



Take advantage of laser marking benefits

Achieve higher uptime, reduce maintenance, and improve mark legibility



Laser marking technology offers many benefits to dairy producers.

This white paper is intended to help dispel many of the myths surrounding laser marking on dairy containers, and the integration of laser marking into dairy production lines.

Dairy packaging materials interact quite differently with laser marking technology depending on the given material and the laser type. The selection of the optimal laser solution depends on understanding these interactions.



Contents

The importance of container materials	4
Aseptic containers: a compelling laser marking opportunity	5
Marking on HDPE bottles and jugs	6
Multiple marking solutions for metal containers	8
Lasering paperboard	9
Film marking benefits	10
The many benefits of laser marking technology	12
Things to consider when implementing a laser marking solution	14

Meet the demands for more accurate and legible product identification

Dairy is at the forefront of packaging innovation. To meet the diverse and changing consumer appetite for dairy products, producers are constantly innovating new products and packaging designs.

While driving growth, these innovations create coding challenges from more product changeover and smaller packaging sizes, to creating contrast on more colorful and intricate packaging design. Leading in this market requires addressing these challenges while improving efficiencies and eliminating production mistakes.

The importance of container materials in laser marking applications



Laser marking is growing in popularity among dairy producers because of its simple operation and inherent reliability.

Among the more common myths, some have believed that laser coders are fundamentally too slow to keep pace with today's packaging lines. Other myths include the mistaken belief that lasers are damaging to barrier materials, challenging to integrate, or simply incapable of marking on multiple items simultaneously. New laser solutions dispel these myths and provide greater flexibility to today's packaging professionals.

Obviously, the container material is selected based upon the product, the anticipated customer use, and your company's marketing needs. The laser coder selection needs to incorporate this material as the primary selection factor. And like other production equipment, factors such as line speed, throughput, and required mark content and size also dictate the optimum laser selection. Not unlike different inks in an ink jet coder, lasers can be selected with a given wavelength, energy (beam) source,

and power output level which combine to produce different results depending on the given container material and production line factors. The right coding and marking partner can help your team select the best laser solution for your application including laser type, wavelength, power, lens and marking head. It is worth considering working with a partner that offers a broad range of laser types, power outputs, and wavelengths to assure you have the full complement of options from which to choose. Like all coding and marking applications, it is critical that a specialist from your laser solutions provider performs testing to identify the best solution for your specific application..

Let's review how to mark with laser on some of the most common container materials used in dairy.

Laser is a compelling choice for marking aseptic packaging

Laser benefits

Laser mark legibility makes it easier for consumers to read, and the marks are permanent on the container. Laser marking can contribute to a cleaner dairy environment by eliminating fluids associated with other marking technologies.

Integration

Because of the production characteristics of the filling equipment, most aseptic container marking occurs on the conveyance system after filling and sealing. In washdown environments, an IP65 rated laser can save time and money by remaining in place during the washdown process.

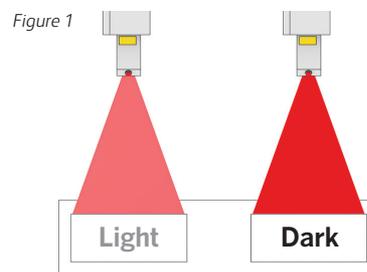
Marking directly on the container

Lasers mark by ablation (the etching of a minute amount of the packaging material) of the carton's top ink layer. The optimal laser solution is built from the proper combination of lenses, marking heads, and laser wavelength to image the mark at the preferred line thickness with the lowest required marking energy. Because small differences in configuration can yield big differences in performance, configurable laser solutions are an absolute must to create the optimal mark on the given material.

Marking on a Datalase™ patch

An alternative approach to marking directly on the container is to incorporate a laser receptive pigment, like Datalase™, into the top coat ink. This pigment is typically only applied to a small area, or patch, where you want to mark. The laser energy interacts with the pigments and changes color at lower power levels than the ablation method.

Controlling Datalase™ optical density for the best mark legibility



The Datalase™ pigment is mixed with ink to create a laser receptive field. The optical density of the marked image is controlled by the amount of Datalase™ ink on the package and by optimizing the laser settings to activate the ink. As shown in Figure 1, the more laser energy applied, the greater the number of pigments that are activated, and the darker the resulting mark.



Laser myth

Lasers can damage packaging integrity which makes laser marking a non-viable solution for dairy applications.

Dispelling the myth

The key to using laser coders on aseptic packaging is to build a specific laser configuration comprised of the optimal focal length, laser power, wavelength and laser spot size to properly mark while maintaining package integrity.

Marking on HDPE bottles and jugs



Laser benefits

Relative to ink-based printing systems, laser marking offers two advantages concerning cleanliness and code permanence. Laser marking does not degrade the overall cleanliness of the production environment provided a fume extractor is used to address any fumes and/or dust from the ablation process. With regards to code permanence, the laser physically alters the substrate and provides a level of code protection for applications where the code may be subject to abrasion.

Integration

Because of the production characteristics of the filling equipment, most aseptic container marking occurs on the conveyance system after filling and sealing. IP65 lasers capable of operating in wet, washdown environments will help improve your production uptime.

Marking directly on HDPE

Directly marking HDPE is impractical for consumer-facing identification information, like expiry information. The marked information is difficult to read because it has a very low contrast against the plastic. It is, however, acceptable for plastic traceability applications.

Marking on labels applied to HDPE

Laser marking on labels applied to the container removes the top ink layer, exposing the base label material resulting in a high contrast, legible mark.

Self-adhesive labeling integration

The best mark legibility and mark placement repeatability is achieved when the laser is integrated into the label applicator and marking occurs while the label is stationary prior to being applied.

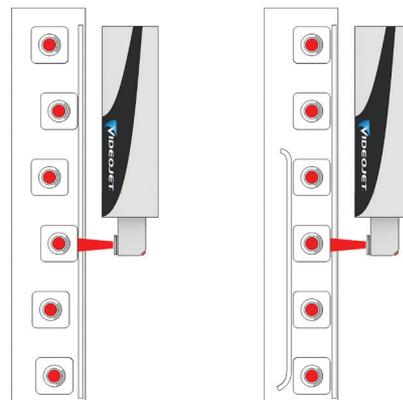
Glue labeling integration

If your application uses cold or hot glue labels, then it's recommended to mark prior to application on the container. This will help ensure that the mark placement is accurate and legible. Label swim could detract from mark legibility and location repeatability if the label is marked after it is brushed onto the container.

Conveyor line labeling integration

Marking on the label as the container is moving on the conveyor is a viable option. However, it's important to remove the variation in production positioning while moving down the table top conveyor.

Excessive side-to-side container movement may move the label in and out of the laser's focal point resulting in sub-optimal mark legibility. It is recommended to guide the containers to one side of the conveyor to better control the distance between the laser and the container.



Positional variation in unguided containers

Consistent positioning in guided containers

Container curvature and mark legibility

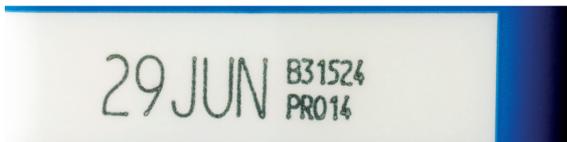
Marking on a curved container can be challenging for other technologies because the effective marking distance changes along the curvature. With laser technology, it is possible to select a lens with a longer focal distance. This distance allows the laser to stay in focus on the material and therefore, accommodate moderate fluctuation in product position and shape.

Marking on sleeves

Some producers, following the market trends of convenience and product branding, are using sleeves to brand products. In this case, a Datalase™ laser-sensitive patch of ink is applied to the inside surface of the sleeve when the sleeve is produced. The patch is marked and then the sleeve is applied to the container, trapping the marked information between the sleeve and the container, which protects it from abrasion and damage. You can also mark on multiple sides of the container with sleeve applications.

Sleeve marking integration

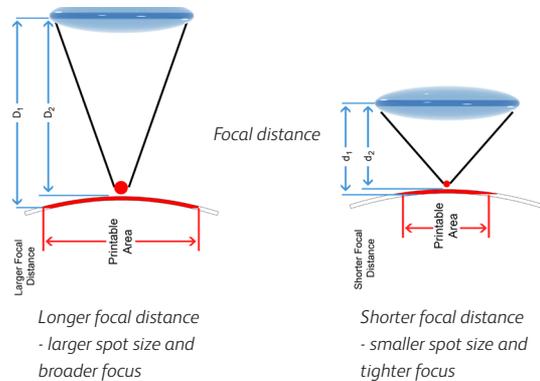
Sleeves are marked prior to entering the bottling process. Sleeve marking requires high-speed lasers because of the higher material speed that occurs after a new roll of sleeves is spliced into the machine. To meet speed requirements, it is important that producers select a laser capable of printing faster than the average material speed to accommodate material acceleration as a new roll is spliced into production.



Laser marking on sleeve using Datalase™

Optics - beam delivery

A larger focal distance accommodates more product curvature.



Longer focal distance
- larger spot size and
broader focus

Shorter focal distance
- smaller spot size and
tighter focus

Laser myths

Laser struggles to mark labels and sleeves at production speeds and is challenged when marking on curved surfaces.

Dispelling the myths

When marking on labels or sleeves, laser can meet typical production speeds, and with the use of Datalase™ inks the marking speed can be increased. With laser's greater depth of field, the optimum marking point can follow the curvature of typical dairy containers; producing highly legible marks.

Multiple marking solutions for metal containers



Laser benefits

Laser marking on metal cans offers the benefits of high permanence, high legibility, and accurate code placement.

Marking directly on metal

Direct metal marking is typically seen in applications which require traceability and a high degree of mark permanence. With the correct laser wavelength for the can material, direct marking is relatively straightforward. Producers who have adapted this solution find that coding on the bottom of the can offers an ideal coding location and easy code visibility.

Marking on an intermediate material

Some producers have adopted marking on a round patch of ink applied to the bottom of the can. This enables the use of a non-metal marking laser with the benefit of a high contrast mark, which can only be removed if the ink is removed.

Integrating direct can or ink marking

Most often cans are marked as they are being transported through the filling process. As with all conveyance marking applications, mark legibility is improved when the cans are stable and registered.

Marking on wrap-around labels

Wrap-around labels are an ideal marking material. Marking on these labels is similar to other label marking applications. It is best to mark on darker inks for higher contrast marks.

Wrap-around label marking integration

Marking in the label applicator will result in the best mark legibility and more consistent mark placement.

Marking on the label as the can is moving on the conveyor is possible. However, movement stability on the conveyor and product rotation might impact mark legibility and placement.

Laser myth

Consistent marking on metal cans is complicated because of the cans' unpredictable movement.

Dispelling the myth

Laser marking on the bottom of the can provides an ideal, consistent, and permanent marking location. Integrating laser into the wrap-around label applicator also provides very consistent mark placement by synchronizing with the label application.

Lasering paperboard produces great looking, easy to read marks



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Laser benefits

Laser marking directly on colorful paperboard package designs produces highly legible marks. Lasers can mark in any orientation, can cut through light condensation, and can mark with fonts that better match your product's branding or other pre-printed consumer information such as nutritional data.

Paperboard cartons are ideal laser marking containers

Lasers will reliably ablate the ink off the carton and expose the paperboard below. Laser ink removal will generate minor particulate debris removable via a filtered vacuum system. Removal of darker colored inks produces higher mark contrast. Water based inks will take longer to ablate because the ink is typically thicker, while solvent based inks are typically thinner and faster to mark.

Marking speeds of 50ms for the mark shown above are achievable with moderate power lasers. Both higher mark speeds and lower particulate debris can be achieved using laser sensitive pigments, like Datalase™. These pigments are marked on a specific location on the paperboard and will change color when exposed to laser energy.

Integration

The laser integration location is within the carton filling equipment because the carton's movement is under tighter control, which will produce a more legible mark. Integrating the laser marking system within the cartoner also simplifies production setup and helps protect the laser from accidental damage or misalignment.

Conveyor integration

If carton integration isn't possible, the laser can be integrated downstream on the conveyor. As with all conveyor marking, guiding the carton to a consistent distance from laser helps ensure the optimal mark quality.

Laser myth

Laser is fine for simple codes, but it struggles with complex marks at higher speeds.

Dispelling the myth

Complex, multi-line codes are achievable with today's laser marking solutions. However, it is important to work with a laser supplier that offers not only a broad portfolio of lasers, but also a range of lens and marking head options. Interestingly, it is not correct to assume that all lasers of a given power output are effectively the same. In reality, the chosen lens and marking head can dramatically influence the ability of the laser to print the needed code content at the required production speed.

Film marking benefits from laser's multiple item marking capability



Laser benefits

Laser marking on film is growing in popularity as producers discover lasers' many benefits. There's virtually no likelihood for product contamination because there are no fluids, the overall operation is cleaner, and a fixed position laser can expeditiously mark multiple items in multi-lane applications.

Laser power management

The common myth that laser will perforate the film as it marks it is founded on two misconceptions. The first is that the laser energy will simply burn through the film similar to a metal cutting laser. This is untrue because the laser's energy is programmed to only mark on the film's surface, and the amount of energy is spread across a wider marking point to lower the energy density. The laser's settings are password protected to ensure that they can't be inadvertently changed.

The second misconception is that the laser will apply too much energy through sharp transitions, like the letter *M*, or as the laser makes multiple passes over a single point, like the number *8* (see example on the left). This is managed using non-crossing fonts that prevent the laser beam from traveling over the same location more than once.

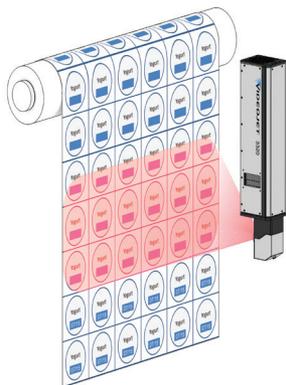
Multiple global producers have adopted laser film marking, verifying laser will not puncture the film material. These producers work closely with their suppliers' regional test facilities to determine the optimal laser and marking settings, and ran comprehensive production tests to ensure expected performance.

Laser's adaptability for multi-lane filling applications

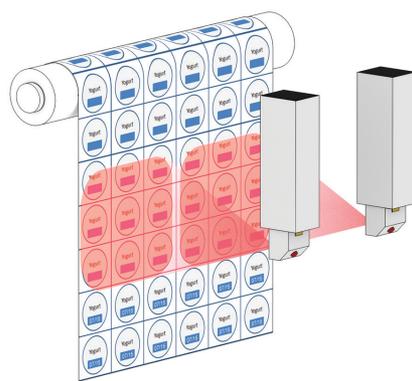
Since many film applications are deployed in multiples across filling applications, laser has the added advantage that it can quickly mark on multiple containers. The larger the field, the more characters can be marked at the same time, which decreases the number of lasers you need, and as a result, reduces your required investment.

Laser integration

Lasers are most often integrated into the filling equipment prior to the film being applied to the containers. For higher speed linear applications, incorporating Datalase™ pigment during film manufacturing will decrease marking time, increasing the number of items marked per minute.



Videojet laser with 450mm marking window



Other lasers with 250mm marking window

The dwell application represented above has 6 items across the web that need to be marked prior to the film indexing to the next position.

A single laser with a larger laser marking field can simultaneously mark up to 18 items.

Lasers with a smaller marking field can only mark 9 items simultaneously, which will require at least two lasers to mark all the items.

Increasing the mark field size requires higher quality laser focusing and beam steering technology; otherwise mark legibility and quality will vary dramatically across the web.

Laser myths

Lasers can be harsh on lidding material; a single laser struggles to mark all items across the film web, and image quality can be inconsistent.

Dispelling the myths

Laser energy is highly specific and controlled. The result is that marking only occurs on the surface of the film, and the integrity of the product being marked is maintained.

With the right lens and marking head selection, a large marking field enables a large number of items to be marked simultaneously at very high mark quality.

The many benefits of laser marking technology

Marking expiry codes, production information, and batch/lot information is common in dairy applications, and typically required by law.

1.

Continuously imaged material produces characters, logos and bar codes with continuous lines. This greatly improves the mark's legibility.

2.

Mark a wide variety of different text styles to better match your packaging styling. This improves your brand image and improves the consumer's sense of quality in your product.

3.

Permanently mark on a wide variety of materials. This permanence helps prevent tampering of your marked information (to help reflect and support your brand's image) and it is important in traceability applications.

4.

Mark in any orientation, even bottom up, for simple production line integration.



5.

Filters are the only supplies required for efficient laser operation. The costs associated with purchasing and storing consumables, and the operating costs associated with keeping printers filled with consumables are eliminated.

6.

Greater uptime because of less ongoing maintenance and operator intervention.

7.

The lack of fluids and marking consumables can create an overall cleaner operation, which is advantageous in food production since it helps eliminate the likelihood of ink-related product contamination.

8.

Fewer environmental challenges – laser is more forgiving in your production environment because it isn't impacted by the temperature and humidity changes common in dairy production environments.

Things to consider when implementing a laser marking solution

Clean operation. Less maintenance. Better brand representation. Consider Videojet.

Leader in laser design and manufacturing

With an extensive portfolio of laser technologies, power outputs, and lens and marking head options, Videojet laser systems can be optimally configured to deliver high performance. This provides your operation with greater uptime and longer laser life. Designed to meet most application marking requirements, our lasers run cooler, therefore, extending their life. Our lasers are also designed to be cooled without the need for compressed air, which saves you money and lowers maintenance requirements.

Exceptional reliability and economical to operate

By their very nature, laser marking systems are inherently reliable and typically very low maintenance. However, the biggest enemy of lasers is heat. Heat reduces laser efficiency and shortens life. Our robust laser designs are intended to be ambient air cooled instead of requiring compressed air to cool the laser. This design philosophy has led us to design air cooled IP65 lasers for washdown environments. These sealed lasers don't require compressed air, which means lower maintenance costs.

Regional customer application and laser specialists

Every application is unique; different materials interact differently with laser energy. When investigating laser's applicability to your specific needs, it's important to test your materials to identify the optimum solution. Videojet's laser specialists will help create the optimal configuration and our test facilities, located around the world, can test and optimize a solution to your materials.



Larger mark fields mark more items and, by design, allow you to use less lasers and minimize your investment

Industry-leading 24 mark fields combined with high resolution marking heads and multiple different focal distance options allow you to mark more items or to mark longer on moving objects. A laser with a larger mark field can mark more items compared to other solutions that require multiple lasers. Our advanced laser design can mark more information on moving items by tracking each item longer.

The Bottom Line:

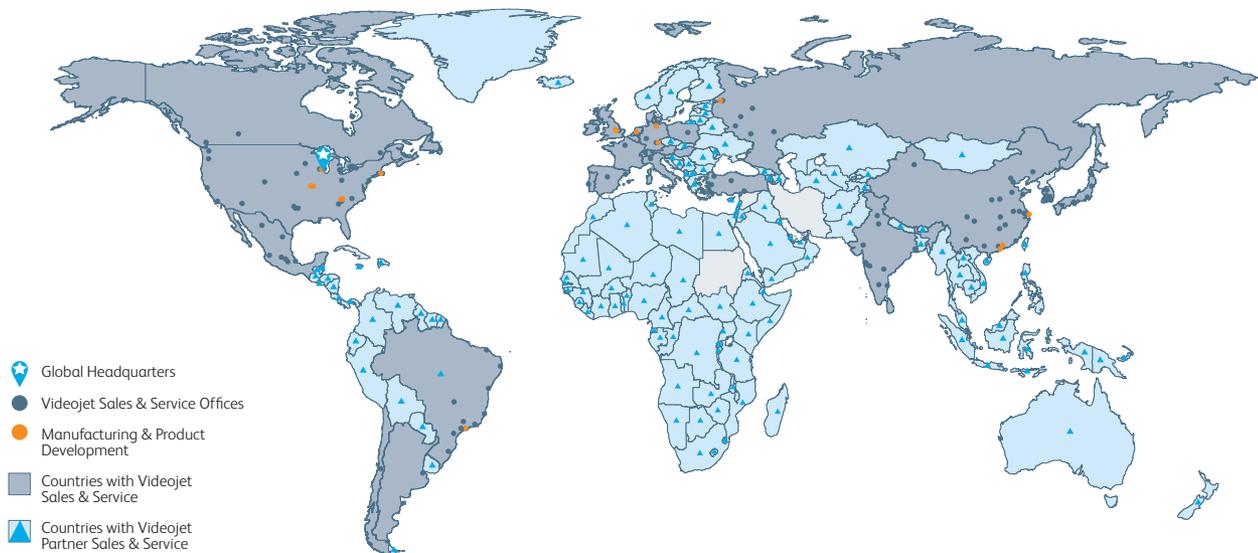
Laser marking is a proven and attractive option to help you enhance operational performance while meeting the growing production demands of your dairy operation.

Videojet, the industry leader, offers exceptionally reliable and easy-to-use laser marking systems that provide superior mark quality.

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 utilize 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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