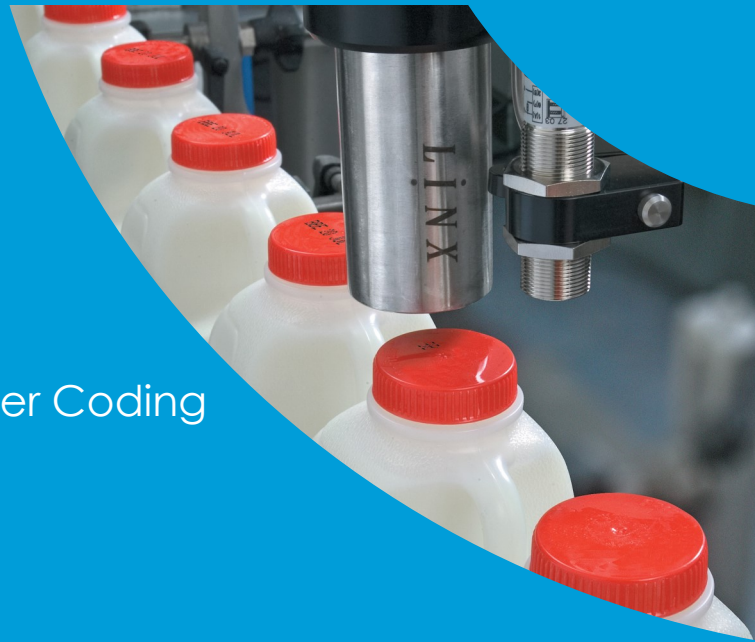



Coding for Safety & Traceability in the Food Supply Chain



A Comparison of
Continuous Inkjet and Laser Coding

   **Diagraph**
   An **TW** Company



“According to Grocery Manufacturers Association in the U.S., the financial impact of a recall is quite significant:

52% of all recalls cost over \$10M and 23% cost over \$30M.”¹

- Food Safety Magazine

Quickly recognizing and rectifying a food product recall can minimize major financial and public safety consequences. Without proper systems in place, the impacts could be damaging to your reputation, your finances and the health of your customers.

Product identification, in the form of date codes, lot codes and batch codes, is a crucial step in the supply chain -- one which is necessary to trace and recall defective products.

FSMA guidelines are driving towards total transparency in food product ingredients, with consumers expecting to know where their products originated from “farm to

fork”. This whitepaper will compare the merits of two automated marking and coding solutions – continuous inkjet and laser coding – and how these solutions stack up against product traceability goals and consumer expectations.

¹ Source: <http://www.foodsafetymagazine.com/enewsletter/the-importance-of-food-traceability/>

² Source: <http://www.foodsafetymagazine.com/enewsletter/traceability-and-food-safety-in-produce/>



“According to data from the U.S. Centers for Disease Control and Prevention, approximately 48 million people get sick each year from a foodborne illness, while another 128,000 are hospitalized.”²

-Food Safety Magazine

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WHAT IS CONTINUOUS INKJET CODING?

Continuous inkjet (CIJ)

is a form of non-contact printing. With a wide range of inks, CIJ printers can mark alphanumeric and barcodes on virtually any surface - porous or non-porous, flat or curved surfaces - through electrically-charged ink droplets. Because of its versatility, CIJ is a preferred option for manufacturers with high speed production lines running a variety of different packaging types.



COMPARISON OF KEY CIJ & LASER FEATURES:

Packaging Considerations

	Continuous Inkjet (CIJ)	Laser
Substrates	Plastic bags and pouches, glass, metal cans, flow packs and shrink wrap	Glass, plastics, papers and rubber
Consumables	There are a variety of inks available with different adhesion properties as well as colors.	Laser does not use inks or solvents, making it a greener solution.

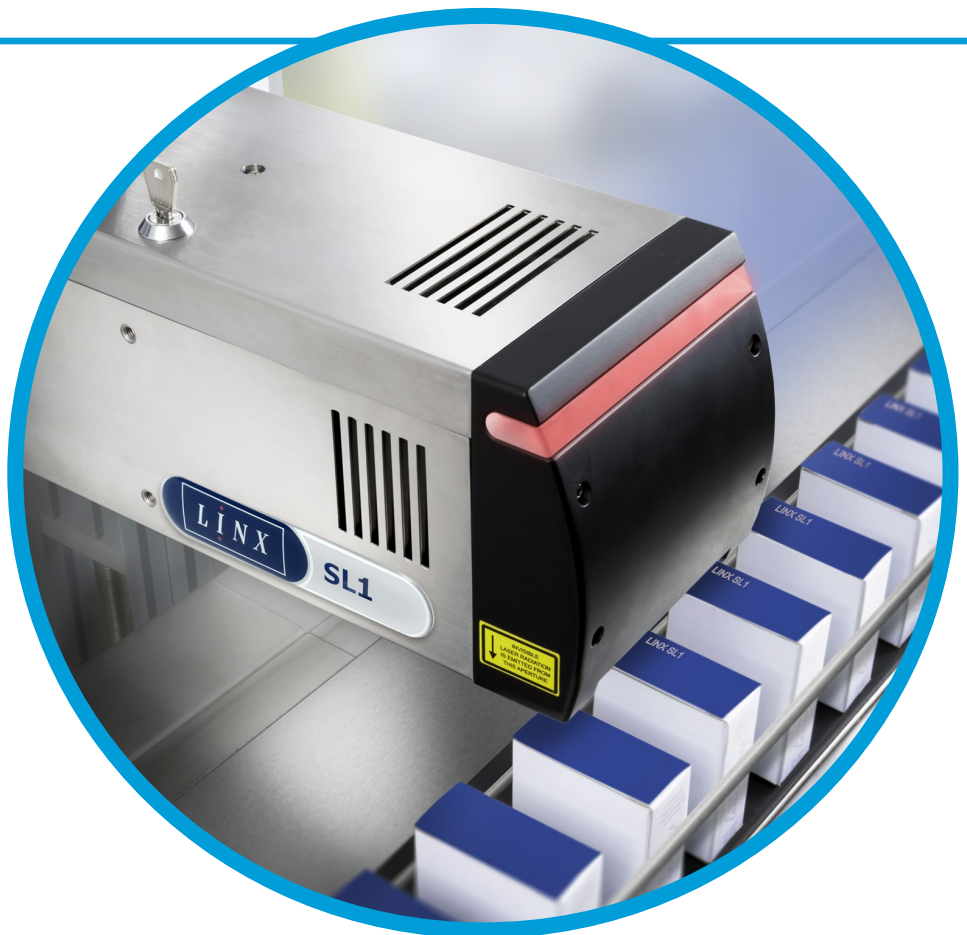
COMPARISON OF KEY CIJ & LASER FEATURES:

Mark Considerations

	Continuous Inkjet (CIJ)	Laser
Mark Permanence	Ink is not guaranteed permanent, but does create durable marks.	Can produce a permanent mark on many substrates.
Mark Contrast	Creates high-contrast, visible marks using ink.	Will create low-contrast codes on light colored or clear plastic or glass packaging.

WHAT IS LASER CODING?

As another form of non-contact printing, **laser coding** creates a permanent mark making it a great option to prevent counterfeiting. This method is more environmentally-friendly because it does not require any inks or fluids. While the initial investment costs for a laser printer are more expensive than the entry cost of a CIJ printer, the trade-off is no costs for ink consumables. Certain safety precautions are also a consideration for your production environment if operating a laser.



Create Permanent, Readable End User-Facing Codes

There are various stages of handling in the supply chain process, so it is crucial that once an identification code has been printed onto a product, like a jar of peanut butter, the unique lot, batch or “Best By” code remains legible on that jar.

You'll want to ensure that your message (1) adheres to the product packaging and (2) is visible and legible for consumers.

Different printers are required for printing on different packaging types. Continuous inkjet (CIJ) will offer the widest range in the variety of packaging substrates that it can print on including plastic bags and pouches, glass, metal cans, flow packs and shrink wrap. There are a variety of inks available with different adhesion properties as well as colors, to achieve durable marks. The ink is quick drying, and the variety of colors nearly guarantees



that printing will be high-contrast against any color packaging for easy customer readability.

Laser will make a permanent mark in most materials, including glass, plastics, papers and rubber. A permanent mark ensures against counterfeiting. Because lasers do not utilize ink, depending on the packaging type, you may not be guaranteed a high-contrast mark. For example, printing a lot code on a clear plastic jar would not offer high-contrast if etched with laser as compared to black ink from a CIJ printer.

If the coding on the peanut butter jar line is inconsistent or not marking the unique, identifying product information properly, the financial and health risks increase in the event the batch is found to be defective.

Consider your packaging substrate when you're choosing between CIJ or laser:

- ▷ Is it porous or non-porous?
- ▷ Light or dark-colored?
- ▷ Is it a curved glass jar or a flat carton?

This criteria will be a large determining factor in your decision.

▷ Laser Expiration Date on Sachet Pack



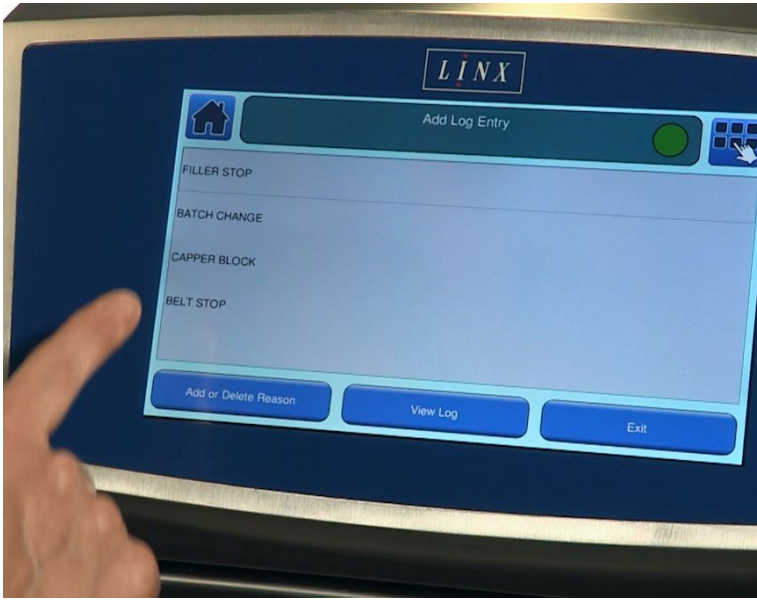
“If your product coding is inconsistent or not marking the unique, identifying product information properly, the financial and health risks increase in the event the batch is found to be defective.”

Simplify Print Message and Product Changeovers

End users must be able to clearly decipher information like the date code, lot code, batch code and expiration dates, but it is the job of the production line worker to have the correct code on the correct products to make that data meaningful. Leading automated coding solutions have capabilities to simplify this process by storing multiple messages and creating unique, variable codes that can assist in the tracing of products from farm to fork.

Both CIJ and laser have wide ranging capabilities with regards to message storage and configuration with different production line settings – aiding the process of tracing a product through the





supply chain process.

With CIJ, top printers store up to 1,000 diverse SKUs with the ability to pre-program custom line settings with a meaningful name such as “Beans” or “Milk” for easy, mistake-free product changeovers. Laser solutions with message preview abilities allow you to quickly browse and select the right message every time for error-free coding.

It is essential for internal tracing as well as a customer expectation to have correct, specific codes on all food goods. Consider the time and money lost when rework is needed to correct a mistake in a production line – especially if you run lines for a variety of products. Look for solutions with icon based software to make message creation and selection simple.

“Simplify the automated coding process with capabilities for storing diverse SKUs and pre-programming custom line settings. These features are instrumental in putting the right code, on the right products for end user traceability.”

Code as Part of the Safety Process

In certain cases, your external coding can work for you as an indicator that your products have completed a process, like in retort canning. This is mainly accomplished with functional or specialty process-specific inks like thermochromic ink – available for some CIJ printers. Thermochromic ink changes color when subject to wet heat conditions – common in sterilization and retort canning processes – to indicate that products have completed a process. In addition to this visual verification feature, the ink adheres to metal cans and even oily surfaces to ensure codes remain intact throughout the process.



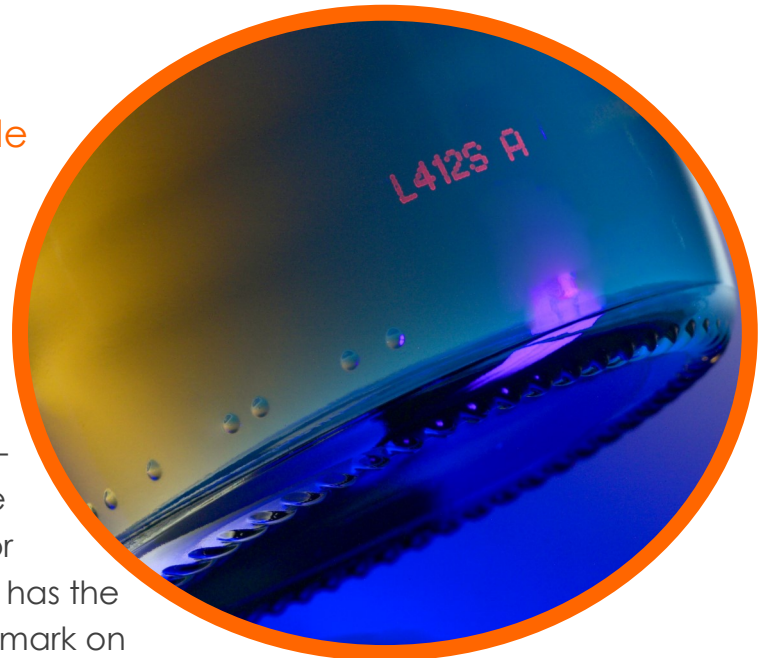
Special products and packaging require codes for internal track and trace, or codes that are only meaningful to the producer, to identify origin or verify authenticity.

Security inks that fluoresce only under UV light, but otherwise create nearly invisible marks, have been developed for CIJ to use on high value products, like alcohol and pharmaceuticals. This discreet coding considered an unobtrusive and secure way to track

▷ UV readable
security ink

products through the production and packing process. Laser can also create low-contrast discreet marks that do not interfere with the integrity of the packaging design or distract from consumer-facing codes. Laser has the benefit of creating a subtle yet permanent mark on packaging – especially on more high-end packaged goods like olive oil or liquor bottles which are subject to counterfeiting.

Ask yourself whether you think a functional or specialty ink could help streamline the verification of a completed sterilization process in your products. Canning manufacturers, for example, may want to consider CIJ with a thermochromic ink to accomplish their coding and take preventative safety measures. If your products are high-end and subject to counterfeiting, laser coding is a great solution to create security codes that protect the reputation of the brand and protect consumers from fraudulent foods that cannot be accurately traced.



▷ Low-contrast
discreet laser marks

Conclusion

In summation, there are many factors to consider when evaluating whether continuous inkjet or laser coders will best support your product identification needs and food safety requirements. For manufacturers running at high speeds who require durable batch, lot and date codes on a variety of packaging surfaces, CIJ would be an ideal solution. A benefit of CIJ is that the solution offers a range of ink varieties which adhere to porous and non-porous surfaces and create high contrast marks. However, the drawback of ink is the ongoing cost and potential for messy spills. Laser, on the other hand, requires no fluids for an environmentally-friendly option. Laser coding is a perfect option for high-end premium items that require internal tracing codes to verify authenticity due to the permanent marks it creates on many packaging surfaces.

It is important to find the right marking and coding solution supplier that not only improves operational efficiencies, but has a deep understanding of traceability goals and safety in the food supply chain. This allows you to keep your time and resources focused on meeting your preventative food safety guidelines. Questions about automated coding? We are honored to be your go-to resource for all things marking and coding. Contact Diagraph today to discuss the best options for your food operation.

About Diagraph

As a leading provider of marking and coding technology, Diagraph works with food and beverage manufacturers of all sizes across the country to comply with food safety requirements and traceability goals. Diagraph manufactures batch coding and date coding technologies that span the entire packaging line — from primary product to secondary packaging all the way to pallet labeling.



1 Research Park Drive | St. Charles, MO 63304-5685 USA
+1 800 722 1125 | Diagraph.com