

Advanced continuous inkjet technology for micro printing

Drive line productivity in wire and cable applications with up to five times greater uptime



Most manufacturing facilities are looking for ways to streamline production, removing unnecessary waste and cost to maximize efficiency and profitability. This is no different for producers of wire and cable, and therefore any equipment purchased for the line must meet tough criteria to deliver maximum uptime and productivity. In addition, they have the need to apply ultra-small text at very high-speed without losing any print quality.

The latest innovation in High Resolution Continuous Inkjet (CIJ) printing addresses these challenges by enabling high-speed throughput of quality marked product without the unexpected downtime events that have historically presented problems for wire and cable manufacturers.



Contents

Introduction	3
Code content and printing environment considerations	4
Performance and maintenance issues from outdated printers	6
A look at advanced continuous inkjet technology	8

As your market continues to grow, make sure your line is up-to-date with technology that helps you meet your operational and financial objectives

Numerous printer maintenance events — both planned and unexpected — often impact productivity in the wire and cable industries. Advanced High Resolution CIJ technology represents a step-change improvement over mechanical and early-generation variable printing methods. Today's printing technologies help increase printer reliability and quality while extending mean times between scheduled maintenance to reduce downtime and material waste.

New generation CIJ printers have demonstrated uptime (defined in this document as the mean interval between required maintenance, e.g. printhead cleaning) that is up to five times greater than early generation CIJ technology. In addition, the latest innovation for High Resolution printheads allows absolute legibility of codes down to the smallest possible text heights of 0.6mm.



Code content and printing environment considerations

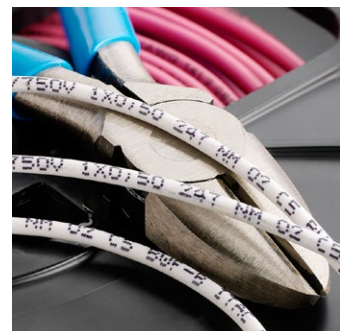
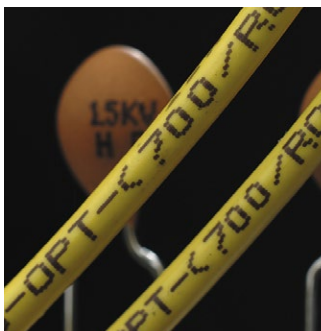
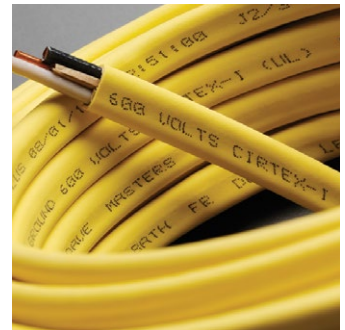
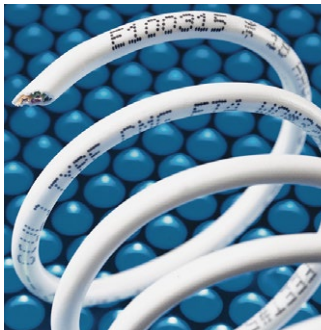


The long and winding code

Printing and marking on wire and cable exists for many reasons. Manufacturers need to identify part numbers, lot codes and production dates. Some codes are needed to meet regulatory compliance, such as listing material composition, electrical insulation rating and resistance to fire.

Others help with product measurement and installation. And some markings serve as the primary means for branding the product with the manufacturer's name and logo.

It all adds up to a lot of printing that is essential to the quality, compliance, traceability and even the brand identity of the product. Regardless of the reason for printing and marking products, this information has to be visible on a wide variety of substrates and withstand the friction of product winding, storage and installation without smudging or transferring. But first, the codes need to get on the product.





It's a tough business

According to Big Market Research, the wire and cable industry is forecast to grow 8.3% from 2014 to 2018. In addition, Market Watch projects the global cable industry to grow from \$205 billion in 2014 to \$297.4 billion in 2019; a CAGR of 7.7%. That's the good news.

The more sobering news isn't news at all. Extrusion businesses are very expensive to operate — more than three times as expensive as the US manufacturing average in the case of wire drawing and insulation according to North American Industry Classification System statistics. Much of the cost is due to the cost of raw materials — something manufacturers have little control over. Labor costs must be paid whether or not product is coming off the line, meaning that any downtime is a serious liability. And the high cost of production machinery also plays a substantial role.

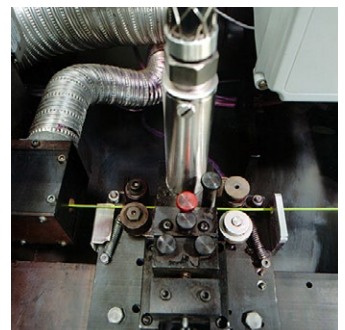
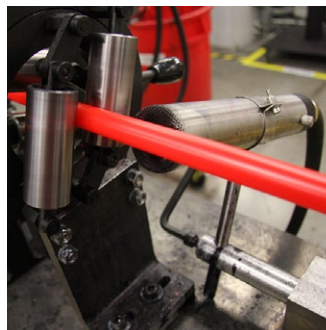
The message is clear: Make sure that new equipment investments are driving production efficiencies to maximize uptime and minimize overall production costs. While it's natural to focus on extrusion, winding and other "core process" machinery, consider that the codes and marks are as much a part of the product as the copper, resin and other material inputs. And if the printing and marking system isn't working properly, the production line is idle.

Demanding operating environment

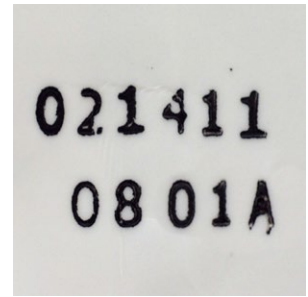
The operating environment in wire and cable production doesn't make the printing task any easier. Facilities are often exposed to external weather conditions that can swing widely with both seasonal and daily changes. The environment can range from hot and dry to cold and damp — and everywhere in between.

High production speeds increase printing difficulty. Depending on the diameter of the product, line speeds can exceed one thousand feet per minute. Electrical static becomes a concern when dealing with product that is moving at high rates of speed. Also, printing quite often happens in close proximity to extremely hot extruder output.

So a printing solution has to be able to work reliably in harsh, fluctuating conditions. And it must be able to keep up with peak production speeds, without unexpected disruption. If the printer fails in any way, the extruder or line isn't going to stop until the run is finished. Then the manufacturer is left with production line downtime, material rework and scrap. The associated costs per event can range from a few hundred dollars on the low end to many thousands of dollars.



Performance and maintenance issues from outdated printers



Many times, the “something” that goes wrong during a run is an aging industrial printing solution. Outmoded marking methods like hot stamping, contact rolling and pad printing require nearly constant maintenance. In addition, they don’t allow for reliable variable printing, such as inserting a different mark at each meter of cable.

When printers don’t keep their commitments

With these older printing methods, something as simple as changing the date requires laborious changeover activities. Worse still, the codes produced are often of low quality and difficult to read — which can unfairly influence the customer’s perception of the underlying product’s true quality.

Early-generation CIJ technologies have proven to be an improvement over those older analog methods. With just the push of a button, a line manager can immediately recall a digitally stored code, thereby reducing changeover times.

Still, these early-generation printers have their drawbacks in demanding operating environments like those found in wire and cable manufacturing. Numerous printer maintenance events — both planned and unexpected — can severely impact productivity.

Early-generation CIJ is susceptible to nozzle blockages due to contaminants introduced through open fluids or air intake in the printhead. Either of these conditions can cause blockage of a digital printing machine’s printhead nozzle, which is only about one third the diameter of a human hair. Even the smallest of foreign particles can clog these nozzles. Suddenly, the printer is no longer printing high-quality codes. It may not even be printing codes at all. Splashback from electrical static and high speeds may create ink buildup which can clog the printhead.



Not all air is created equal

An often-overlooked reliability factor is that plant air compressors can contribute to downtime when using older CIJ printers.

Printers need positive air pressure for two main reasons: to drive the ink through the printer and to keep the printhead clear. Older printers were designed to simply connect to a plant's air compressor systems.

Air compressors often use lubricating oil to operate. That oil can easily contaminate the air being supplied to the printer and may come in contact with the ink. This oil is wholly incompatible with the inks used in printing and marking. And if the compressor is taking in overly humid air, condensation can collect in the air lines and contaminate the ink with water.

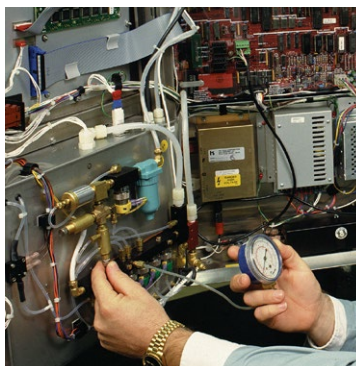
New-generation CIJ printers avoid these problems by incorporating an internal air-compression system, isolating the ink and printhead from any contamination that may be present in plant-supplied air.

The high cost of maintaining low-tech printers

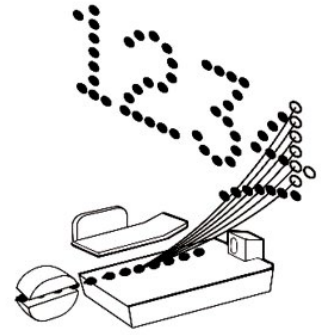
In an effort to avoid unpredictable production disruptions, line managers routinely perform printer maintenance between runs. This, of course, slows down changeovers between SKUs and negatively impacts productivity.

Additionally, with such older technology, this maintenance is fraught with potential problems. Something as simple as replacing inks — a common task — takes on complicating factors that can have huge consequences. In older CIJ printers, the inks and makeup solvents are held in tanks. Beyond the possibility of spilling expensive fluids and creating an enormous mess, there's the very real chance of mismatching inks and solvents or even pouring in the wrong ink for a printer. By the time the mix-up is realized, the damage has been done.

Even just removing a tank's lid carries potential issues. Given the difficult production conditions, dust and dirt from the lids can contaminate the ink and lead to production downtime.



A look at advanced continuous inkjet technology



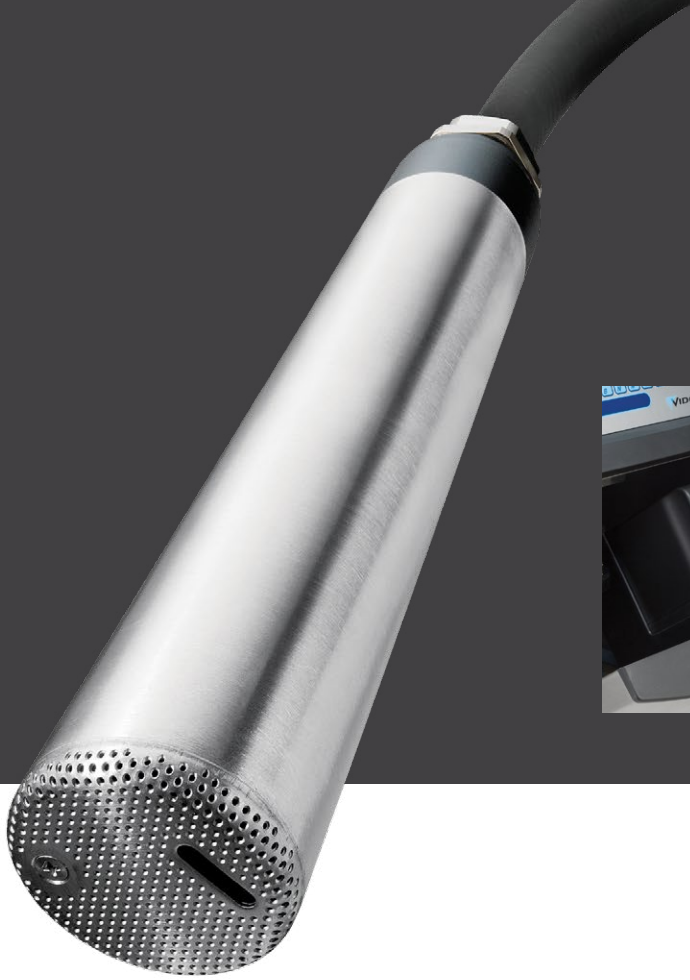
The case for new-generation CIJ technologies

The latest CIJ technology is a step-change improvement over prior CIJ options, which were themselves superior to older mechanical printing technologies.

New CIJ technologies increase printing solution reliability and extend the mean times between scheduled maintenance procedures, increasing production line uptime while reducing product rework and material waste. In laboratory testing, new generation CIJ printers have demonstrated uptime (defined here as the mean interval between required maintenance, e.g. printhead cleaning) that is up to five times greater than early generation CIJ technology.

Manufacturers should look for improved technologies like these to make the printing and marking operation nearly invisible on the production line:

- 1** The newest printhead designs help ensure the highest print quality with minimal cleaning. Perforated designs with increased positive airflow are engineered for reducing ink buildup in high-output, high-static environments like those found in wire and cable production environments.
- 2** Cartridges with built-in intelligence replace messy open fluids tanks. Sealed cartridges deliver the required inks and makeup solvents while eliminating spillage, contamination and flash-off. They also allow for quick fluid replenishment with no mistakes, so line managers don't have to worry about the wrong fluids fouling a printer, bringing down production and requiring a time-consuming and expensive flush of the system.
- 3** Integrated units combine wear parts and filters into a single central module that users can easily replace on one predictable maintenance interval. Once the module is replaced, users can feel confident that their CIJ printer will run efficiently over a specified number of production hours.
- 4** Built-in air pumps insulate new-generation printers from external air compressors, helping ensure a clean, consistent flow of air over internal components and through perforated printheads. This prevents the intrusion of outside contamination in dirty production environments. They also tend to operate more cost effectively than expensive plant air.
- 5** Temperature-sensing devices and internal heaters keep the ink stream at a constant temperature, regardless of ambient conditions, so the ink is more controllable and overspray is reduced. Whether the printer is installed near the extruder or next to a drafty door, it is more likely to operate smoothly and deliver optimum ink drop placement and quality.



Benefits of new CIJ technologies

Transitioning to new-generation variable printing in wire and cable applications brings a host of benefits:

- Fewer touches by maintenance personnel, especially when using high-contrast pigmented inks, can lead to dramatically improved production uptime (particularly compared to analog hot-stamping and roller-coding methods)
- Code content can be varied automatically based on length of wire or cable produced
- Higher quality and greater flexibility helps enable full inline printing of scannable bar codes and logos
- New printers are able to withstand wide temperature swings and difficult operating environments
- Cartridge innovations with built-in intelligence simplify ink management and reduce human errors

Driving production efficiency

New-generation variable printers offer significant and relevant improvements to help keep production moving and keep idle time, scrap and rework costs to a minimum. Wire and cable producers can drive much higher production uptime, throughput and quality when they upgrade from an early-generation CIJ solution to today's advanced technology.

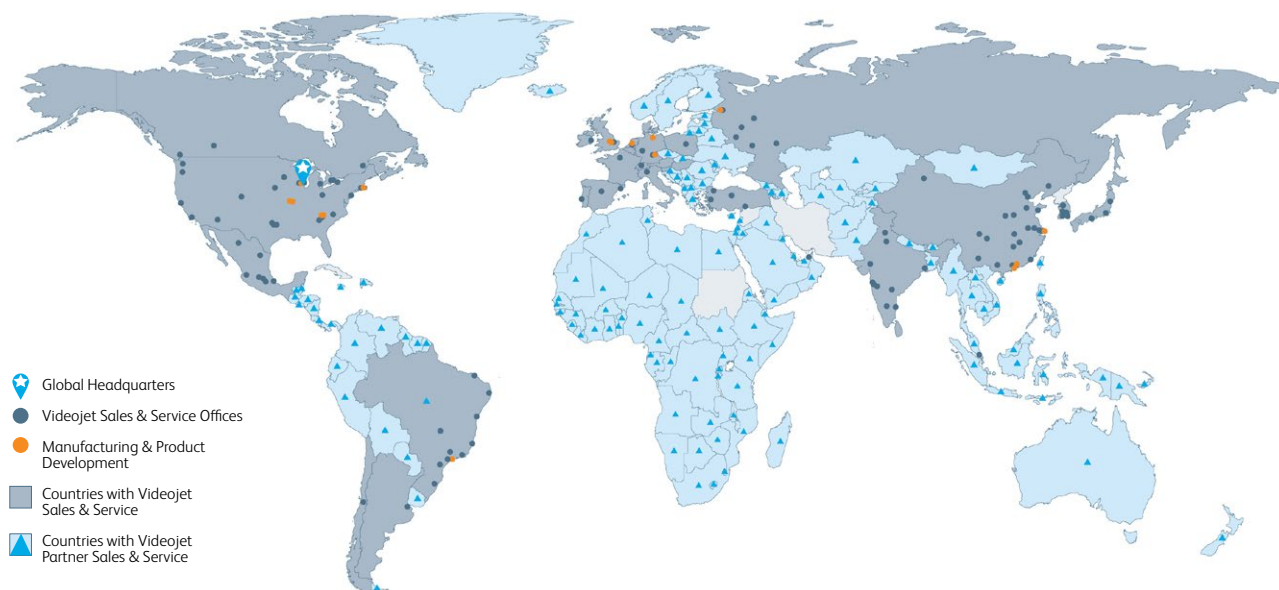
Manufacturers that are still using hot stamping, roller coding or other antiquated marking technology that requires higher levels of maintenance and produces substandard codes, have even more to gain from the benefits of improved production uptime, automatic code variation and higher-quality results using new-generation CIJ systems.

Peace of mind comes as standard

Videojet Technologies is a world-leader in the product identification market, providing in-line printing, coding, and marking products, application specific fluids, and product life cycle services.

Our goal is to partner with our customers in the consumer packaged goods, pharmaceutical, and industrial goods industries to improve their productivity, to protect and grow their brands, and to stay ahead of industry trends and regulations. With our customer application experts and technology leadership in Continuous Inkjet (CIJ), Thermal Inkjet (TIJ), Laser Marking, Thermal Transfer Overprinting (TTO), case coding and labeling, and wide array printing, Videojet has more than 325,000 printers installed worldwide.

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