

EDIsecure[®] XID Re-transfer Printer

Comparison of Printing Technology

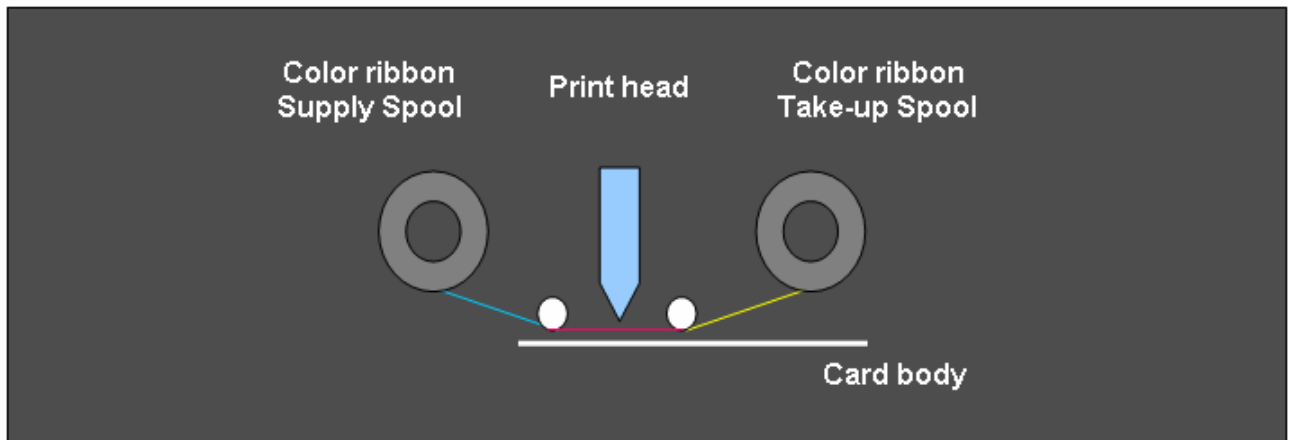
1. Purpose

Purpose of this document is to highlight the *EDIsecure[®] XID Re-Transfer Printing Technology* and to focus on the professional ID card personalization solutions from Practical Peripherals Corporation (PPC).

2. XID Re-Transfer Printing versus Direct Card Printing

Both systems are based on Dye-Sublimation Thermal Printing but XID Re-Transfer Printing has a plenty of merits presented subsequent.

Direct Card Printing:

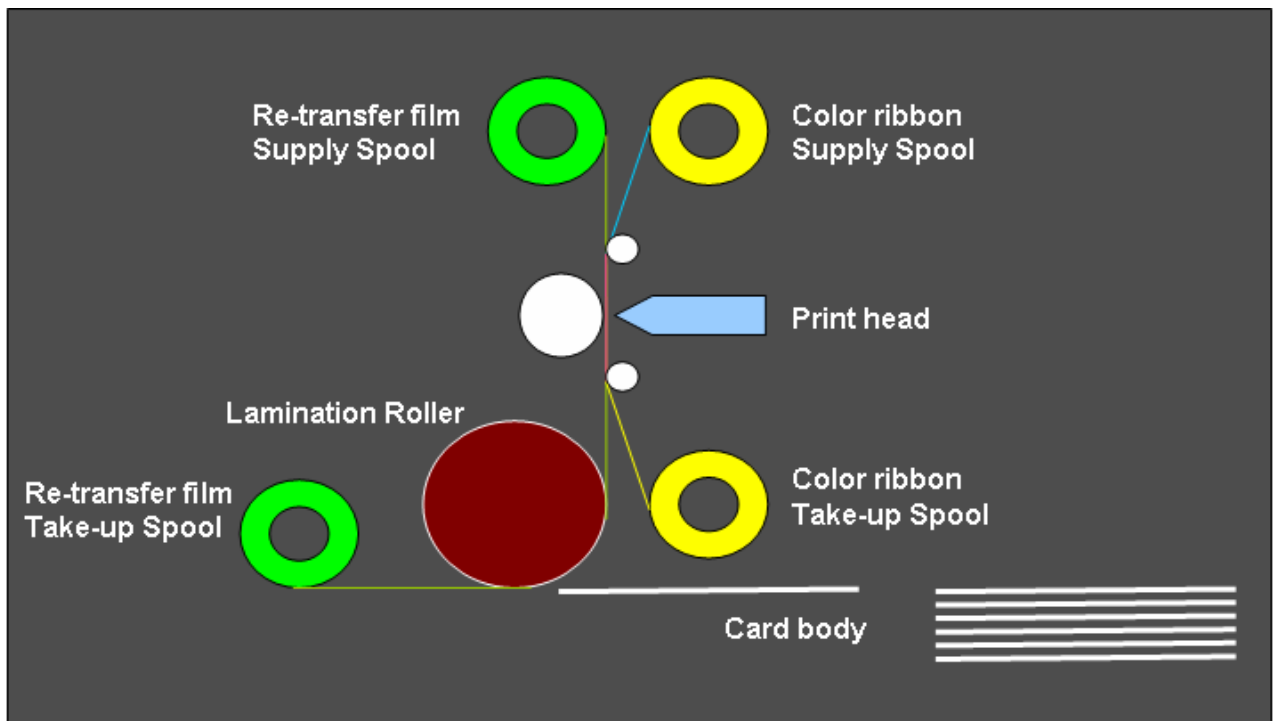


- Direct card printers are printing with the print-head directly onto the card surface and therefore can only print on PVC and PVH (hybrid card with PET core and PVC top layers).
- PVC card life time is approx. 2 years, has limitations to environmental conditions and therefore is PVC not recommended for long lasting usage like as National-ID cards.
- PVH hybrid cards are offering a longer life time, due to the PET core, but the PVC top layer still causes limitations to environmental conditions, therefore also not recommended for long lasting usage like as National-ID cards.
- Mineral contaminant, such as sand, dirt or metal, imbeds the PVC surface and is dragged into the print head during the printing process. This results to that the print head has only a certain life time (e.g. 10,000 prints) and than needs to be replaced. This means recurrent and considerable costs for print head replacement coming

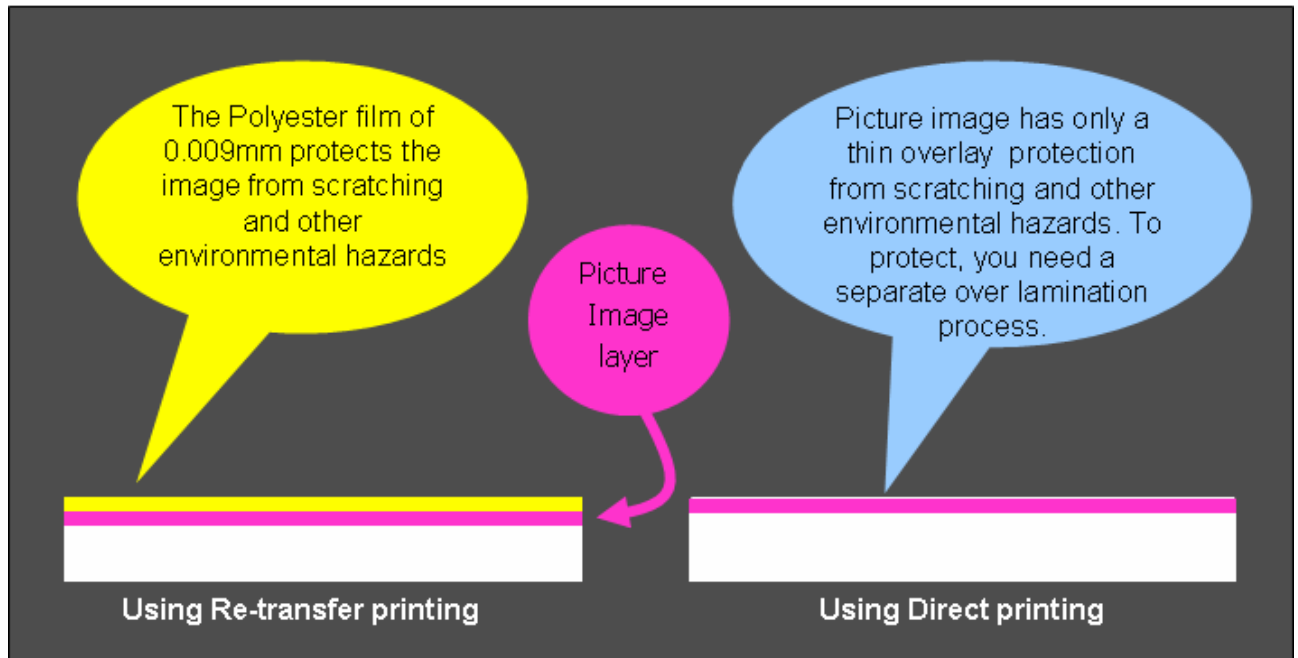
along with costs for consumables and cards. Also down time of the printer for print head replacement has to be considered and the need of skilled personal for service and so on.

- The direct card printing process needs an additional layer after the print process to protect the printed information and the card surface from scratching and other environmental hazards like abrasion and wear out. It is not a part of the transferred printed information.
- Commonly this additional over lamination is applied only to front side of card. Backside of card with e.g. 2D barcode and OCR lines remains unprotected and vulnerable for read errors. After a certain time of use, even at normal use, the direct card printing on the unprotected backside will rub off and cause barcode read errors. That means card needs to be replaced or card holder runs into troubles. This risk you have to face long time before the expected lifetime of the card material itself is reached.
- Due to un-flat edges of the card, the print-head cannot go too near to the edge and hence true edge-to-edge printing is not possible.
- Due to uneven card surface, the print-head is unable to print areas that are too low or high, like at chip cards or proximity cards, aside from the hazard of print head damages.
- Direct card printers are printing in landscape and moving the card for each color back and forth. Not so precise at all. That is why carbon black panels are necessary to print black text of acceptable quality, otherwise result is too poor.

XID Re-Transfer Printing:



- XID Re-Transfer technology does not have the print head touch directly onto the card surface. Instead, the card-data is printed mirror-inverted onto a PET film and subsequently released from this film and fused onto the card through heat and pressure. The print itself is completely independent of the card surface or the card material. This eliminates the ongoing costs for print head replacement. DIS grants unlimited Print-Head lifetime warranty for *EDIsecure®* XID Re-Transfer Card Printer as long as *EDIsecure®* material is used.
- The print engine used in the XID printers is the most reliable in the world and is not only an easy to use machine but also extremely service friendly, if in case of.
- Besides PVC and PVH now it is possible to print on 100% PET (Polyester), ABS (injection molded plastic cards) and even on Polycarbonate cards. The usually required thin PVC layer, which allowed a thermal transfer print, is no longer necessary. These materials offer far more advantages to the customer as they have a better temperature resistance, lifetime cycle and resistance to physical and chemical impact.
- 100% PET Cardware is a very reliable card material at reasonable costs with good heat resistance and very good mechanical strength. Such material would significant help to avoid headaches regarding to expected card lifetime of 10 years like as National-ID cards. This material is not printable with direct card printers but pretty well with XID Re-Transfer technology.
- With XID Re-Transfer technology the printing on the card automatically is protected by the 0.009 mm thick PET release layer of the re-transfer film against scratching and other environmental hazards. That leads to a much more durable card, highly resistant to physical and environmental impacts. Even backside of card is protected by this PET layer against abrasions if printed e.g. with 2D barcode and OCR lines. This minimizes read errors. Lifetime of card and usability period will definitely increase when using Re-Transfer technology. Manipulating the card will destroy and damage the printed layer and make fraud visible.
- Furthermore a versatile lamination program inline or offline with OVD Overlay, OVD Patch and Clear Patches is available for additional protection, if requested. The lamination will not interfere with the pre-print of the card. Most of sample cards from Digital Identification Solutions are already pre-printed with UV and Microprinting.
- The XID Re-Transfer film laminates nicely onto card surface even when edges are not flat or when card surface is uneven. Hence true edge-to-edge printing. Now chip cards or proximity cards can be personalized without any problems.
- XID Re-Transfer technology is printing on an accurate guided Re-Transfer film in portrait mode. This means short ways for a precise and bright print result. That is why YMC panels can be used to print clear black fonts in an economic way with best results. As a matter of course K panel is available if necessary to print text or barcodes. Therefore with an YMCK ribbon you could use YMC panels to print color information and black text on front side of card and K panel to print barcode and OCR lines in carbon black on backside of card.
- Because XID Re-Transfer print results are of best quality costs for pre-print on Cardware can be reduced by printing backgrounds and logos with the printer.



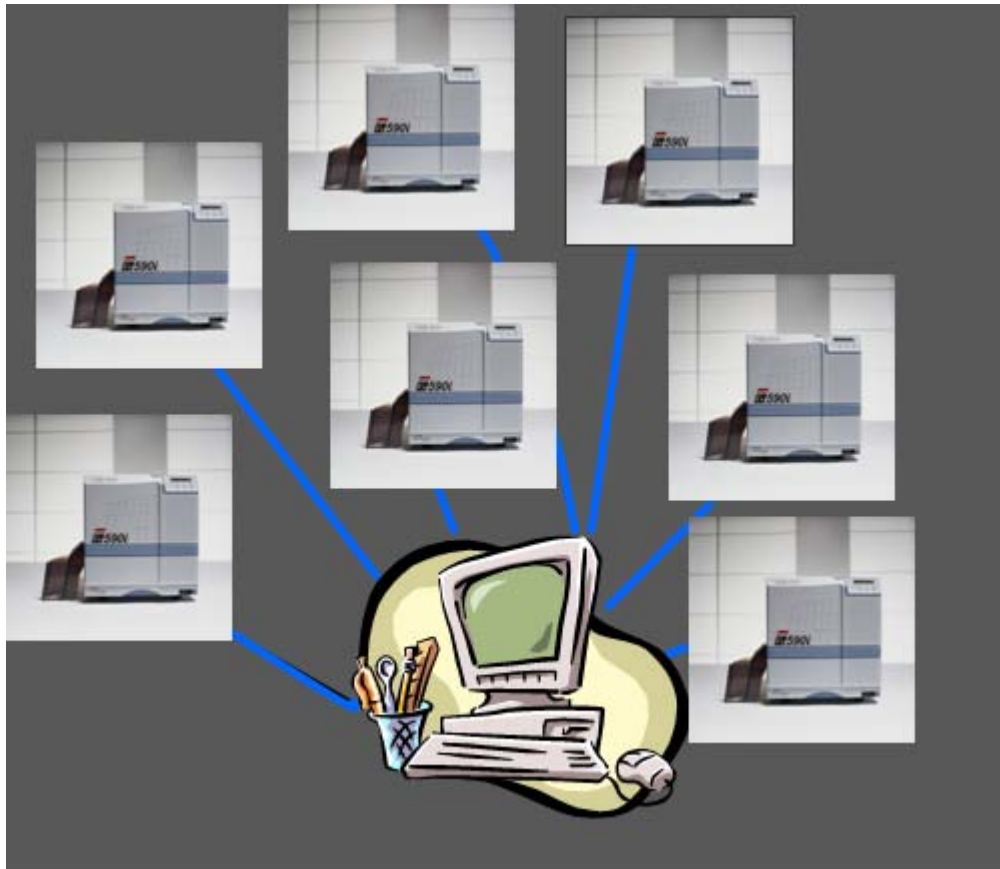
3. XID Re-Transfer Printing with IPM (Intelligent Printer Management) versus Printing with Serial Production Workflow

Printing with Serial Production Workflow:

- Personalizing ID cards in a serial production workflow stands for a high investment costs with expensive ongoing maintenance costs.
- This will require highly skilled staff to operate and maintain the system.
- Personalizing ID cards is handicapped or even stopped all in all when one part of the machine is off due to maintenance work, operation fault or any other disruption.
- Pretty difficult to adapt to changing capacity needs due to high investment costs for these high performance industrial machines.
- Commonly used for centralized production.
- Does definitely not support any intentions or attempts for decentralisation.

XID Re-Transfer Printing with Advanced IPM (Intelligent Printer Management):

In contrast to serial production workflow are the XID 590i Re-Transfer printers, even with inline lamination, planned for parallel processing.



- Due to Advanced IPM up to 7 printers can be clustered to one print server to build a print server group which can be used in a multiple print server environment.
- Investment for such a print server group with multi-parallel processing is very reasonable.
- Downtime for each printer (if any) is short, ~ 5 min to replace one printer (spare is readily available).
- Does not require a specialized full time, standby technician. Normal operator or existing staff would do to run and maintain the system.
- Low initial cost and hence low maintenance cost.
- All print heads come with a lifetime warranty.
- If one printer in such a group is down, only 15% of work is affected but only for a very short while (~ 5 min), therefore predictable output.
- Ribbon, film and card material is easy replaceable during running production without significant impact on the per hour productivity. If consumables are changed on one printer all other are still working.
- Capacity can be easily scaled upwards or downwards, just by adding printers to a group or installing additional print server groups.

- Designed as compact desktop printing system the XID 590i does differ genial from the serial production machines.
- Can be used centralized or decentralized.



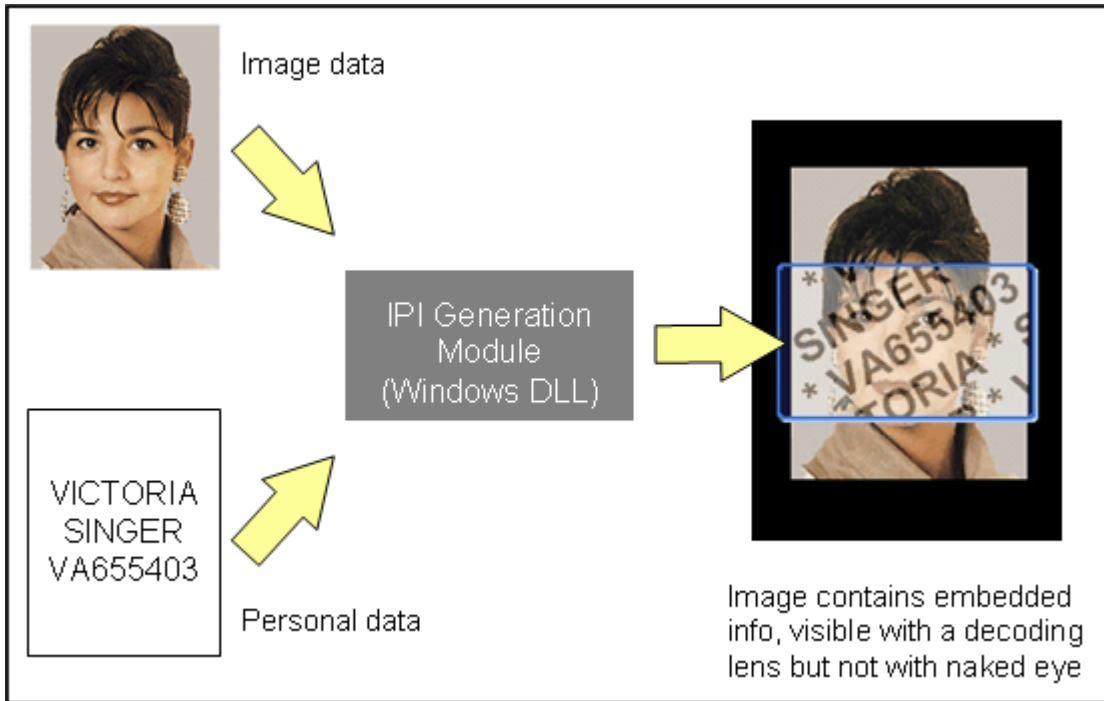
4. Software Controlled Security Features

IPI Invisible Personal Information:

IPI is a worldwide high-security feature to encode personal data into the photograph to improve the protection against alteration and replacement of the applicants photograph. This is the only security feature today that links the photograph to the owner and to the document which is easily checkable without an electronic verification device.

The personal data is invisible by naked eyes but the officials may verify authenticity with a simple decoding lens. Because no electronic device is necessary to check authenticity handling or operator faults are impossible.

Common security features are focused to the card body, like pre-printing with guilloche, fine-line, micro text and UV ink. But even an embedded metalized does only protect the card body but not the personalized card. If somebody does take unauthorized possession of blank cards by stealing or whatever he would need only a printer to produce forged cards. Even a 2D barcode isn't that powerful on security because you need an electronic device to check authenticity and validity. Therefore IPI adds highest security against counterfeiting to the complete personalized card.



The benefits of IPI:

- Elimination of the photo replacement as a means of fraud
- Verification does not need special knowledge or experience
- Easy to use in the field; the decoding lens verifier requires no power, so it may be used in any location

To work at best results IPI requires high quality, high-resolution color printer such as the EDIsecure® XID 590i Retransfer printer.

Shadow image (ghost image):

In addition to the regular printed color image exactly the same will be printed translucent as a shadow image underneath of text information. Counterfeiting or replacement of the regular image would be immediately obvious in relation to the shadow image.

Digital signature:

The card holder's signature will be scanned and printed on the card. Parts of the signature can be printed over the image. A manipulation of the signature will be easy visible as the image will be damaged as well.

2D Barcode:

The 2-dimensional barcode is encrypted and cannot be read with the naked eye. Text data as well biometric data (e.g. fingerprint) can be stored within this barcode and so be used for verification and proof of authenticity.

To enable biometrics to be stored in this barcode, additional software and equipment would be necessary, e.g. software for fingerprint minutia extraction, fingerprint scanner and fingerprint verification.