



For Graphic Artists — Drop on Demand Printing Technology

Drop On Demand Printing Modules



ENTRUST
SECURING A WORLD IN MOTION

DESIGN GUIDE FOR GRAPHIC ARTISTS – CARD

Drop On Demand Printing Technology

Printing technology overview

Drop on Demand printing technology, also referred to as digital printing, is a method for depositing liquid ink droplets on a card substrate. Entrust offers this technology with the Drop on Demand Printing Module Gen 2 as well as the Duplex Drop on Demand Printing Module – both available on the Datacard® MX Series Systems.

Both versions of the Drop on Demand (DoD) Modules are capable of printing full card images using 4 color (CMYK) with 600 dpi printheads and White with 360 dpi printheads. They also offer the capability of Varnish for clear printing at 360 dpi. The CMY inks are translucent similar to other printing technologies to allow the colors to blend when printing the image. The ink is layered to create the card image, which produces a slight topology effect. All inks used in this module are UV-curable to provide the durability required for financial and government card printing. DoD printing technology adheres to a variety of card surfaces and can accommodate a wide range of flat card designs. Edge-to-edge DoD printing is not recommended in combination with embossing.

This document is created to help create artwork that will make the most of the DoD Printing technology.

Creating artwork for full background printing

It is important when printing full background images and personalization to maintain color accuracy, repeatability, and consistency. Implementing organizational color management policies for artwork and procedures will help ensure high-quality output. This section provides recommendations to support the artwork process.

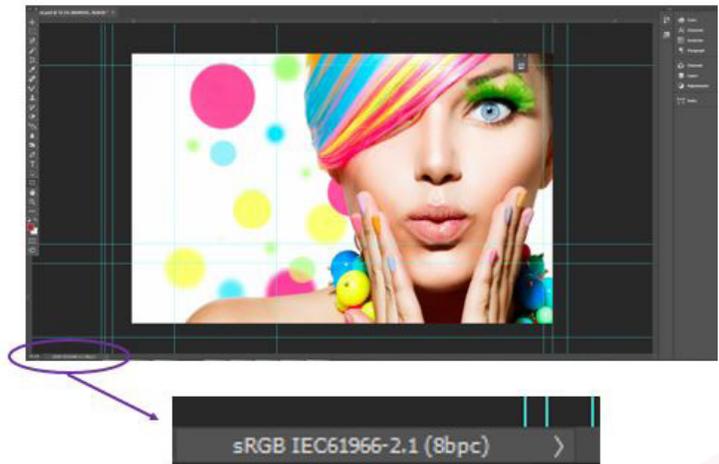


Color management

Color management can be simplified by utilizing the International Color Consortium (ICC) standards. Creating artwork that follows these guidelines helps streamline card design and approval processes.

Key recommendations:

1. Images should have a color profile (color space) embedded into the image file. This allows the MX controller software to correctly map the image colors to the printing device.
2. Files should be saved with a consistent file format.



Preferred file formats in order

File format	RGB support	CMYK support	ICC embedded	Compression (typical default)	Typical use
TIFF	Yes	Yes	Yes	Lossless or no compression	<ul style="list-style-type: none"> • Printing high-resolution images • Highest quality; large file sizes
JPEG	Yes	Yes	Yes	Lossy	<ul style="list-style-type: none"> • Common with photo images • Small enough to send via email • Mid to high quality depending on file size
PNG	Yes grayscale & monochrome	No	Yes Strongly recommend for output consistency, due to a wide variety of implementations	Lossless	<ul style="list-style-type: none"> • Print and web images • Mid quality
BMP	Yes grayscale & monochrome	No	Yes Later version support only	Uncompressed format	<ul style="list-style-type: none"> • Mid to low quality

Elements to include in the background design

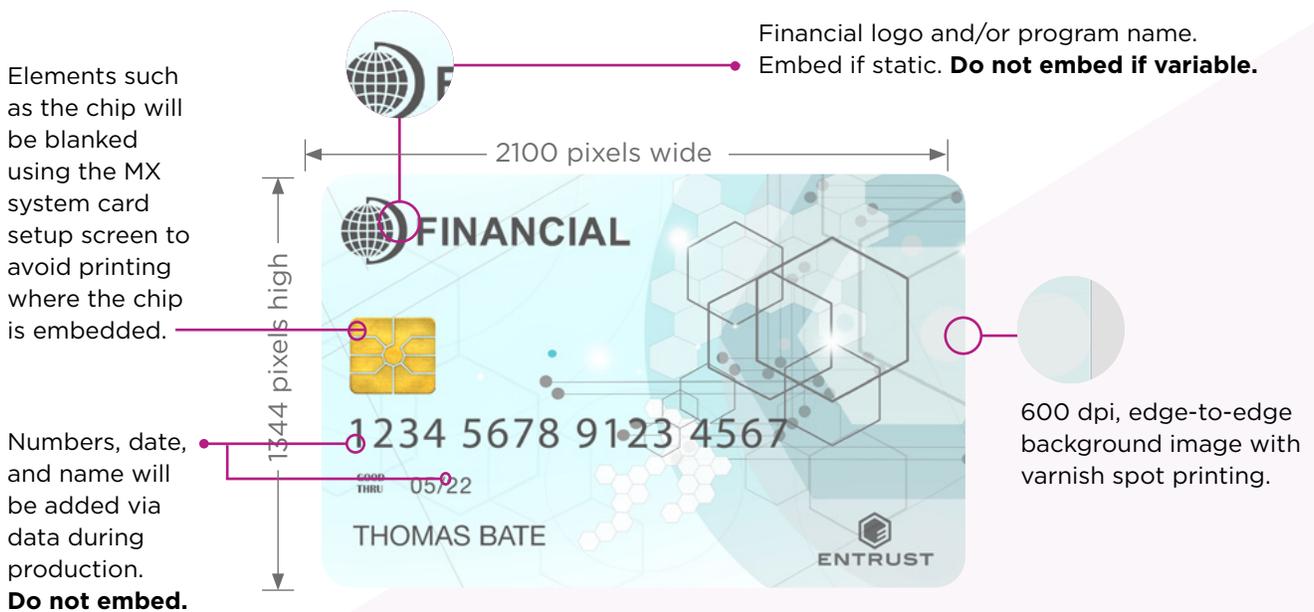
When working on a financial flat (unembossed) card design, the payment brand logo and chip placements are pre-defined by ISO standards and the payment brand regulations. The remainder of the card space is flexible and available for customization.

Light background

When creating a light colored background with black design elements, it is best to embed those elements into the background image art file. This will work best with static images. If a variable image is required, it is best to use a process black.

Dark background

When creating a dark colored background with white design elements, the white will become a knockout where the true white of the card is visible. This is described further on the next page.



Note: Card association (Visa or Mastercard) specifications take precedence over Entrust guidelines. Please be sure all processes have been completed with the appropriate association.

Blanking an element

Ensure understanding of where the chip, cardholder data, and any preprinted logos will be in relation to the card image. It is recommended to mark the artwork with the exact size and placement to create a visual test of the final card production. Provided artwork will not include these markings. The blanking elements will be chosen within the MX system card setup to avoid printing where the exact elements are on the card. If bringing an image that has typically been printed with retransfer printing into a Drop on Demand Printing Module, a thorough review of the image is required to determine where blanking may be needed.



Figure 1. Artwork marked with an exact size and placement of chip and staging box for preprinted hexagon logo to assist with reviewing image.



Figure 2. Artwork submitted to the system. Card setup process includes choosing blanking elements for chip and logo box.



Figure 3. Final card where no printing occurred in the chip placement, the cardholder data, or the box around the logo.

Incorporate knockouts to create clean designs

Artwork using white elements allow knockouts where the color of the card substrate comes through the image to create a unique card design. When the entire background of the card is printed during personalization, knockouts will provide crisp, clean text and logos. Achieve the truest white when the blank white card surface is visible.



Figure 1. Example of the artwork to print the background where all white elements will become knockouts.

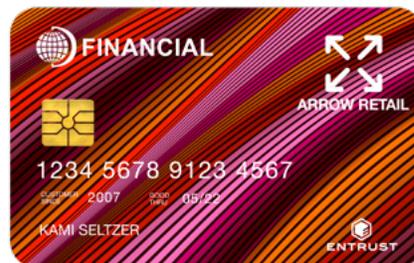


Figure 2. Printed card where the white artwork elements did not print and the white of the card is now visible, creating a crisp and clean image. Cardholder data was placed using blanking in the system card setup.

Embedded black or colored text for a uniform image

To avoid unnecessary ink layers, embed all static text into the artwork. Using various shades of gray instead of true black may generate the best results.



Figure 1. Artwork with static text embedded.



Figure 2. Printed card with a uniform look and feel.

Unique differentiation and texture with varnish

Design with texture by adding varnish printing. This clear topcoat can be added as an icon, pattern, or any design you wish to create on any part of the card. A printhead for varnish will be required along with the second image. One artwork design will print the background, while the other will add the varnish to achieve the final output. The images below show an example of full card varnish giving it a textured visual effect. To accomplish edge-to-edge varnish, the second image (figure 2) would be full black.



Figure 1. This is the background artwork designed with static text embedded.

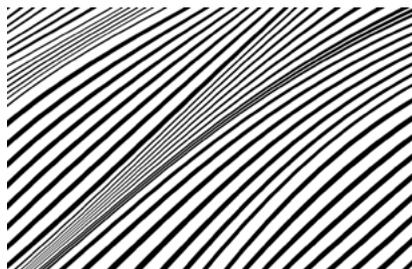


Figure 2. This is the artwork used to print the varnish. The design elements need to be solid black (grayscale or monochrome) to allow transfer of the varnish.

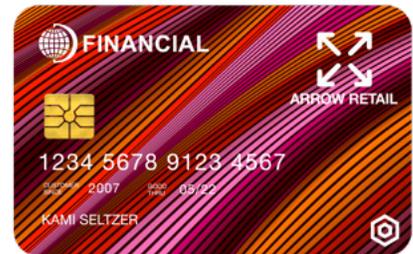


Figure 3. Background image is printed. Data drives the printing of the personalization.



Figure 4. Finished card with varnish layer printed. Varnish will be completely clear when printed. Transparent white shown here indicates where varnish was applied

Security and additional durability with varnish

Varnish printing applies a clear durable topcoat that protects the printed image and text, offering visual tamper-evident characteristics and adding texture to the card. A printhead for varnish will be required along with the second image. One artwork design will print the background, while the other will add the varnish to achieve the final output. The images below show an example of spot varnish. To accomplish edge-to-edge varnish, the second image (figure 2) would be full black.



Figure 1. This is the background artwork designed with space for personalization and white knockout shapes for the bar code and headshot to be printed.

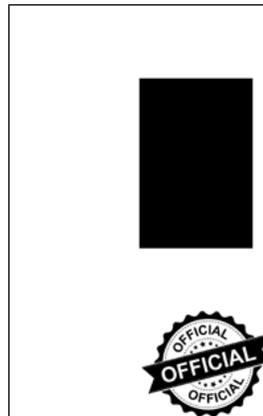


Figure 2. This is the artwork used to print the spot varnish. The design elements need to be solid black (grayscale or monochrome) to allow transfer of the varnish.



Figure 3. Background image is printed. Data drives the printing of personalization, bar code, and headshot. The bar code was added by the controller software to control the amount of ink used.



Figure 4. Finished card with varnish layer printed. Varnish will be completely clear when printed. Transparent white shown here indicates where varnish was applied.

Card substrate considerations

Card substrate texture is a technique that card designers have started using to create differentiate cards. The challenge with these card types is that many flat card personalization technologies like retransfer, direct-to-card, durable graphics and drop on demand (DoD) may have a hard time adhering evenly to the card. If a textured card is used, it is not recommended to personalize the cardholder information over the texture. It would benefit the overall look and quality of the card to design the texture in an area of the card that will not be personalized.

When personalizing with UV-curable technologies, it is recommended to avoid using cards manufactured with varnish on the surface of the card. The UV-curing will cause the card to have low surface energy and a cross-linked surface that can prevent durable graphics or DoD inks from achieving good print quality, adhesion, and durability. A solution to this desired output would be to add a DoD varnish feature as a part of the background design, after the DoD ink has printed the personalization. This approach results in vivid images, quality printing, and added durability.



Talk to your Bureau

When personalizing flat cards, there are steps that should be taken to keep the card surface ready for a quality print. Talk to your Bureau to ensure they are aware of these steps as you move your portfolio to flat.



The first consideration is to keep the card surface free from dust. Dust comes from many places, including the manufacturing process or from the time spent sitting on inventory shelves. Surface dust when using flat card technologies can cause print voids and quality issues.



Many issuers use rubber bands in their processes today. This is another consideration that should be looked at to ensure there are no alterations made to the card substrate. When pulling cards from the vault and building jobs, rubber bands are often used to keep the cardstocks separated for operators. While there is a benefit to the operation, there is a negative effect in using rubber bands when moving to flat card printing. The bands can leave a residue on the first and last card in the stack. Most issuers will notice intermittent void areas on the front or back of the first and last cards.



Finally, card handling is important when printing with flat card technologies. In the mechanical embossing world it didn't matter how cards were handled, as oils from your hands and lotions didn't affect the quality of the embossing. This is no longer the case when personalizing flat. Vault personal and system operators need to pay close attention to how the cards are being handled. Some of the early adopters to flat card personalization have changed vault handling processes or issued gloves to their personnel to help reduce potential card scrap.



Flat cards get noticed. We want your cards to get noticed for their differentiated designs and bold branding, not because there is a void in the printing that could have been avoided. All of the work you do to design your card needs to be executed to the highest level of quality and this is just one way to help ensure you get what you want.

Technical Information

Image layout & formats

Background image size	<ul style="list-style-type: none"> • 3.5" x 2.24", 2100 x 1344 pixels (this includes bleeds on all four sides) • 600 dpi resolution
Varnish image size	<ul style="list-style-type: none"> • Variable up to 2.1" x 1.344", 1260 x 806 pixels for edge-to-edge printing • 360 dpi resolution • Image required to be slightly larger than card to ensure edge-to-edge printing. Small margin of ink will be captured on an overspray tray.
Text	<ul style="list-style-type: none"> • Variable text uses fonts located on the MX system; make sure to specify a font that is available to the MX controller. • Scalable fonts supported, including TrueType and OpenType fonts for Microsoft Windows operating systems. • Embedded or static text will be converted to an image before printing; actual font type not required on the MX controller. • Text and logos should be no closer than 0.18" from the image edge to avoid clipping when printing.
Font size	<ul style="list-style-type: none"> • Sans Serif fonts are recommended for readability. • CMYK printing at point size 4 and below should be tested for readability. • White printing at point size 4 and below should be tested for readability. • Varnish printing at point size 6 and below should be tested for readability.
Color formats	<p>Color management defined: A way to set up your environment (called a workflow) to allow devices to speak the same language to ensure you can get accurate and predictable results.</p> <p>Two primary color models*</p> <ul style="list-style-type: none"> • RGB — Devices that transmit light such as computer monitors and digital cameras display color using Red, Green, and Blue (additive color system). • CMYK — Printed materials reflect light and are made of four primary colors: Cyan, Magenta, Yellow, and Black (subtractive color system). <p>Controller software builds and renders images in RGB space before printing in CMYK space.</p> <p>*Grayscale and monochrome color models also supported.</p>
Supported color spaces	<p>All image rendering/compositing work is performed in a user-defined RGB working color space.</p> <p>Deployed RGB ICC working profiles for supporting working color space and/or non-ICC RGB images:</p> <ul style="list-style-type: none"> • sRGB IEC61966-2.1 (default) • sRGB IEC61966-2-1 black scaled • sRGB v4 ICC preference perceptual intent beta • Adobe RGB 1998 (bigger gamut than sRGB and is closest to the Artista VHD Module Gen 2 gamut) • ECI RGB v2 ICCv4 • Apple RGB • HDTV (Rec. 709) <p>Deployed CMYK ICC profiles for supporting non-ICC CMYK images*:</p> <ul style="list-style-type: none"> • Coated FOGRA39 (ISO 12647-2:2004) • Coated GRACoL 2006 (ISO 12647-2:2004) • Uncoated FOGRA29 (ISO 12647-2:2004) • U.S. Web Coated (SWOP) v2 <p>*It is recommended to always embed a proper ICC profile into source image files whenever possible to avoid any ambiguity.</p>

Image layout & formats (continued)

When saving images

- Always work from a Master version, keeping a large color gamut in known color space (i.e., sRGB IEC61966-2/1) and all layers and effects intact
- Use Save As to create a new file (a copy) in a preferred format for production.
- Production files need to be flattened to remove layers and finalize transparency.
- If saving as JPEG, choose Image Option: Minimal compression (maximum quality).
- If saving as JPEG, choose Format Option: Baseline (standard).

Entrust recommends a format with no compression or lossless compression (e.g. TIFF). If this is not possible, then the lowest level of compression is most desirable. Higher levels of compression can remove some information from images and can cause image artifacts such as banding or posterization, especially in images that have gradients. Low levels of compression are not likely to affect the true color match of ICC workflow.

For more information

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ABOUT ENTRUST CORPORATION

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