



## Evaluating the implications of PET lightweighting on the marking of date codes

Laser marking on thinner plastic bottles



**Lightweighting beverage containers has become a powerful means for beverage bottlers and suppliers to contribute to their sustainability goals while reducing direct material and transportation spend.**

This white paper is intended to help explain the implications for laser marking onto lightweighted bottles and provide suggestions for producing clear, readable laser codes.

# Laser marking on PET bottles



The beverage industry, led by bottled water and soft drink producers, has taken a leadership role among consumer packaged goods companies and continues to introduce dramatic lightweighting innovations. The latest “ultra thin” polyethylene terephthalate (PET) bottles are as much as 50% thinner and lighter than they used to be.

What does this mean for coding? The lightweighting of PET bottles has had limited impact on the application of codes with continuous ink jet coding technology, as Videojet ink-based codes work just as well on thin-walled containers as they did on preceding thick-walled packaging designs. For laser coders, on the other hand, the impact has been dramatic. Specifically, thinner walls may sometimes present a risk of traditional lasers burning through the PET, resulting in small holes or creating unsatisfactory weak points. Either condition can result in bottles bursting or leaking when stacked on pallets or retail shelves.

Videojet promptly recognized the danger of burnthrough when bottled water companies were developing the earliest ultra-lightweight PET containers. To prevent burnthrough on ultra-lightweight PET containers, Videojet introduced a novel modification for its laser coders. This specialized laser tube creates a beam with a wavelength of 9.3 $\mu\text{m}$  (“9.3 micron”) rather than the conventional 10.6 $\mu\text{m}$ , enabling Videojet to avoid deep engraving of the plastic surface.



10.6 $\mu\text{m}$  standard wavelength



9.3 $\mu\text{m}$  special PET wavelength

Called the Videojet K-tube, its specialized wavelength delivers a unique interaction with the surface of polyethylene terephthalate. This interaction yields a “frosted” effect on the bottle created by microscopic bubbling rather than deep engraving typical of traditional laser wavelengths. As a result of this distinctive effect, the depth of the laser mark can be reduced by more than 50% versus the mark created by the conventional 10.6  $\mu\text{m}$  wavelength tube. The structural integrity of the PET is thus preserved. (See Figure 1.0)

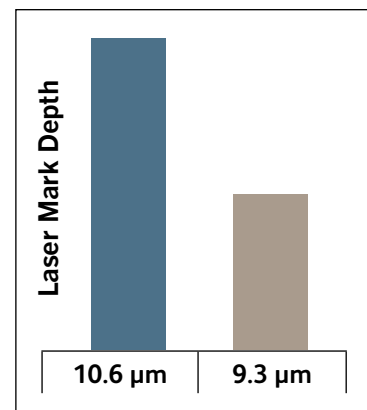


Figure 1.0

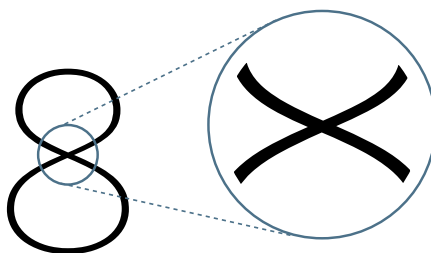


This approach also yields a much brighter and more easily readable code, particularly on clear PET bottles or on bottles containing a light-colored beverage. While traditional laser-engraved codes can be difficult to read on certain bottles or under real-world lighting conditions, the tiny bubbles created by the Videojet 9.3µm K-tube refract ambient light providing enhanced code contrast. The result: easier-to-read codes on both conventional and lightweighted PET bottles.

## Optimizing code formation

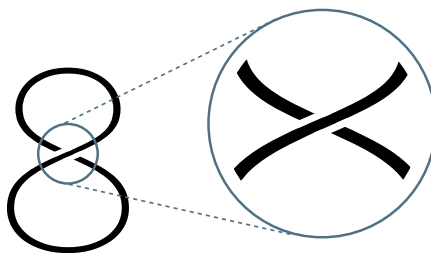
The font used in a laser coder is another important element to consider when marking on thin-walled PET. For example, when products are marked with a conventional scribing laser font, certain points of the PET may be touched twice by the laser beam as it draws characters such as “8”, “B”, “E” or “H”. This can present obvious risks of burnthrough particularly on thinner bottles. A specialized font, such as the Videojet non-crossover font, is one method available to help ensure that the code character formation is optimized for lightweighted packaging. Equipped with the right knowledge and coding system, beverage fillers and container manufacturers can be prepared to mark on even the latest lightweighted bottles.

### Typical Laser Font



*As it draws a number “8”, the laser beam marks the point of intersection twice.*

### Non-Crossover Font

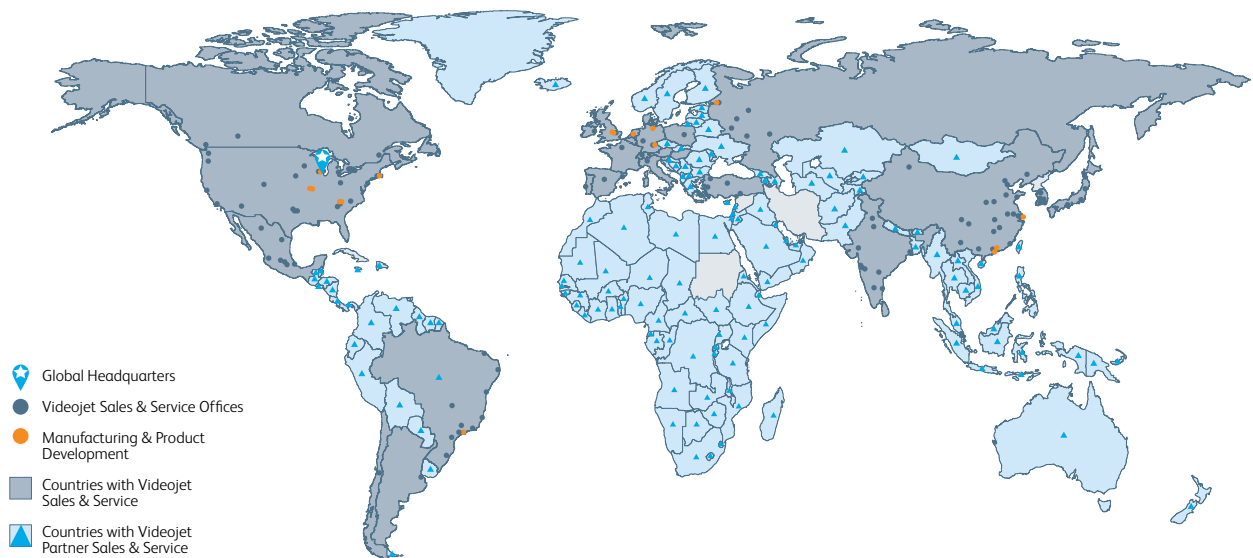


*The laser beam skips over the precise point of intersection during one pass, ensuring that the PET is never burned twice*

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- 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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