

STAYING AHEAD AMID QUICK-FIRE CHANGE

Kornit Believes the Answer is to Control All the Variables



By Paul J. Borucki, VP Operations for
Kornit Digital North America

Digital printing direct on garments is a process, and controlling that process is the key.

When Kornit Digital first began engineering the Kornit line of digital-printing equipment in 2003 there was an understanding of what was needed to control the process: develop a line of equipment from the ground up and prepare for the inevitable changes in technology. Only then can you gain control of the process.

Understanding the dynamics of the digital-printing process is like arranging a row of dominos on end, to form a continuous action when set in motion.

When Kornit made the decision to build an industrial solution for the direct-on-garment industry, Kornit engineering sought out the finest components available. First the components

needed to be robust and, second, they must be capable of being manipulated to allow for the certainty of future demands for greater speed.

Before the actual printing components could be brought together it was essential to begin with a rigid steel-box-beam frame to combat vibration. The rapid oscillations of the printing pallets and the print heads will lead to vibrations that would compromise print quality. When you are working with drop locations measured in microns it is critical that the platform is stable to guarantee a quality print. The mass of the frame in the Kornit printers is by far the most stable platform in the market.

As print-head technology improves, this gives us the ability to control more-rapid firings of the piezo ink jets in the print heads. Kornit Digital uses the finest printheads available from Spectra. The faster you can fire the print heads, the further you can



expand the goal of building the most efficient, high-speed digital printer in the industry.

The ability to increase the firing speed of the ink jets can be disastrous unless you can control the composition and characteristics of the ink. If the ink is not manufactured at the perfect viscosity, with the perfect surface tension, the ink droplets will destruct prior to reaching the material, leaving you with soft, muddy prints. Digital ink must be chemically designed to be proof against high speeds. Kornit Digital develops and manufactures its own line of digital inks, so changes can be made to the ink to adapt to changes in the mechanical aspects of the equipment.

Once you have the heads firing rapidly and the chemistry of the ink under control, then you can accelerate the printing pallets to match the firing of the ink jets. By using magnetic linear drives in place of conventional motors, to drive the motion of the pallets and the print heads, Kornit can alter the speed of the printing pallets on demand. These linear drive components offer unparalleled accuracy, stability and variability to adapt to changes in the printing speed, print-head and ink-chemistry technology.

Finally, as the ever developing computer industry offers new capabilities, the ability to control complex computer-driven functions in unison saves valuable seconds on every print. Designing all of these critical computer programs by in-house Kornit computer engineers allows the constant development of more-efficient programs to take every advantage possible to produce a more productive machine.

Now that the process is controlled, printing can take place. We all know the garment industry is plagued with variables. Each garment manufacturer has a slightly different process that will directly affect the quality and durability of the product. Kornit's approach to controlling this variable is not to print on the garment, but rather to print on a controlled wetting solution (sometimes referred to as a primer or fixation solution).

A wetting solution that is applied off-line can lead to variables in the durability and quality of the print. If this off-line wetting solution has dried out or has been affected by other ambient conditions where the garments are stored, the prints may wash out, crack or prematurely fail.

To control this variable, Kornit has designed an automatic spraying system that is built into the



Kornit digital printers and applies the wetting solution to the garment just prior to printing. This reduces labour costs, as the garment is handled just once, by the operator, and not once by an off-line person to prep the garments and then by an operator to load the garment to the machine.

By applying the wetting solution inside the machine and then printing directly wet-on-wet, inks to wetting solution, a strong chemical bond is formed between the fabric, the wetting solution and the ink. This is especially critical when printing white inks; the bond between these materials must be strong and flexible to withstand stretching and many, many washes.

This unique process between the chemistry of Kornit's proprietary wetting solution and Kornit's inline application process has led to many new advances by Kornit Digital in the digital market. The ability to print not only on 100% light-cotton garments, but directly on light- and dark-coloured 100% polyester and polyester performance fabrics, pigment-dyed fabrics and many other materials, with a single ink line, has brought flexibility to digital-printing companies. These companies can now offer a multitude of high-quality products in single and short-run prints for the retail market, or produce hundreds of one-off prints in the on-demand, Internet-based industry. As the speed of the digital equipment continues to improve, this ability is expanding the quantities that can be profitably produced. **DT**

