High Definition Printing™ for Maximum Security Identification Cards

Executive Summary

Identification cards produced with High Definition Printing (HDP®) reverse transfer printing and holographic HDP Film offer end users the greatest security and ease of use. While traditional direct-to-card printing requires a lamination station to apply a secure overlaminate to a printed card, a reverse transfer printer creates a card whose security is second to none, without the need for a lamination station.

Independent security testing on three different holographic cards: 1) a card printed with direct-to-card printing and laminated with a 0.6 mil holographic polyester patch; 2) a card printed with direct-to-card printing and laminated with holographic thermal thin film; and 3) a card created with High Definition Printing on holographic reverse transfer film (HDP Film) and no overlaminate, showed that holographic HDP Film provided the greatest protection against counterfeiting and tampering. In addition, holographic HDP Film provides edge-to-edge protection of a security credential with a durability that well exceeds a comparable overlaminate. While abrasion resistance and cost are also important factors, HDP Film is comparable to or better than most options currently available.

Scope

High Definition Printing is a more secure method for personalizing and protecting an identification card than the direct-to-card, dye-diffusion thermal transfer (D2T2) and post-printing lamination method. Using holographic HDP Film eliminates the need for printer lamination hardware while providing a highly secure, tamper-evident and durable identification card.

Printing Background

Traditional direct-to-card printing diffuses ink into the surface of a card substrate to create an image. To increase tamper resistance and durability, organizations often apply an overlaminate to the card. The overlaminate creates a physical barrier against tampering while protecting the printed image from abrasion. In most cases, organizations layer the overlaminate with holographic features to add integrity to the credential's security.

Reverse transfer printing, the technology of a Fargo® HDP Card Identity System, diffuses ink into a dye-receptive transfer film (HDP Film). The printed film is then fused to the surface of the card substrate. The HDP Film acts as a protective barrier to the information printed on the underside of the film while providing a tamper resistant barrier similar to that of an overlaminate. Holographic HDP Film adds security and protection to the credential while providing the excellent image quality expected from a reverse transfer printer.

Image Security

Holograms on identification cards add multiple levels of security to the credential. While most people tend to associate holograms with visual, or overt, security only, covert and forensic security features can also be incorporated into the design. A variety of security elements are available to accommodate all different types of holographic designs and customer requirements.

When comparing holographic overlaminates to HDP Film, High Definition Printing has distinct advantages to direct-to-card printing from a security standpoint. Data printed onto a card with direct-to-card technology and laminated with a polyester patch or thin film is vulnerable. The overlaminate covering the printed image can be attacked and the card data can be manipulated.

Data printed onto HDP Film (with High Definition Printing) that is fused to cards is much more secure. While it is possible to corrupt HDP-printed data, it is significantly more difficult. Any attempts to manipulate data on the card will damage the film such that it cannot be repaired or re-used. Tampering will be immediately evident. When an HDP image is printed onto film that contains a hologram, it is even harder for a counterfeiter to remove and then reapply or recreate that image on a forged card.

Pira International, an independent consulting organization, recently tested and compared three applications designed to protect personalized data on ID cards. The applications are described below:

High Definition Printing on Holographic HDP Film, No Overlaminate This card was printed using a reverse transfer printer and the image transferred at approximately 190°C. A separate lamination station was not used to produce this card.

Direct-to-Card Printing with Holographic Thin Film Overlaminate
This card was printed using a direct-to-card printer with dye-diffusion ribbon. It was then laminated with a holographic thin film overlaminate (approximately 3-6 microns thick) at approximately 125°C.

Direct-to-Card Printing with 0.6 mil Holographic Polyester Overlaminate Patch This card was printed using a direct-to-card printer with dye-diffusion ribbon. It was then laminated with a 0.6 mil holographic polyester patch at approximately 130° C.

In order to compare the security level, Pira performed several tests on each of the card types. After the tests were completed, each card type was rated low, medium or high, based on its performance. A more thorough description of the tests along with the overall comparison chart can be seen below.

Threat	**Card Type**		
	Holographic HDP Film (no overlaminate)	**Holographic Thin Film Overlaminate**	**0.6 mil Holographic PolyGuard® Overlaminate**
Resistance to Solvents	High	Medium	Low
Water-Based Reagents	High	High	High
Physical (abrasion and scraping attack)	Medium	Medium	High
Light Bleaching	High	High	High
Overall Ranking (1=Best)	1	2	3

When completing physical and chemical attacks, a threat assessment was conducted to determine which of the three card types was judged the most resistant to attack. Some methods of physical attack included delamination with extreme heating and cooling, cutting and surface abrasion. Some methods of chemical attack included the use of solvents and reagents in addition to chemical bleaching and accelerated UV light exposure to remove printed data.

Pira's conclusions indicated that 0.6 mil holographic PolyGuard overlaminate was the most resistant to physical attack; however, it was very vulnerable to chemical attack. Pira found that this overlaminate's vulnerability to chemical attack could allow for the patch to be reused on a counterfeit card quite easily.

The results suggest that holographic thin film overlaminate is more resistant to chemical attack. While the holographic material could not be reused on a different card, it was easily destroyed by most solvents, which makes it easier for the original card to be altered.

Holographic HDP Film rates high in every category with the exception of a medium rating for physical attack. While physical attack shows evidence of film removal, the printed image is also removed with the film, making counterfeiting very difficult

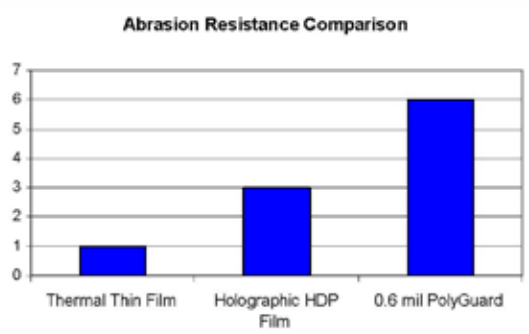
Overall, holographic HDP Film was judged to be the most resistant to attack, suggesting that it has the highest security level currently available for an identification card printer.

In addition to the security testing discussed above, there are a few other notable security features provided by holographic HDP Film. One feature is that this film allows edge-to-edge holographic coverage on an identification credential. The holographic image can be customized to meet specific requirements, and can either be in register (the same image in the same location on every card) or in a random pattern. This film is applied during the printing process, eliminating the need for a lamination station and producing cards at a much faster rate than those that need an overlaminate.

With the high level of security available, the end user may consider putting all the required security features in the HDP Film. Currently some end users put some security features in the card stock and some in the overlaminate. Placing all the security in the HDP Film serves two benefits: the end user only has to maintain strict control of one consumable for the printer, and it is easy to detect corrupt credentials when the printing and holographic layers are so close to each other.

Durability

While security is important, durability must also be taken into account. When comparing durability test results, abrasion resistance is responsible for the biggest difference between the three different card types. Since each user environment has a different set of requirements, the end user must decide the appropriate amount of durability required. Abrasion test results between the three card types are compared in the chart below.



Price Sensitivity

On a per-image basis, costs for personalizing ID cards with Holographic HDP Film approximate the cost of a direct-to-card print plus overlaminate.

Reasons:

- Lower fixed investment required (no laminator necessary)
- Reduced service and maintenance expense (absence of overlaminate station improves reliability by reducing the number of mechanical steps and parts required to produce a secure credential)
- Fewer printing/laminating materials required with holographic HDP: Holographic HDP Film takes the place of both clear HDP Film and a custom holographic overlaminate.

The net result is a reduced, overall cost of ownership to the end user.

Conclusions

High Definition Printing on holographic HDP Film produces more secure ID cards than direct-to-card printing plus lamination. Holographic HDP Film provides formidable abrasion resistance. In addition, the hologram on HDP Film is essentially melded with the personalized image, making image tampering extremely difficult.

References

Oshima, Katsuyuki. 1998. New Thermal Dye Transfer Recording Method by Using an Intermediate Transfer Recording Medium. 1998 International Conference on Digital Printing Technologies.

Chamberlain, M.R. 2006. Evaluation of Card Security Consulting Report.