



Application Note



Pharmaceutical Implementing High Contrast Codes on HDPE Pharmaceutical Bottles

The challenge

Packaging engineers are increasingly looking to deploy higher quality traceability codes directly on round HDPE bottles. Traditional methods using CO₂ lasers are inadequate since the resulting code contrast is insufficient for automated verification by machine vision systems.

The Videojet advantage

Due to its broad portfolio of laser technologies, Videojet can provide the appropriate laser technology for a given pharmaceutical substrate, resulting in the highest quality traceability codes.

In addition, our long-standing relationships with key pharma OEMs ensure that coder integration details are properly addressed to help ensure successful project completion.

Finding a permanent marking solution for HDPE

High Density Polyethylene (HDPE) bottles remain one of the leading packaging solutions for pharmaceutical products, especially for liquid solutions where the material's flexibility aids dispensing. And while substantially all HDPE bottles are labeled, many pharmaceutical packaging engineers are investigating coding on the bottle itself to aid traceability efforts. The placement of a traceability code on the bottle bottom (versus placing this code on the label) simplifies downstream machine vision reading by eliminating the need to orient the bottle or to deploy more expensive 360° vision solutions.

However, code placement directly on HDPE introduces other complexity since traditional laser solutions (CO₂ and Fiber lasers) cannot impart any contrast on the HDPE material, rendering bar codes essentially unreadable to machine vision cameras.

One of the leading global eye care companies recently approached its suppliers to identify the means to apply high contrast, highly permanent DataMatrix traceability codes on round HDPE dispensers. This customer had strict requirements for permanence, which eliminated labeling from consideration as well as traditional ink marking technologies for fear that marks could be degraded over time due to handling.

Innovative UV laser provides required quality and contrast

After careful consideration of available options, the customer turned to FP Developments to address the project requirements. FP Developments, a leading manufacturer of packaging equipment for the pharmaceutical, biotech, and diagnostics markets, approached Videojet with the unique coding challenge. Videojet Ultraviolet (UV) lasers were selected for the application. The UV laser met the high speed requirements (250 bottles per minute) and offers a distinct advantage over other laser marking technologies. The UV laser creates a dark, permanent, high resolution DataMatrix code against the light-colored HDPE substrate background. UV laser technology features a short wavelength beam of 355 nanometers [or .355 µm (microns)]. This wavelength is in the ultraviolet range of the light spectrum and interacts with the surface of HDPE to create a unique dark mark, unachievable by most other laser wavelengths.

Integration details essential for success

Videojet worked closely with FP Developments to ensure the proper integration of the UV lasers into their packaging equipment. With over 50 years of packaging machinery design experience, FP Developments created a solution that provided very smooth material handling, a prerequisite for marking high quality DataMatrix codes at the specified line throughput. In addition, the Videojet UV laser software included arc compensation as a standard feature. This software feature further increased the DataMatrix code quality by compensating for the trajectory of the product on the rotary material handling device (star wheel). Operational and coding requirements vary among companies, so the ability to easily tailor the system to meet these needs is critical. User-defined parameters and set up options help companies easily achieve their individual level of code detection.



FP Developments packaging solution including Videojet UV laser installation



Star wheel transport for positive bottle control during marking



Bottles being marked on bottom; laser shield shown in black



High contrast UV laser mark on HDPE bottle

The Bottom Line

Most laser technologies used for marking and coding are unable to achieve a satisfactorily visible mark directly on HDPE. However, by employing a Videojet UV laser, pharmaceutical packagers have been able to successfully mark high-contrast codes directly on the underside of HDPE bottles. This mark placement eliminates the machine vision challenge of finding a code marked on the side of a round bottle.

This innovative UV laser solution, coupled with superior material handling, delivered read rates that have exceeded customer expectations.

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