White paper

Keeping pace with flow wrapping

Regulation requires bakeries around the globe to include expiration and manufacturing information on their products, and flow wrapped products are no exception.

Different technologies from mechanical to digital printers are used to print these codes directly on the products. Primarily, codes are used to indicate the freshness of the product. A consumer will use a 'best by' or 'sell by' date to verify that a product is safe to eat. Additionally, this information can be used by retailers to remove expiring items from the shelf. Manufacturing information is also used for traceability purposes as these unique codes allow products to be tracked throughout the supply chain and be recalled should there be an emergency.

Some bakeries use printers to print non-regulatory information on their products. For example, some print the price of the product directly on the package to avoid the additional step of adding a price to the product at the retail location and to fix the price, while other bakeries may print gaming information on the inside of the product for contests. There are many other applications that the printers can be used for including logos, nutritional facts, bar codes and ingredients.

Contents

Meeting the speeds of flow wrappers

To meet the needs of baked goods companies, packaging equipment manufacturers have pushed their machines to the limit and continually release products into the market that can package at higher speeds.

Also, trends have pushed baked goods companies to release individual and smaller portioned packages which run at higher throughput speeds than larger products.

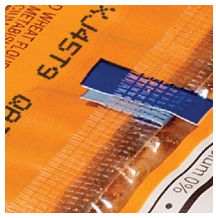
However, even with these two factors pushing maximum throughput speeds higher, the variety of baked goods products and packaging formats has led to a wide variety of speeds even within the same facility. For example, coffee cakes may be packaged at 65 products per minute, while individual crackers can be packaged at over 300 products per minute. It is possible, but not common, to find applications at over 500 products per minute.

While many baked goods companies think of speed in terms of throughput, coding technology manufacturers think of speed in a slightly different way. In addition to throughput, linear speed, which is the speed of the film, is also important. The coder needs to be able to not only get the entire message on the product clearly and in the allotted space but also make all necessary adjustments to be ready to code on the next package.

Baked goods companies can choose from a variety of mechanical coding technologies, such as roller coders or hot stamp printers, to digital printers, such as Thermal Transfer Overprinters (TTO), to meet their needs.

Digital printers offer more reliability, faster changeovers and can typically offer lower total cost of ownership as compared to mechanical printers.

Furthermore, digital printers are perfectly adept at meeting line speed requirements across a range of flow wrapping applications from slow speed trays of cookies to ultra-fast individual pastries. Three digital printing technologies, Thermal Transfer Overprinting (TTO), Continuous Ink Jet (CIJ), and Laser Marking Systems, are particularly suited for integration with flow wrapping machinery. This white paper describes these technologies as well as considerations and selection criteria.



Thermal Transfer Overprinters (TTO)

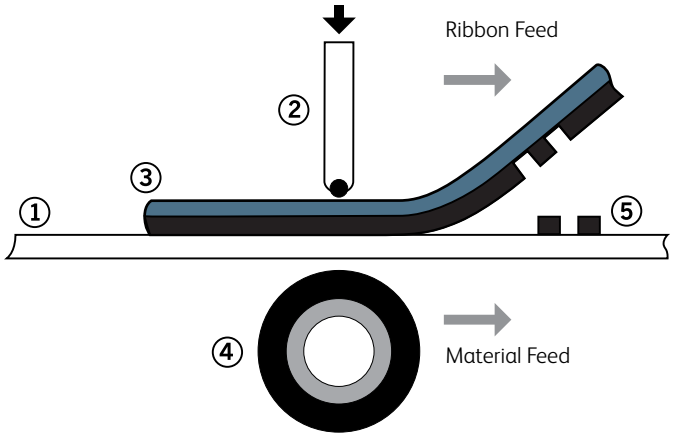
How TTO works

Thermal Transfer Overprinters are used to mark directly on flexible packaging. In flow wrapping, the packaging material is printed while the film is moving (see below).

The printer is mounted close to the point of packing by a bracket mounted directly onto the machine.

The film (#1) runs between the printer unit's printhead (#2), inked ribbon (#3) and a print roller (#4) which are all integrated into the bracket as part of the TTO printer unit. The printhead is positioned perpendicularly to the flow of the film. After a signal from the packaging machine, such as a print mark, the printhead, ribbon and packaging film are pressed against the print roller and printing is started.

Individual heating elements on the printhead are heated as required based on the content of the required code data and the coloured ink on the ribbon (#5) is then transferred onto the packaging material only where the elements are heated. As soon as printing is finished, the printhead returns to the start position.



TTO is a clean, no mess printing technology that is friendly to the operators and production environment. No solvents are used and ribbon waste can be disposed of without special arrangements for hazardous substances.

Thermal Transfer Overprinters are easily programmable and can update variable data for each print.

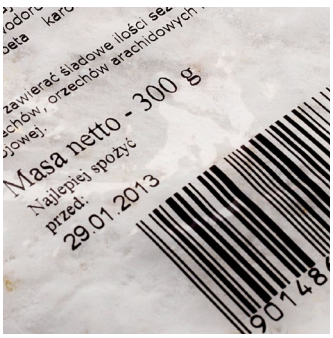
This high-resolution printhead enables text, graphics, batch numbers, real-time dates and bar codes to be printed.

The codes produced by TTO should typically read in the direction of the endseal (widthwise) to maximise ribbon usage. Since the printhead is positioned perpendicularly to the flow of the packaging, printing in the other direction would only use a portion of the ribbon unless it was a tall code or the printer had radial ribbon save functionality. Radial ribbon save allows companies to utilise the entire ribbon width with the caveat that the position of the code will move from product to product within the width of the ribbon.

One of the major benefits of TTO is high resolution content, as most advanced TTO printers can print a resolution of 300 dots per inch (DPI) or 12 dots per millimeter.

TTO considerations and limitations

Major considerations when purchasing a Thermal Transfer Overprinter



Keeping the packaging lines up and running is critical for any baked goods company.

TTO printers must be integrated directly with the packaging equipment. Thus, when purchasing a TTO printer, one should carefully consider the integration of their new TTO printer with their new or existing flow wrapper.

While the function may be the same, flow wrappers from different manufacturers are built differently and can require specialised brackets and other accessories. Therefore, it is important to find a company with the right experience and accessories to complete the integration seamlessly.

Regardless of the margin profile of the product, hitting production targets every day is critical and any unscheduled downtime that stops product from getting out the door should be reduced or eliminated. Thus, baked goods companies should look for TTO printers that have been designed for maximum uptime and a total low cost of ownership. TTO printers can be extremely reliable and require minimal maintenance as compared to other coding technologies, but some TTO printers maximise the use of ribbon in the printer which leads to ribbon savings and reduces downtime required to replace the ribbon on the line. Additonally, the time between changes can be increased with the use of longer ribbons, and since ribbon replenishment will be required for any TTO printer, one should choose a printer that makes ribbon replacement easy.

Speed limitations for TTO

There are very few baked goods products that are flow wrapped at very high speeds. However, some limited products exceed the speeds of what TTO is able to achieve. Linear speeds greater than 1,000 millimeters per second and pack rates greater than 350 packs per minute are at the extremes of most TTO capabilities.

This speed limitation is primarily caused by the print cycle time, which is the physical time it takes to print a single code and then be ready to print the next code.

Various processes have to be undertaken within the TTO printer unit to ensure consistent and accurate control of the complete printing process and this can lead to small packaged goods on a flow wrapper being ready to accept a print too quickly for the TTO printer.

TTO, however, is not the only option for coding on flow wrappers.

Beyond the speed limitations of TTO, two other digital technologies can be used to meet coding requirements for flow wrapped products: CIJ and Laser.

Unlike with TTO, CIJ and Laser Marking Systems can code on the packaging either before or after the product is wrapped. Coding ideally occurs before the film has been formed around the package where control of the film is greatest. Installation of the CIJ printhead or Laser Marking System within the wrapper can be challenging but the reward is the best print quality and precise code positioning. Many CIJ printers have custom head mounting and configurations such as 90° bends on the printhead to accommodate machines with tight clearances. Similarly, many Laser manufacturers offer accessories such as beam turning units and specialised brackets to integrate with flow wrappers.

Once products are packaged, they tend to be conveyed without strict guides. Variation in product positioning such as distance from the printhead and the laser and variable speed can affect print quality and positioning.

While printing post wrap on the conveyor may not be ideal, CIJ and Laser Marking Systems are tolerant of some variation in distance and substrate variation. In addition, printing on the conveyor is typically easier to integrate into the machine because there are less obstructions or other machinery to get in the way.

Finally, CIJ and Laser coding are usually in the direction of the movement of the film and will be oriented parallel to the inline seal (lengthwise). This often provides a very narrow window to print in and therefore, it is critical to have the product in the same position every time.

Continuous Ink Jet (CIJ)

How Continuous Ink Jet Printers work and their benefits

CIJ can keep pace with high speed flow wrappers

With CIJ, printed characters are made up of individual ink drops. The motion of the product or film provides one axis (length) of printed characters and the printhead provides the height axis by applying different charges on the drops and causing them to hit the film at different points. This method of marking is used most often to print alphanumeric codes such as expiration dates or manufacturing data. Matched with application specific inks and solvents, this type of printer can be used on nearly all types of package types and speeds.

In general, CIJ is the most versatile of all of the digital types of printers described in this white paper and, therefore, can be used on a wide variety of packaging types and equipment in the facility.

Major considerations when purchasing a Continuous Ink Jet printer

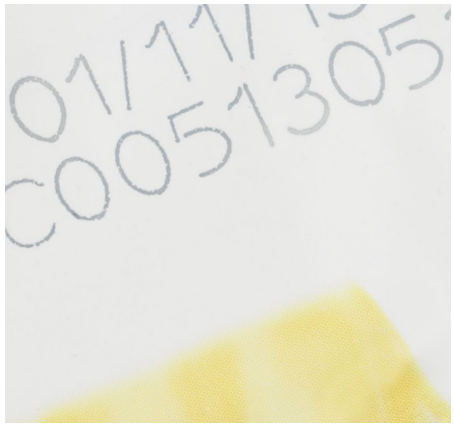
One should choose a CIJ printer with easy and predictable maintenance and that allows for long run times without even handling the printer.

Picking the right printer is only part of the solution. Picking the right ink is just as important. Different package types and production environments require different types of inks. Some inks are environmentally friendly and can be found in different colours. Some are water resistant and others have special characteristics such as 'UV readability' inks.

There are a number of ink characteristics to consider. Therefore, it is important to pick a supplier with the experience and a comprehensive selection of inks to meet the specific needs of an application.

The state-of-the-art in CIJ technology has advanced rapidly in the past 5 years with step-change improvements in reliability and uptime.

Laser Marking Systems



How Laser Marking Systems work and their benefits

Laser Marking Systems mark on products in one of three ways: by ablation or removal of the surface coating revealing what is underneath, by colour change of the material or by exciting an ink with the Datalase® pigment to change colour.

Codes marked with a steered beam (or 'scribing') Laser are solidly filled. This code is visually different than a code from a CIJ printer which forms characters with a dot matrix.

In addition, codes are permanent. The code is resistant to most abrasions and solvents and marks can only be destroyed through physical removal of packaging material.

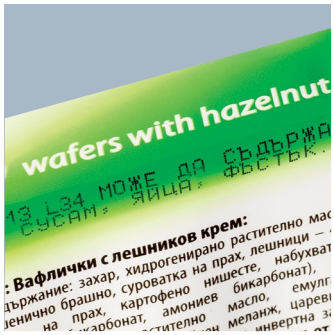
Finally, minimal operating costs can lead to a comparable total cost of ownership when compared to ink jet technology due to the lack of consumables and reduction in labour and downtime due to infrequent maintenance events.

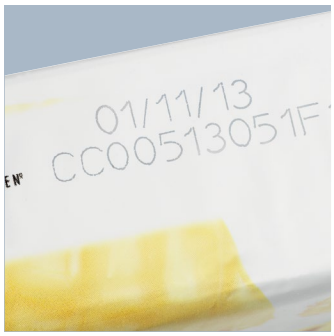
Major considerations when purchasing Laser Marking Systems

Integration with a flow wrapper optimizes performance and can require additional accessories such as beam turning units, specialised brackets and fume exrtractors. It is important to pick a supplier with the right accessories and deep industry experience to successfully integrate the Lasers into a flow wrapping machine.

Unfortunately, while the marking systems can keep up with the high speed lines, the systems cannot mark on all type of films. Typically, on metallized foil, it is possible to ablate the laminate or the ink on the laminate but it is usually not possible to use a Laser on polyethylene film. Additionally, it may be possible to reverse print a Datalase® patch between two layers of a multi-laminate film which can be excited to change colour without disturbing either laminate and eliminating the need for an extraction system commonly used with the ablation method.

Every application though should be evaluated on a case by case basis. Therefore, it is recommended to provide film samples to a coder supplier for testing and work closely with their representatives to determine if Laser marking is the right solution for an application.





Whether flow wrapping large trays of cookies at 95 products per minute or individual pastries at 400 products per minute, there are three digital coding solutions to meet the needs of many bakery applications.

TTO is an ideal coding solution for flow wrapping and works well on the majority of these products. TTO printers produce high resolution codes with no solvents and no mess on flexible film. For those applications that exceed the speed limitation of TTO, CIJ and Laser can satisfy most coding requirements. CIJ is the most versatile coder and can print on almost any packaging type and in any production environment, but requires ink and solvent and produces a lower quality code than TTO and Laser. Lasers produce clear, consistent and permanent codes with limited consumables but are not able to be used on every packaging type.

Every packaging application is different and may have special requirements that lead to the use of one technology over another. It is important to understand the unique demands of the application and the benefits of each technology before determining which coder is best.

Work closely with a coding equipment manufacturer for guidance on these different technologies, sample testing or a production line audit.

Peace of mind comes as standard

Videojet is a world leader in industrial coding and marking solutions, with more than 325,000 printers installed worldwide. Here's why...

- We leverage over 40 years of globally gained expertise to help you specify, install and utilise the most cost-effective solution; one best suited to your operations.
- We deliver a wide range of products and technologies that deliver tangible results across an extensive range of applications.
- Our solutions are highly innovative. We are committed to investing in new technologies, research and development and continuous improvement. We stay at the forefront in our industry, to help you do the same in yours.
- We have earned a reputation for both the long-term reliability of our products and excellent customer service, so you can choose Videojet and relax.
- Our international network includes more than 3,000 staff and over 175 distributors and OEMs, in 135 countries. So wherever and whenever you're ready to do business, we're ready to serve.

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