



A Zebra Technologies White Paper

# Retransfer Technology Delivers the Optimal Card Printing Solution





# The Need for Retransfer Printing is Real

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A wide range of industries today are realizing the significant benefits that personalized access control, financial, retail, and smart cards can bring to their enterprises. The rapid expansion of on-demand issuance of cards for identification, tracking, and monetary applications calls for an innovative card printing solution. However, with an ever-increasing emphasis on security, flexibility, and efficiency, organizations now face the need to produce cards with the highest image quality, using a diverse range of card materials, with the broadest array of chip-encoding options.

Retransfer technology is the optimal on-demand printing solution for meeting the stringent image quality and encoding standards that advanced card applications require. In the past, desktop retransfer printers offered low printing speeds and image quality, thus limiting their applicability in many card issuance applications. This lack of performance and quality slowed the adoption of retransfer technology industry-wide. Today, however, innovative technology for retransfer printing delivers a fast, flexible, and affordable solution.

While direct-to-card (DTC) printing will continue to be the technology of choice for many standard card-printing applications, fast retransfer printing promises to expand a much broader range of possible applications, from high-security ID cards, to retail loyalty cards, to financial cards and beyond. In fact, retransfer technology offers a quantum leap beyond DTC printing. Retransfer printing commands 8 to 10 percent of the current market, with the current market expected to grow to 12 to 15 percent within three years<sup>1</sup>.

## Retransfer Card Printing Delivers Key Advantages

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Under the hood, retransfer technology uses a process called reverse thermal transfer. Unlike traditional dye sublimation card printers, which use a printhead to transfer the image through a dye ribbon directly onto the card surface, retransfer printers use a two-step process:

1. In the first step, the retransfer process prints a high-resolution image in reverse directly onto a clear receiving layer carried by a flexible, intermediate film. The dye sublimation process prints the image to the film, just like DTC printing.
2. Next, the printer uses heat and pressure to thermally transfer the image and the entire image-receiving intermediate film onto the card surface. During this process, the layer thermally bonds to the card surface, and the printed image resides underneath the clear image-receiving layer, inside the card.



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1. Zebra estimates based on a 2008 survey of select markets.

## Superior Image Quality

When it comes to identification cards in demanding government and business applications, photo image quality is essential. Security depends on photos that accurately portray the cardholder, and businesses expect sharp graphics and faithful reproduction of colors to communicate their brands effectively. With retransfer technology, the days of fuzzy photos and dull graphics become a thing of the past.

The challenges of printing directly to a hard plastic card surface fundamentally limit the image quality of the DTC process. The relatively small number of affordable, durable card materials that accept dyes limits the types of cards used, and limits the intensity of colors that DTC can reproduce. In addition, the DTC process depends on uniform, intimate contact between the printhead, the dye ribbon, and the card surface. Because of the unevenness of many card surfaces, DTC cannot achieve high color density and uniformity when transferring dye directly to a card.

Retransfer printing separates the image creation step from the card application step, relieving many of the inherent constraints of DTC. The intermediate film is thin and flexible, making it easy to maintain uniform printing pressure. In addition, the retransfer process can optimize the dye for print quality—regardless of the card material. This ability to print first and then transfer to the card opens up new possibilities for high image quality.

## Greater Flexibility

Identification cards and smart cards use a variety of materials in their production. Enterprises in the public and private sector demand flexibility when choosing cards that meet specific cost and application requirements. Built with a wide range of materials, smart cards contain circuitry such as a microprocessor and memory pre-loaded with information. In reality, DTC dye sublimation requires a porous surface available only with PVC-based cards, thus limiting card material options.

In many sophisticated plastic card applications, such as retail loyalty, smart cards, and finance, it is important to cover the card surface entirely with background graphics, yielding a more professional look. Traditional DTC printers leave a small white border around the outside perimeter of the card, due to the difficulty of maintaining contact all the way to the edges during printing. This white border detracts from the look of the card and discourages adoption for high-end applications.

Through over-the-edge printing, retransfer technology enables true edge-to-edge images, giving users access to the entire card surface. Retransfer prints the image to the intermediate film in a slightly oversize form factor, so that the transfer to the card surface occurs with complete edge-to-edge coverage. This full “over-the-edge” effect produces a sleek, photo-like appearance that is very different from a traditional ID card.

The retransfer process is relatively insensitive to the card material, permitting the printing of high quality images on a wide variety of card types. In addition, retransfer enables “green” initiatives that require biodegradable cards. These advantages clearly differentiate the retransfer process from DTC, and provide a significant advantage to many applications.

## Improved Security and Tamper Resistance

With all forms of theft on the rise, government agencies and businesses must take every precaution to secure their workforce and assets. The transfer film inherently provides fraud protection since the film easily shows tamper evidence. Any attempt to tamper with data on the card also damages the film—which cannot be easily repaired or re-used. Users gain the edge-to-edge protection of a security credential, with durability exceeding a comparable DTC print.

For added security, retransfer technology allows the use of transfer films with holographic images. In addition, users can use laminates with a multitude of security features such as holographic images, optical variable ink, and morphing for an even greater layer of security.

## Lower Printhead Costs

In traditional DTC printers, the printheads must contact the rigid card substrates, creating excessive wear. When printing to the card edge, DTC printheads often suffer premature failure, or outright damage. Because retransfer printers print on soft transfer film panels, printhead life span improves dramatically. The result is a reduction in overhead for spare printheads, lowered maintenance workload, and significantly improved return on investment (ROI).

## Key Considerations when Choosing Card Printers

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Retransfer printing enables a wide range of applications for the public and private sector. In federal, state, and local government, identification and smart cards find significant use in access control, tracking personnel, smart driver's licenses, voter registration cards, and national IDs. In the private sector, manufacturing, retail, and financial enterprises use cards for employee access control, gift cards, loyalty cards, and cash cards in markets such as gaming, cruise lines, and entertainment.

DTC printing addresses specific applications but may not meet all criteria and/or applications. When choosing a card printer, consider the following benefits of retransfer technology:

- High print quality and flexible options for card materials:
  - » DTC diffuses dye onto the surface of a card substrate to create an image, potentially compromising image quality on non-smooth surfaces.
  - » Retransfer delivers high print quality, the ability to print on uneven card surfaces such as smart cards, and on non-PVC cards. The result is a more durable and abrasion-resistant card that lasts longer than traditional materials.
- Built-in fraud protection, since the film is inherently tamper evident:
  - » In government and financial applications, security is a top priority. Agencies and businesses require provisions to prevent counterfeiting and reduce card tampering.
  - » Retransfer is the only printing technology that offers the encoding flexibility, compliance options, and fraud protection that smart card users demand.
- True edge-to-edge images (via over-the-edge printing):
  - » DTC yields low-throughput card printing that can waste card surface area. The lack of over-the-edge capability can lead to excessive printing supply usage and printhead burn rate.
  - » With retransfer printing, users can immediately benefit by placing images across the entire surface of the card.

# The Zebra Retransfer Printing Solution

For card applications that require photo-like images, fast print speeds, rich encoding options, and intuitive system integration tools, the Zebra ZXP Series 8™ printer and ZMotif™ software deliver the optimal retransfer-card printing solution. The ZXP Series 8 achieves the fastest print speed on the market today while maintaining top image quality and the highest cost efficiency.

## Sharp Images and Graphics that Stand Out

Zebra’s innovative reverse thermal transfer process delivers superior image quality, allowing users to issue cards that match the brand expectations of their customers. Our technical expertise in the photo printing business served as the foundation for the ZXP Series 8 printer. The ZXP leverages sophisticated image-processing algorithms to compensate for image errors normally caused by high printing speeds—enabling photo-quality images and print resolution even at increased print speeds.

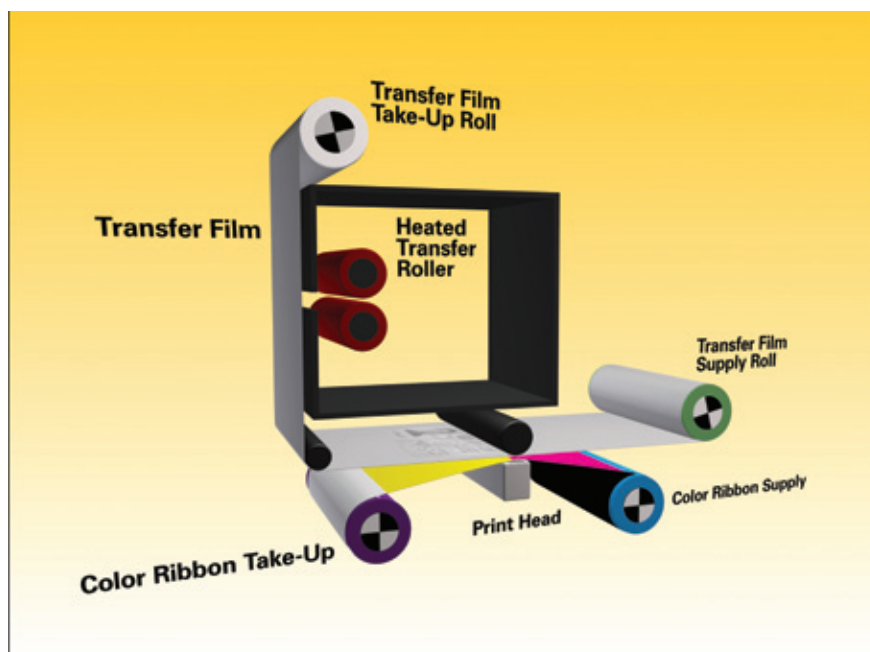
## High-throughput Enables Efficient Printing

The ZXP Series 8 solution achieves print speeds that exceed any other retransfer printer in its class. In fact, the ZXP delivers speeds that are comparable to many of the fastest DTC printers currently on the market. Traditional retransfer printers must mechanically flip the card to print on both sides, while the ZXP Series 8 uses a simultaneous dual-sided process to transfer the front and back images from the intermediate transfer film to the card at the same time. This exclusive, patent-pending architecture significantly increases the transfer speed and simplifies the retransfer system.

The ZXP printer also gains speed by printing the card images over the short dimension of the card rather than over the long dimension. This “landscape mode” approach is a highly efficient way to reduce print time per color panel and to reduce the time required for mechanical retraces between color panels.

The combination of simultaneous dual-sided and landscape mode printing enables 100 percent use of card area—regardless of the card materials. The result is improved process efficiency and use of print resources.

### ZXP Series 8—Simultaneous Dual-Sided Efficiency



## Unmatched Integration and Ease of Use

The ZXP Series 8 includes ZMotif XML-based software for easy integration with enterprise-based applications. Built around an intuitive user interface, the ZMotif printer management software speeds up implementation of custom projects, while reducing startup and migration costs. The software uses Microsoft® Windows® certified drivers to help ensure application ease of use, compatibility, and investment protection within existing infrastructures.

The ZMotif graphical user interface (GUI) presents printer configuration tools and utilities that provide an IT department complete control over all printer functions and features. Graphics designers benefit from an XML-based software development kit (SDK) and printer interface language, enabling flexible project customization, and design reuse. In addition, users can access networked ZXP printer resources from within the familiar Windows printer environment—enabling the best ROI value.

## Modular Hardware and Software Drives Scalability

The ZXP Series 8 printer offers a full complement of encoding options suitable for a variety of applications. These options include magnetic encoding, contact smart card, and a variety of contactless smart card encoding options. When adding a new module selection, IT departments can benefit from easy setup and faster deployment because the ZXP automatically detects and configures the device. Businesses can purchase options with the initial printer, or add the options later as the department's printer demands grow.

## Optimize Your Card Printing Operations

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IT professionals and operations managers deserve the best from their card printer infrastructure. Zebra's ZXP Series 8 printer and ZMotif software can help eliminate traditional barriers to card applications that require high photo quality or embedded technology. The ZXP solution delivers the crisp images, highest throughput, and cost-effective retransfer printing value available today. Now, businesses and government agencies can achieve simple, quick rollout of identification cards, driver's licenses, ATM, debit, and non-embossed credit cards.

Zebra Technologies Corporation provides the broadest range of innovative technology solutions to identify, track, manage, and optimize the deployment of critical assets for improved business efficiency. Zebra's core technologies include reliable on-demand printer and state-of-the-art software and hardware solutions. By enabling improvements in sourcing, visibility, security and accuracy, Zebra helps its customers to put the right asset in the right place at the right time. Zebra operates in over 100 countries and serves more than 90 percent of Fortune 500 companies worldwide. For more information about Zebra's solutions visit [www.zebra.com](http://www.zebra.com).

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