assurance and traceability of their components through complex manufacturing processes, while demonstrating compliance FDA regulations.



**Datamatrix 2D codes have error detection and correction built in**

The GS-1 global traceability standard that is becoming ever-more widespread embraces these 2D codes as a fundamental part of the supply chain management system. The traceability aspects of these coding systems are provided by secure databases, which can be accessed via the internet to give confidence to registered end users.

In most systems, the printed code simply encodes a number that is in itself meaningless until a database search reveals detailed information about the item that may include time, date and location of production, lot code, and so on. The alternative of including information within the code explicitly does away with the need to connect to a database, but places a severe limit on the amount of information that can be encoded and is unsuitable for applications such as anti-counterfeiting.

The advantages of 2D codes compared to printed text or linear barcodes are significant: a 12 by 12-dot 2D code only a few

**A 12 by 12-dot 2D code only a few millimetres square is able to encode 100 million combinations**

millimetres square can be reliably printed and scanned, and can encode 100 million combinations, with an error detection and correction algorithm built in. The codes can be constructed using non-proprietary software and rendered by a variety of techniques, including laser marking, inkjet printing, dot-peen marking, a fixed pattern incorporated into a moulding or even a drilled pattern of holes.

When marking onto easily marked substrates, such as printed or plastic packaging, a manufacturer can usually expect to obtain what they need directly from a specialist supplier of

## what's new marking and traceability

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### » STRINGS ATTACHED

Marks & Spencer (M&S) has signed a deal with supply-chain traceability company Historic Futures that will give the retailer full 'raw material to store' traceability on every single clothing and home product it sells. Historic Futures will work with M&S to phase in the use of its traceability service 'String', making it possible for M&S to collect information from the extended supply chain, describing where and how every product is made. String has been designed to make it simple for each organisation to record and share relevant information — even at the far end of the chain, where access to technology can be a challenge.

[www.historicfutures.com](http://www.historicfutures.com)

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### » FLYING COLOURS

Kaye-Dee will demonstrate how the TPE 251 pad-printing machine from Teca-Print AG can now be used with improved versatility at Interplas 2011 — an engineering exhibition taking place at the Birmingham NEC from 27–29 September. According to Kaye-Dee, improved product innovation using a combination of new accessories and peripheral devices means users can now produce cost-effective four-colour prints in one run, achieving an output of up to 800 parts per hour. By combining the two-colour transfert-carré TFC 125 and a pad sliding device, the machine is reportedly able to print two colours on both of the two print stations, making four-colour printing possible. All four colours are picked up from the printing plate at the same time.

[www.kayedee.co.uk](http://www.kayedee.co.uk)

### » QUICK FIX

Dentafix, a manufacturer of dental and surgical hand instruments, has recently introduced a new laser marking system from Rofin-Baasel. The Rofin Easymark E Line was selected by Dentafix as a compact, self-contained and purpose-designed system for marking small instruments, as well as metal and plastic components. Rofin's Visual Laser Marker (VLM) software reportedly allows the layout generation and transfer of the required marking data to be sent straight from a PC to the laser marker, providing the flexibility required for quick set-up and frequent changeover. The system uses a diode-pumped Nd:YVO4 laser source and the capacity to accommodate components up to 450 x 150 x 200mm.

[www.rofin.co.uk](http://www.rofin.co.uk)

### » FIRE POWER

International Battery (IB) is a technology company providing large-format, rechargeable lithium-ion cells and batteries. The outer covers of the battery cells are made from fire-retardant polypropylene (FR PP) and require both in-process and after-the-sale traceability information for each cell. However, traditional adhesive printed labels did not adhere very well to the polypropylene surface and were prone to lifting or peeling. IB contacted Synrad and discovered that the company's CO<sub>2</sub> laser marking is not only permanent and easy to read but it also eliminates the consumables inherent in other marking processes. UK distributor Laser Lines offers a complete range of Synrad CO<sub>2</sub> lasers suitable for laser marking.

[www.laserlines.co.uk](http://www.laserlines.co.uk)

### » ADDED FIBRE

JK Lasers plans to enhance its portfolio of fibre laser products with the introduction of a high-power 1kW fibre laser. The laser, which has been developed at the company's headquarters in Rugby, will incorporate many of the features seen in the lower-power models, including high brightness, fast modulation, pulse shaping, processing heads and integrated FiberView software. One of the laser's most notable features will be its beam switch capability, enabling time and energy sharing of the laser output between a maximum of four fibres. This will provide an enhanced level of flexibility to the laser user.

[www.gsiglasers.com](http://www.gsiglasers.com)

marking systems. Laser marking systems, for example, continue to become more affordable and flexible by using innovations such as fibre lasers. In these applications, the marker head can be mounted above a conveyor with a simple trigger signal or encoder to synchronise the marker with product flow.

More challenging applications will benefit from an in-depth analytical review of the complete manufacturing process to understand what information to encode and how best to achieve this, and the physical aspects of marking may require the marking system to be combined with complex part handling.

For example, it is possible to permanently and indelibly mark directly onto ground or machined surfaces of complex metal components, but tight tolerances on positioning are demanded to ensure reliable code reading. In such cases a robotic handling system, synchronised

## GB Innomech replaced the text version of the array location with a separate, smaller 2D barcode

with the marker, may be required to ensure the surface for marking is presented in a consistent way. A flexible handling system, based around vision-guided robotics, can offer the opportunity to cater for multiple shapes and sizes of component.

GB Innomech worked with a medical-device manufacturer to develop a marking technique for the consumable used within its diagnostic equipment. Sub-components of the consumable item were produced on printed sheets and the manufacturer needed to show traceability for the product based on the original location on the sheet, the sheet serial number and the lot code for the batch. The small size of the consumable and the desire for an unobtrusive code led to the specification of a Data-matrix code capable of 100-billion unique identifiers. Even with this large quantity of codes available, however, directly encod-

## production essentials

Key facts to take from this article

- » **Manufacturers are beginning to exploit 2D codes in different ways**
- » **One of its main new uses is as a vital part of supply chain management**
- » **2D codes have many functional advantages over older technologies**
- » **They can be easily rendered using one of a number of techniques**

ing information describing batch code, array serial number and array position into the 2D code was likely to exceed its capacity during the product lifetime.

The chosen solution was to exclude the array location from the 2D code to ensure that the specified code was suitable, and to include the location as alphanumeric text as part of the printing. The combination of this text and the 2D barcode provided the required item specific traceability.

A concern was raised that the end user might read some unintended meaning into the alphanumeric codes (for example, not accepting specific numbers — for the same reason some airline passengers are unwilling to be seated in row 13 — or considering components labelled C as being inferior to those labelled A). GB Innomech suggested eliminating the text version of the array location and replacing this with a separate, smaller 2D barcode that could be rendered using the manufacturer's existing equipment. This allowed all the relevant data to be discreetly encoded in the space available and immediately removed concerns about user acceptability.

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