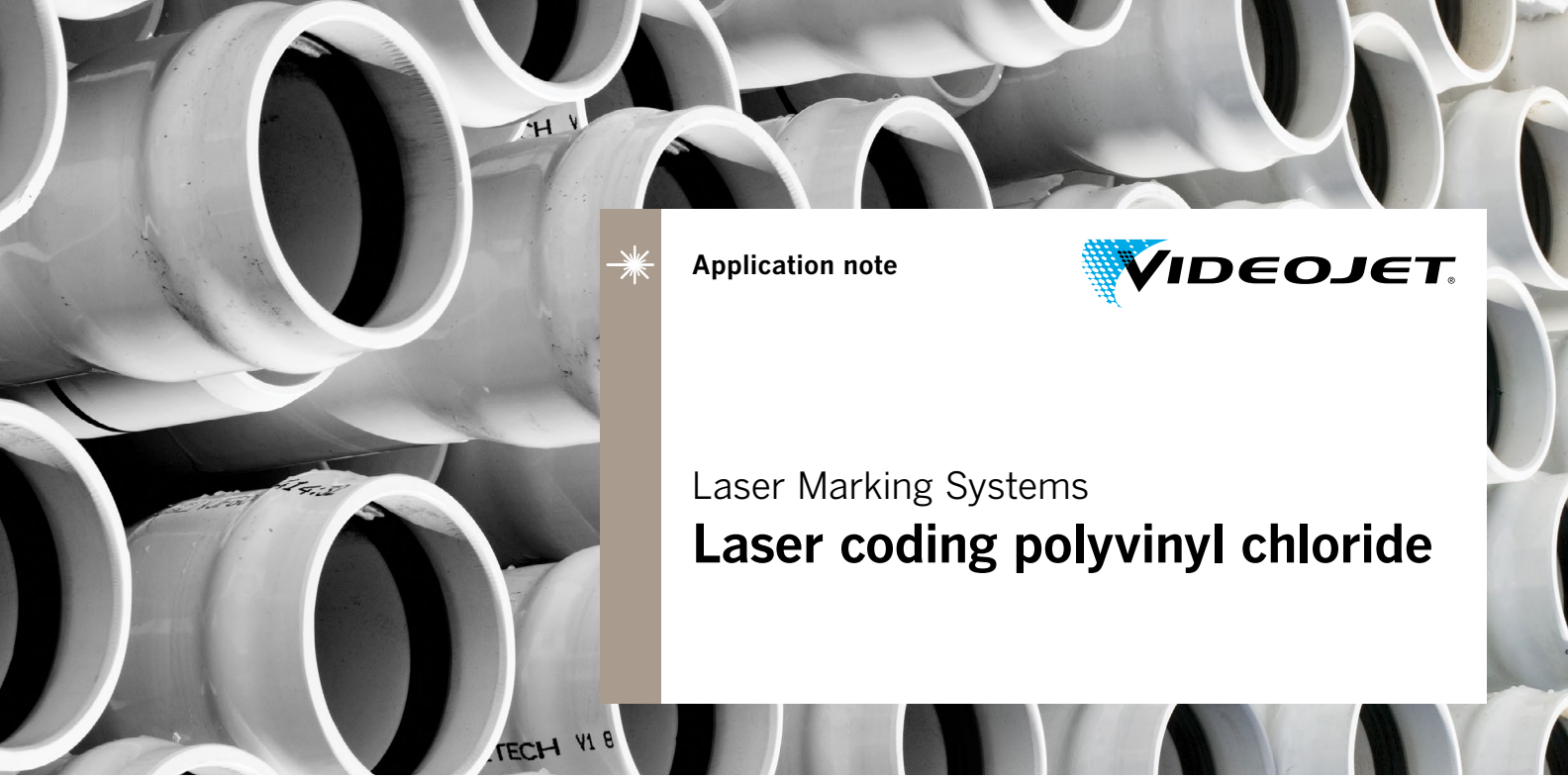

Application note

Laser Marking Systems

Laser coding polyvinyl chloride

The challenge:

Many extruders and molders of polyvinyl chloride (PVC) may be interested in the operational savings associated with transitioning to laser coding of logos, brands and variable data.

However, the chemistry of laser marking PVC presents very unique challenges, risks and benefits. This application note highlights the major issues to consider when evaluating laser coding and marking for PVC products.

Code color and appearance

Pro:

Due to a natural chemical reaction, CO_2 laser marking on PVC produces a unique gold-colored mark, with subtle variations in hue depending on the color of PVC substrate. Codes marked with a steered beam (or 'scribing') laser are crisply defined and solidly filled. Manufacturers of pipes and other extruded or molded PVC products can take advantage of this unique color change to create highly attractive, precise and distinctive production codes, bar codes, logos and other marks.

Con:

Contrast of the gold mark depends on the color of the PVC itself – for example, a gold mark stands out strongly against black or white pipe, but appears more subtle against yellow or orange PVC. Unlike with continuous inkjet technology, it is not possible to alter the color of the code made by laser except by introducing chemical additives during extrusion of the PVC.

Laser coding polyvinyl chloride

Purchase and operating costs

Pro:

The purchase price of a laser marking system can be two to three times the initial cost of an inkjet system. However, minimal operating costs lead to a lower total cost of ownership over time. No inks or solvents must be purchased, held in inventory or changed during production. The absence of printer cleaning and relative infrequency of other maintenance events reduce labor costs. Operating cost savings can be particularly significant in high-throughput production environments.

Con:

Replacement filters for the fume extraction system are an often overlooked operating cost and should be changed on a monthly or quarterly basis, depending on application and operating environment. The laser tube will eventually require replacement, typically once every seven to ten years, depending on operating conditions.

Coder maintenance

Pro:

Laser systems are relatively low in maintenance, with a typical month of production requiring few interventions, if any.

Con:

Laser systems are not entirely 'maintenance-free'. Filters for fume extraction systems must be replaced occasionally at a higher rate than in other laser coding applications due to the volume of fumes and particulates created when marking PVC. Waste residue from marking should also be wiped away from the laser lens periodically to prevent accumulation.

Versatility

Pro:

Variable coding laser systems can produce virtually any type of code or mark, including brands, logos, text, meter marks and more. The laser system can be instructed to draw virtually any logo or design utilizing a simple interface such as Videojet's SmartGraph graphical user interface. Marks are fully variable and can be automatically altered based on time, date, length/quantity of product that has passed or many other variable inputs.

Con:

If printing linear or 2D bar codes, it is important to consider the level of color contrast required to ensure consistent readability across all types of scanners. Videojet can provide sample marks on the actual PVC substrate for evaluation of contrast and machine-readability. The gold mark can sometimes exhibit lower contrast than is achievable by CIJ ink.

Code durability

Pro:

The unique gold effect results from a permanent change to the molecular structure at the surface of the PVC. This will be resistant to most abrasions, sunlight, solvents and weather. Laser marks can typically only be destroyed through physical removal of PVC material.

Con:

None

Environmental/safety considerations

Pro:

An appropriately installed high-volume fume extraction system will suitably address all PVC fumes created during marking.

Con:

Laser marking of PVC releases various toxic substances, most notably chlorine vapor. Employee health and safety depends on effective control of these fumes. Moreover, chlorine reacts with water vapor in the atmosphere to produce hydrochloric acid, which can degrade metals and plastics in the immediate production environment. An appropriate fume extraction system is a fundamental requirement in laser marking applications for PVC and must not be ignored. However, turn-key fume extraction and Plexiglas shielding (for eye protection) adequately address all environmental or safety considerations for marking PVC. Videojet has many years of experience in providing expert installation of this safety equipment.

A laser system will often lower your long-term costs while providing exceptional code quality. Sample testing of your products are important to ensure you'll know exactly what to expect in terms of code appearance. And if you'll be printing bar codes, run tests to ensure you're getting the contrast you need for good machine-readability.

The bottom line

Laser marking polyvinyl chloride presents unique benefits and trade-offs that should be carefully considered.

The decision between using laser marking or new-generation continuous inkjet marking for polyvinyl chloride should be a thoughtful one, and Videojet stands ready to help you think through the best solution for your production line. Videojet's portfolio of lasers is among the broadest and most capable in the industry. With robust CO_2 laser and fume extraction systems optimal for PVC production environments, Videojet has the hardware. And with dedicated laser physicists, technicians and knowledgeable sales engineers, Videojet has the expertise.

Interested in exploring laser coding for your PVC line? Ask your local Videojet representative.

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