

# CODING AND MARKING

REPORTS ON DEVELOPMENTS IN PRINT-APPLY LABELLING, INK JET PRINTING, LASER MARKING AND ON-LINE CODING SYSTEMS.

## INK JET PRINTING

### Late stage customisation for pharma cartons

Late stage customisation of pharmaceutical cartons by ink jet, in full colour and with variable 'embossed' data such as Braille, now seems set to provide a further answer to producing small quantities in different languages, or for specific market conditions, without the cost of repacking. Blisters and labels can also be handled in the same way.

May's Achema exhibition in Frankfurt saw manufacturer Domino introduce a prototype full colour variable information print system, based on its new K series of high resolution drop-on-demand digital ink jets, developed for the graphics industry. These use ultra-violet curing inks to print an area up to 60mm wide at speeds of 200 metres a minute, handling variable data on items such as ticket tags.

For pharmaceutical industry use the system has been refined and provides a speed up to 90 metres a minute which, with pharmaceutical cartoning lines running at less than 50 metres a minute, means speed is not an issue.

Able to print a full range of line and halftone artwork, the Domino system can also use Data Matrix codes to provide serial numbering and hence unique identification that allows a product to be established as genuine at the point of sale anywhere in the world. Braille is applied by using thermal ink, which leaves a relief pattern.

"The versatility offered by the K series is a key differentiator to previous ink jet systems," says Lee Metters, sector development director at Domino. "These typically only printed the lot and expiry information on packages, while the remainder was printed by traditional methods."

Meanwhile, although outer case coding by ink jet has changed little in technical terms over the

past year or two, suppliers believe that the general trend to drive down production costs is seeing a steady move to generic packaging – decorated and coded on line by ink jet.

For example, the latest outer case coder from Linx is a twin head version of its IJ600 impulse jet coder, which enables both sides of a container to be printed simultaneously with graphics, text and bar codes up to 70mm high using a single control unit. The printheads are also self-cleaning and can print in any orientation up to 8 metres away from the control unit.

The one touch start/stop operation is said to allow quick and easy start-ups while the combination of the IJ600's IP65 rated stainless steel enclosure and pressure and temperature control at the point of coding enables the printer to operate in harsh environments.

Ease of operation remains a particular theme with suppliers of the different ink jet systems.

Imaje, for example, reckons to have gone back to basics with its 9000 series range of small character ink jets, both in terms of the relative simplicity of the system and its cost.

Steve Ellison, Imaje UK operations manager says: "The 9000 series is one of the most cost effective printers available. In fact our customers could save as much as 25 per cent in cost of ownership compared with our competitors."

#### Self-sealing containers

Features include ink and additives supplied, and loaded into the coder, in self-sealing containers that can be changed in 30 seconds without shutting the machine down. A new cleaning system for the print head automatically rinses the nozzle to ensure trouble-free start-up and optimum print quality.

There are two models. The 9020 suits all standard applications offering up to four lines of coding at speeds up to 4 metres/sec while the 9030 offers more advanced features and suits applications that require up to eight lines of text at higher speeds. With an IP65 rated option, the



*Simple to use: New Imaje 9000 series ink jet coder is loaded with cartridges of consumables*

9030 is more suited to harsher environments and offers more versatility through a choice of network connections.

Both coders use the IC60 ink circuit. With its internal reservoir, this means that the system can continue coding for up to 60 minutes after the 'empty' signal first appears, giving the operator ample warning when it comes to replacing consumables.

In the Wolke m600 thermal ink jet printer distributed by Sunala – part of Travtec – both the ink and the print head are contained in a replaceable Hewlett-Packard printer cartridge.

This eliminates maintenance since the important elements of the printing system are regularly replaced, and at the same time is said to guarantee a consistently high quality of code. The system is also completely drip-free both during operation and changeovers.

Each Wolke cartridge holds 42ml of ink and the system is able to calculate how many individual codes can be printed before a changeover is required. The ink is water based and, says Sunala, specifically formulated to match the porosity of the board used for the cartons.



**Late stage customisation:** Blisters and cartons can be handled in colour by the new Domino system



**Dairy applications:** Linx 4900DC ink jet coder is designed for traversing duties

For maximum user convenience, inputting of data, which includes date of manufacture, date of expiry and batch number, is carried out remotely via a central PC using the m600's Manager software.

Indeed the basic simplicity of the m600 has led generic pharmaceutical manufacturer Teva UK, Eastbourne, to buy two machines as an alternative to embossing, which was proving slow and inefficient to set up.

### Low maintenance

"The m600 delivers an outstanding solution to our requirements, which combine clear text and fast changeovers with a reliable, low-maintenance performance," comments Teva UK

engineering packaging manager Dave Gadd.

Meanwhile, Linx has announced a new continuous ink jet printer designed specifically for coding dairy products.

In particular, the print head and conduit of the Linx 4900DC are designed for traversing applications, where the print head is moved back and forth across multiple lanes, while the curvature of the machine's stainless steel case assists rapid washdown and provides protection to IP55.

Compared with the standard Linx 4900 printer, the new version offers enhanced stop/start performance in humid conditions, faster two line printing – at up to 78 metres a minute – for traversing duties, and can be equipped with the Linx Mini printhead for creating codes as small as 1.4mm character height.

At the beginning of this year, US manufacturer Citronix introduced the 2006 ciSeries range of continuous ink jets, claimed to include the features and functions of higher priced systems yet be the most competitively priced CIJ currently available.

"The Citronix 2006 ciSeries offers a specification normally associated with high end systems on its entry level systems, making the 2006 ciSeries an extremely attractive and cost effective solution for CIJ printing," says Aled Ellis, marketing manager at UK distributor The Needham Group.

Citronix entry level systems offer three lines

of print, and the high end systems five lines of print. All systems also include the Smart Clean nozzle cleaning system.

In addition, all systems use the company's Pixel Plus software, said to raise coding speeds by 30 per cent over standard, give greater throw distance and the ability to print character heights from 1.5 to over 20mm from a single system, avoiding any need for dedicated coders for different requirements.

### LASER CODING

## Hot glass coding lifts legibility and security

**D**emand for higher levels of traceability, particularly from the EU, coupled to anti-counterfeiting measures has led Linx Printing Technologies to develop a new system of laser coding bottles while still hot, immediately after manufacture. In particular, the process recognises that glass remains very much at the quality end of the packaging market, attracting high value products such as wines, spirits, perfumes, premium beers and specialist foods.

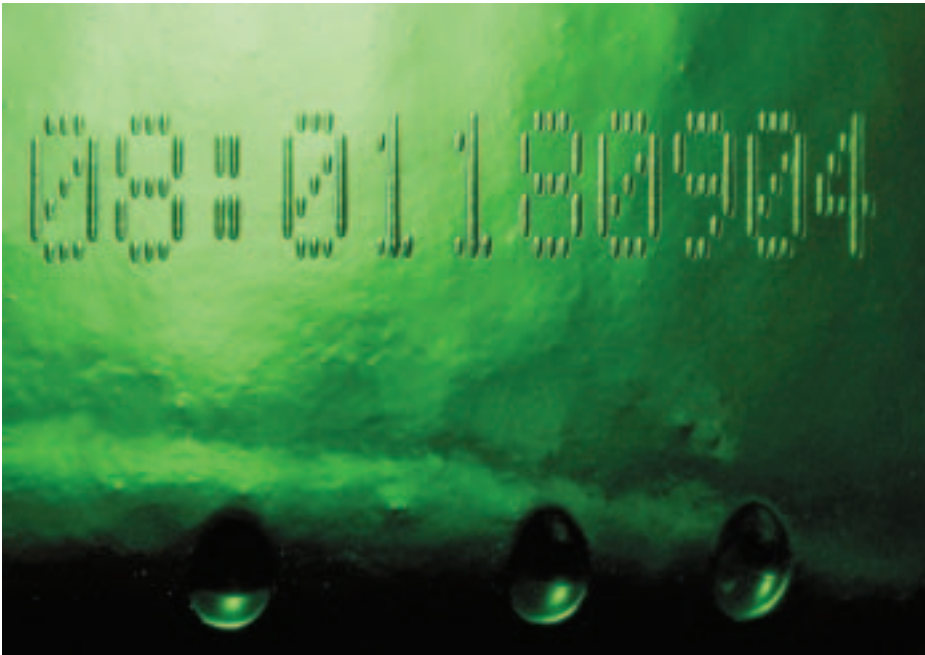
Traditionally, the coding solution for glass bottles and jars has been to apply an ink jet code – sometimes using ink only readable under ultra-violet light – at the end of the production line once the bottle has been cooled after moulding. However, as Linx points out, this creates two major drawbacks.

### Practical problem

The first is that the code could subsequently be confused with whatever information is applied by the filling company to distinguish the batch or use-by date of the contents. The second is a more practical problem. Applying an ink code so early in the bottle's life – when it has yet to face the rigours of the filling and distribution process – means the code could easily be damaged or removed.

Hence the benefit of lasers, such as the Linx Xymark BBH machines now adopted by bottle manufacturer O-I, Harlow, to etch discreet dot matrix codes into the glass and give permanent information and traceability throughout the life of the container.

These lasers, installed on six of O-I's seven high speed lines, are specially adapted to code onto hot glass, marking the base of the bottles with a single line alpha-numeric code at speeds



**Coding while hot:** Linx laser system creates a clean smooth mark on glass containers

up to 50 metres a minute. This position avoids any confusion or a clash with the coding information applied by the filler, usually to the neck, closure or label.

The principle behind this hot glass technology is that the best laser coding results are achieved when coding takes place close to the point at which the bottle or jar is formed, while the glass is still red hot. This generates a clean, smooth mark that helps avoid the creation of microscopic fissures that occur when lasers are used to mark cold glass.

Not surprisingly, coding onto hot glass containers presents a number of challenges. For example, during manufacture, the temperature of the newly formed bottle reaches 650deg C, while the ambient temperature close to the production line is a hostile 70deg C or so.

**Avoiding heat and debris**

Linx has tackled these problems in a number of ways. Its Xymark BBH laser system is mounted above the production line to keep it away from excessive heat and debris. In addition, the machine is sealed to IP66 standards for maximum protection from the surrounding environment and has a long arm to avoid compromising sensitive optical or electronic components in the system. A cooling system allows the laser to operate at 45deg C.

“The high quality permanent code provided by laser coding is the ideal solution, while coding onto hot glass at the point of manufacture is the most effective method – and in our Xymark BBH we have the only coder on the market that

can operate in such a tough production environment,” says Mike Utley, product manager, lasers, at Linx.

Still on traceability, vision system specialist Cognex and parts marking equipment supplier Technifor have joined forces to provide a new system for Central Labo, France, allowing each of the 48 separate wells in a tray of blood and serum samples to be individually identified.

Previously each container of samples was simply identified as a whole using a bar code so, should just one sample provide a problem, the entire container had to be rejected.

Cognex explains that the small size of each

well and the need for complete traceability demanded an automated marking process capable of integrating the necessary data handling, which was also tailored to meet the specific needs and technical requirements of Central Labo. The solution needed to mark two different codes with a result that would be both machine-legible and visible to the human eye, even after long periods of time.

**Zero risk of error**

“Technical constraints were significant in that the solution would have to be a completely automated process complying with Class 10000 clean-room conditions, maintain zero risk of error and ensure any non-conforming pieces are rejected during the process – all the while meeting production requirements of one piece a minute,” says Cognex.

The solution is a custom built laser marking system from Technifor and an In-Sight 1010 vision system from Cognex to read and verify all the codes involved.

After the container is loaded and identified with a bar code, each well is marked with the container code as well as its own unique identification code in human readable text. In addition a DataMatrix machine readable code is added allowing the same information to be held in a particularly small space. At



**Each well identified:** Cognex/Technifor system codes and verifies each well of a tray of samples

this point each of the codes has to be inspected and verified by the Cognex In-Sight 1010 camera, which is mounted in such a way so as to be able to read each of the codes on each sample.

Outside the bottling industry – and similar high speed packaging operations – there are few reports yet of a significant shift from ink jet to laser. But a change of coding method may well bring benefits in some circumstances.

For example, Warburtons the bakers has installed a Markem SmartLase 100i laser coder for applying date codes to cartons of new All in One Riddlers pre-filled bread rolls, allowing more characters to be coded at higher speeds.

Chris Beer, engineering manager at Warburtons' Blackpool bakery, comments: "In the past we would probably have used a continuous ink jet printer for such an application, but installing a laser coder has proved more reliable as well as more cost-efficient in terms of lifetime costs."

The SmartLase 100i is a low power, CO<sub>2</sub> coder able to handle primary packaging such as cartons, labels, glass and pet bottles. Markem says that its reliability is reflected in its three year warranty.

**New generation lasers**

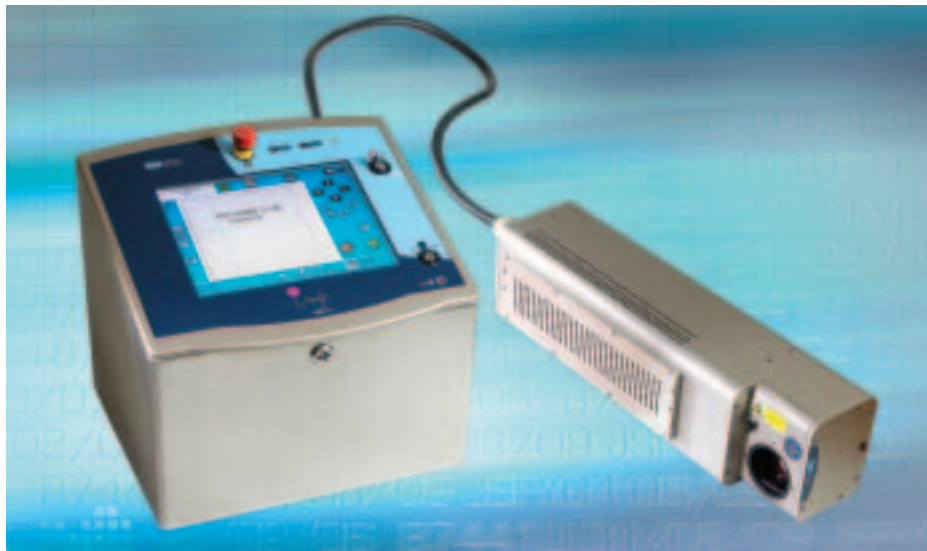
Imaje has just launched a new generation of scribing CO<sub>2</sub> lasers which, according to group product manager, Francois Barreau, will open up laser coding to a much wider market.

"The Imaje 7000 series is a major step in scribing laser technology," he says. "With the 7000 series, laser coding will never be the same again; the time of overheating problems, poor printing performance at high speed and limited duty cycles is over. It offers major opportunities for dry food companies that want to change their marking technology."

There are two coders in the new range, the 10W Imaje 7011 and the 30W Imaje 7031. Both feature a third generation laser head that can operate at temperatures up to 35deg C without the need for external cooling and can provide speeds up to 1000 characters a second with, it is said, no reduction in code quality.

Imaje says that the 7000 series can be easily integrated into most production lines as a result of its modular design, comprising three separate components: a controller, cable up to 9 metres long and a laser head. The controller is housed in a stainless steel cabinet while an aluminium body with FDA approved coating protects the laser. The compact laser head itself offers 0deg and 90deg laser beam orientation.

Spanish manufacturer Macsa Laser is



**Third generation:** Imaje 7000 series laser coder can operate at up to 35 deg C without external cooling

launching its new K-series CO<sub>2</sub> laser, said to be easy to install and use while being particularly competitively priced. "With the Macsa K-Series laser systems we are now well and truly entering CIJ territory in terms of pricing," says Aled Ellis, marketing manager of UK distributor The Needham Group. "Add to this the savings on consumables and it is an extremely attractive proposition."

The K-Series is available with 10W, 30W or 60W of power, a wide range of Windows based fonts, graphics, logo and bar code capacity, Ethernet networking capabilities and meets pharmaceutical standard 21 CFR 11.

PRINT-APPLY LABELLING

**Custom solutions illustrate systems' adaptability**

**T**wo of the most significant developments in print-apply of late – one in software, the other in hardware – show there is no shortage of innovation while a host of custom solutions continues to illustrate the adaptability of the technique to the needs of different industries and products.

The software development is a line set-up and verification system in which use-by dates and labelling data is entered once and passed to coding, labelling, weigh scales and other line equipment – while bar code printing quality is also carefully monitored.

Developed by Cobalt IS, the Sentinel system employs bar code match functions to allow outer packaging to be verified against actual contents,

mis-packaged products and rogue labels to be detected and warnings issued to operators or, in severe circumstances, the line shut down.

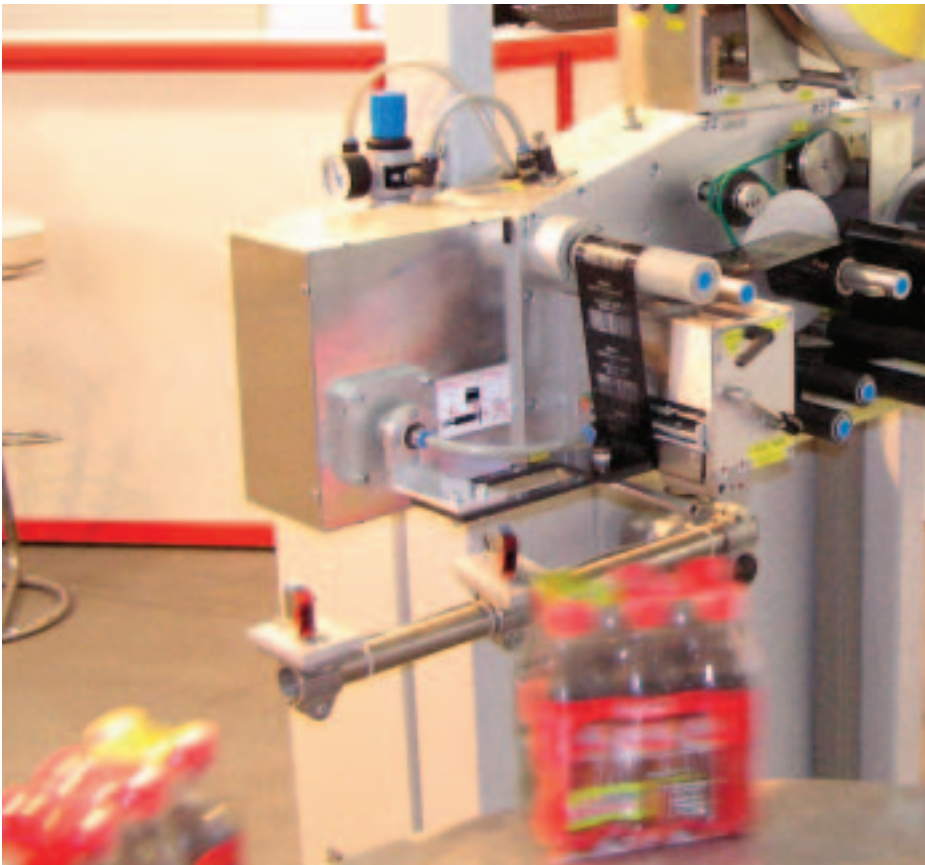
The system is able to read, grade and record bar codes in real time – so that individual packs are uniquely identified for removal or easy tracing at a later stage. Operators are given a graphic display of the current and average bar-code read quality being received – for easy at-a-glance reference – with comparisons of these readings against expected or minimum values to identify early signs of degradation.

Users are able to specify the most appropriate response to any read errors detected which, based on individual site requirements, may include a controlled shut down of the packaging line, audible and visual alarms, quarantining of affected product or automatic 'error' labelling.

Warning messages of impending problems can also be sent to host applications across an Ethernet connection, or to upstream equipment that has a manned control panel, allowing further preventative action. A full audit log of product detail and read status is retained as proof of the bar-coding quality on exit from the labelling station.

On the hardware side a front-of-pack print-apply labeller that avoids the mechanical stress imposed on traditional machines by head-on physical contact with the pack, and can run at speeds up to 80 a minute, is now available from Logopak.

Aimed at applications in which no line space is available to turn a pack 90deg for labelling its face from the side, the new Logopak 906F labeller employs a blow-on label applicator carried on a high speed rotary air cylinder. This allows the applicator to be brought in and out of



**Non-contact:** Logopak 906F front-of-pack print-apply labeller can run at 80 a minute

position much faster than the linear air cylinders traditionally employed which, coupled to the use of a blow-on applicator controlled by proximity sensors, avoids all contact with the pack.

“Up to now, front-of-pack labelling has imposed considerable mechanical strains on equipment, and even the best machines have required extra maintenance as a result of the constant battering,” explains Logopak UK general manager Wilson Clark. “Not only does the new Logopak 906F avoid the problem, but it also gives speeds up to 80 a minute where, before, 40 to 50 a minute was the maximum.”

### Entry level model

Meanwhile Weber Marking Systems has launched a new entry-level print-apply labeller. The Model 2600Lt is an in-line unit for moderate duties or for initial entry into on-line print-apply labelling and, says Weber, includes functions formerly limited to heavier-duty equipment. It uses Sato's new Lt408 direct-thermal/thermal-transfer print engine to provide 203dpi text, bar codes and graphics at speeds up to 150mm/sec, and will dispense labels up to 108mm wide and 150mm long.

Application is by the tamp-blow method of application in which a printed label is peeled from its liner and retained by vacuum on the applicator's tamp pad. The pad is then extended, the vacuum reversed, and the label blown on to the surface of a package from about 6mm away.

Another low cost print-apply system is also now available from Martek Industries in the form of the Delta LT machine aimed at medium throughput applications. Labels up to 100 x 120mm can be printed at 203dpi resolution and applied to pack side or top at speeds up to 45 a minute, by a tamp applicator that can be readily adjusted without tools for different label sizes.

Codeway has recently completed the installation of three print-apply pallet labelling systems for a manufacturer of insulation board, using Avery Dennison ALX print engines. The system incorporates NiceLabel software to provide a simple means of calling up the right label when product specifications, sizes and official approval logos all change, batch to batch, showing the user an image of the label to check before printing.

Codeway also set up the system to obtain information of the company's database and to capture the data from labelling. This triggers the first stage of a tracking system that will follow the product through dispatch to the customer, with proof of delivery.

A new generation of Avery Dennison print-apply machines is now also available from Codeway, including the ALS 204 applicator that can be readily upgraded at low cost to IP65 protection against ingress of dust and water, particularly for the food and beverage industries.

Since the die cast aluminium casing provides a substantial heat sink, ventilation holes are not

## CODING AND MARKING

needed, reducing considerably the cost of sealing. In addition, the mounting bar that carries the dispensing beak can be rotated in steps of 1.5deg, making installation on a variety of host machines much easier for side, top or bottom labelling applications.

Markem has recently supplied tandem Cimjet print-apply machines and Cimpak pallet labellers to all the UK sites of Coca-Cola Enterprises, following initial trial installations at Coca-Cola Edmonton and Wakefield sites where the machines were found to improve labelling accuracy and speed on pet bottles.

Two Cimjets are installed on each of the production lines, working in tandem to apply labels to the side of packs of four and six 1 litre and 2 litre bottles. This system reached higher speeds than the original equipment and prevented delays in production when label reels required replacing.

### Pallets identified

Pallets of shrinkwrapped bottles are subsequently labelled by Cimpak machines which, together with the Cimjet labellers, have been networked by Markem to Coca-Cola Enterprises' on-site warehousing system, helping provide data for stock and traceability purposes.

Other recent examples of print-apply providing tailored solutions include an installation of 35 Logopak machines at the new Quinn Glass factory in Elton, Cheshire, where some of the machines are supported within 4.2 metre high structures, so that tracking labels can be placed on the tops of pallets.

The installation, which is Logopak's largest single UK order to date, is in three sections.

The first applies labels on the tops of pallets at the exit from individual palletisers. These labels are internal and are for tracking the pallet through the conveying system from palletisation to labelling, and then to storage.

Since pallets vary in height from 1.4 up to 2.7 metres, and are transported at this point on 600mm high conveyors, the Logopak 906 TP print-apply machines are carried in a 4.2 metre high support structure and adjust to the height of the pallet.

The second part of the installation is standard EAN labelling on two adjacent sides of stretch-wrapped pallets for the finished product area using Logopak 920PF and P units as well as Logopak VLP off-line systems.

The third part is tray and EAN pallet labelling in the filling and packing hall using Logopak 920PF and the newly developed Logopak



**Adjacent side labelling:** BBK has introduced a new corner wraparound print-apply machine

515b90/600 print-apply machines.

All machines operate from within enclosures to protect the equipment against an "oil laden" atmosphere and to ensure that the label adhesive retains its tack for secure application.

Further manufacturers introducing new print-apply models include BBK Labelling and Coding Solutions with a machine to provide adjacent side coding with a label wrapped around the case corner. As the label is dispensed from the printer it is held on a vacuum pad, dispensed onto the side of the case and then taken round the corner by an arm that also wipes it down completely. The applicator can also be used for side labelling only.

Sessions of York has announced a new print-apply machine, the RCP64, for low to medium volumes of cylindrical containers, from vials to wine bottles. It includes a ribbon save function

and a powered bottle jig that can be quickly changed from one size product to the next. Windows based software is used for label formatting.

Logopak last year launched a new generation of high speed industrial RFID print-apply labellers said to be the first machines of their type developed specifically from the outset to combine the two technologies.

### New print head design

In particular, the Logopak 500 range incorporates a new design of print head that allows the RFID read and write antenna to be enlarged and mounted in the optimum position for efficient operation of the head, both electronically and mechanically.

"The 500 range is the first complete series of RFID print-apply machines to be designed explicitly for the purpose," says Logopak UK general manager Wilson Clark. "Continuing changes in RFID to UHF frequencies mean that new equipment with RFID at its core is now necessary."

The 500 range is available in three print widths of 106, 160 and 216mm giving users access to wider labels able to incorporate the additional information, such as EAN128 bar codes, increasingly demanded by retailers. There is a choice of 8, 12 and ultimately 24 dots/mm resolution to suit the application.

"Print plates from different manufacturers, including ultra-high speed corner edge plates, can be used on the new machines," explains

## Contact ink marking offers cost-effective simplicity

Contact ink marking may not be hi-tech, but it is certainly well proven and cost-effective.

If the application is to print a batch number, a date or a price then, says Cap Coder, the simplicity of its Gentle Touch reciprocating coder can be particularly attractive.

The machine is able to run at speeds of 160 a minute without damage to packaging; a fact proven, says Cap Coder by its ability to code the surface of an egg yoke.

The small print heads are fitted with a type holder to carry the rubber type which can be quickly changed. Multi-coloured ink cartridges are also quickly replaced and last typically for over 50,000 sell-by date codes using 2.5mm high type.

The Gentle Touch can be supplied with control modules for installation on a production line, as part of a capping machine or as a benchtop unit for short runs.



**Cost-effective:** Gentle Touch ink coding head installed on a Top Coder benchtop system

Wilson Clark. "This means there is an open upgrade path for the future, and complete security of component supply."

Labelling speed with variable data is 70 packs a minute on typical 50mm long labels, and 100 packs a minute where label data remains constant. There is no loss of print speed on extended widths.

Mechanically, the Logopak 500 range has been designed to reduce complexity with, for example, just one-third the number of rollers employed by its predecessor. There is also a choice of reel holder, for 300 or 450mm diameter rolls of labels.

Applicators available for the machines cover a full range, including blow-on, tamp, front-of-pack, keg and adjacent side versions.

ON-LINE CODING

## Higher reliability and longer life for components

Improved reliability and longer life for components are currently two issues being addressed by coder manufacturers.

For example, two systems to extend the life of the print head are employed on Allen Coding Systems' latest thermal transfer machines, the NX2 which accepts a 2in wide ribbon and the NX4 which works with a 4in wide ribbon. Both are available for intermittent or continuous motion giving maximum speeds, respectively, of 450mm/sec and 27 metres a minute.

The first system is a preheater for the print head, which, particularly in cold environments, reduces energy consumption, eliminates thermal shock for longer life and is said to give higher print quality, especially at higher speeds.

The second is the Hysteresis control routine for the resistive heating elements within the print head, 12 per millimetre, which heat rapidly and cool when energised, placing the print head under considerable stress.

Unlike traditional systems in which only the duration of the energising is controlled, the Allen system is able to adjust the amplitude. This means that the previous print can be analysed and those elements that are still warm identified and fed a lower current to help reduce stress while maintaining improved print quality.

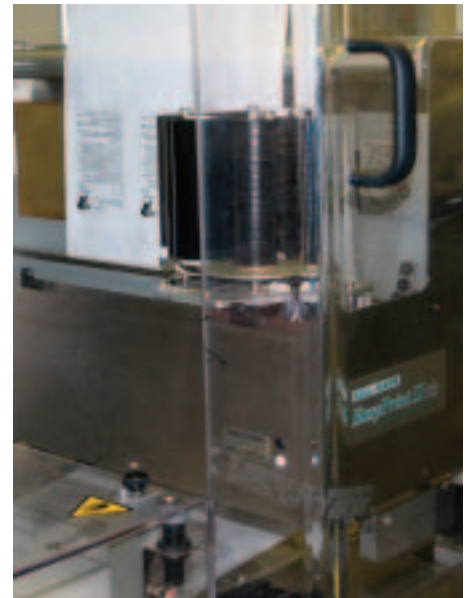
Allen Coding has also equipped its thermal transfer machines with two foil save systems. The first calculates the minimum amount of foil required for the image, leaving the minimum gap between impressions. The second is a sidestep function which, if the pack layout permits it, allows a line of code to be printed a number of times across the head without indexing the foil.

In addition to its new thermal printers, Allen Coding is now also offering two types of networking packages for central control of the systems: AllenSure, giving full tracking ability of the printer and its associated operation to 21 CFR Part 11 standards; and AllenView, for basic networking requirements.

However, for a number of coding jobs, particularly one or two lines of alpha-numeric text applied at high speed, hot foil continues to be the system of choice.

### Hot foil printer

Allen's most advanced hot foil printer, the Super Compact, is able to run at 800 impressions a minute and, via the optional rotary flick-wheel type holder, give virtually the same changeover time as a thermal coder, some 15-20 seconds for a single line of text. For damp environments an IP65 rated version of the Allen Compact model is also available



**Replacing labels:** A Bell Mark traversing printer has been installed by Transpack Medical

Finally, medical device manufacturer Transpack Medical, Blackburn, has installed a Bell-Mark thermal transfer printer on its Tiro-mat thermoformer to allow all information previously carried on hand-applied labels to be printed automatically on the top web.

Supplied by Rotech Machines, the printer traverses the 300mm wide web within the cycle time of the host thermoformer, avoiding any reduction in speed, and is equipped with a 128mm wide print head able to handle the length of label required. The ribbon employed was selected by Rotech for its performance at high speeds on Tyvek and other medical papers. Pantone colours can also be matched.

"We are enjoying significant benefits with the new printer," says Transpack managing director Andrew Micklethwaite. "We have no restriction on the speed at which we can run the thermoformer and are able to produce a far higher quality of print than previously."

By installing the Bell-Mark printer driver, the company is also able to continue to use existing label formats and design software. ■

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