

C. Foil Stamping

1. Standard Foils - Overview

When a print project needs an elegant, non-tarnishing metallic finish to be applied to paper or a similar substrate, it's easily accomplished using a process referred to as *foil stamping or hot stamping*. The reproduction of graphics such as logos, polished metal, or highlighted spot areas requiring a high quality reflective image can be effectively achieved by using foil films rather than metallic inks for the end result. Metallic inks, which are similar to standard printing inks, provide a subdued metallic appearance. The natural tendency of the ink to be absorbed into the stock contributes to a duller looking effect.

Foil stamping or hot stamping (as it is called when heat is applied) requires a metal plate with an engraved image. The plate strikes a foil film, transferring the foil coating from the roll film onto the substrate that is to be imprinted. The substrate then receives the high-density metallic finish, resulting in a reflective image with a bright and dense metallic appearance. A wide selection of foil colors, finishes, and effects are available such as gold, silver, and colored metallics; marble, leather, wood, snakeskin, and pearl finishes; and geometric multi-dimensional patterns.

2. Holograms - An Alternative to Standard Foil Colors

Another foil product for the hot stamp process is the hologram. A hologram is a 2 or 3-dimensional image developed photographically with the use of lasers as the light source and special optics to create the graphics or photo images. The image is transferred to special foil film ready to be stamped onto a selected material.



A random (wallpaper) hologram has a spectrum of color changes when viewed from several angles. The image above shows how the hologram appears in a stationary position. The hologram shown below represents how it appears to the human eye as it is moved.



a. *Hologram Production*

If a hologram is to be designed specifically for a client's needs, such as a logo or architectural image, it may become expensive to create. Consequently, there are a variety of off-the-shelf stock graphics that are available, for a nominal fee, which can be used on any project where a stock hologram image is acceptable. Diffraction foils are one alternative for off-the-shelf products. Diffraction foils reflect multi-colored images and patterns, however they are flat in appearance. Other foils are also available off-the-shelf, which provide greater depth and dimensional effects.

| General costs and time required for the creation of a custom hologram may be as follows: | | |
|---|--------------|-----------------------------|
| Description | Time | Cost |
| Build model to be laser imaged | 2 to 4 weeks | \$ Depends on complexity |
| Hologram master (capturing the image) | 3 to 5 weeks | \$ 4,000 to \$ 15,000 |
| Hologram proof (displaying the result) | 1 week | \$ Included in master price |
| Foil materials (transferring image into foil) | 3 to 4 weeks | \$ 4,000 to \$ 6,000 |
| Cost to produce product (foil stamp on paper) | 2 to 4 weeks | \$ Depends on length of run |

b. Production Process

Art - Select an object or a model from which to work:

- A model will be used to create an exact image of the original in size and detail.
- The model will need to be made from a rigid material such as wood or plastic. Wax cannot be used due to the duration of the heat of the laser focused on the model. Plastic is not the best material to use since it can expand or contract with the laser heat.
- No motion can occur while the laser photo is being produced or the image will distort.
- If a model is desired, it must be built in a 1:1 scale as the desired hologram.
- For a 3D embossed hologram, the depth of the model should not be greater than 1" or the hologram may become hazy. Since the hologram is designed to be used under natural or standard interior lighting, it is required that only one inch of the depth be reproduced to enable an effect of greater depth to be created.
- Models will generally be constructed as a distorted image in order to achieve greater depth in the hologram image.

- Models can have line art logos combined together in order to create distinctive images.

Production - The laser photography process:

- An environmentally controlled photo lab, containing laser equipment and specially designed optics, is used to create exact replicas of the objects and models.
- A laser light is focused on the model or object to record the image. The laser light splits and separates into an object beam and a reference beam, hitting the object or model from different directions and then rejoining as one beam of light.
- A multi-dimensional image is formed at the intersection of the light waves and developed on a photosensitive glass plate, which becomes the "master".

Development - The electro-forming process:

- A photosensitive glass plate is placed into an electro-chemical bath where the chemicals form, or develop, the image on the glass plate.
- The image on the glass plate is then transferred to a nickel die, referred to as the "shim".

Foil Embossing - Transferring the image to foil:

- The nickel shim becomes the embossing plate that is wrapped around the embossing cylinder on the foil embossing press.
- The embossing press, using both heat and pressure, brings the shim in contact with thermoplastic, which will be used for embossing the hologram image into foil, metalized paper, PVC, or polyester material that becomes the final application.
- For longer run applications or wider embossed images, the image, which is now a relief pattern, is copied from the shim and reproduced onto a custom embossing cylinder or drum.

Transfer Application - Transferring the hologram image onto a substrate for further processing:

- Transferring the hologram onto a substrate occurs at this point by hot stamping or die cutting the hologram onto the selected material.
- Individual die cuts to create single sheet holograms or kiss-cut impressions on pressure-sensitive roll stock for hand or machine application, are then created.

Final Application - Transferring the hologram onto the printed piece:

- A hot-stamp press is used to transfer the image that exists on foil onto the materials (paper or plastic) that will be used in the print project.

- Some images are simply transferred from the pressure sensitive label material onto the receiving material, such as security labels that are attached directly to the product package. Generally, however, images are stamped into the product directly from the foil carrier, such as the hologram that is transferred to a credit card, promotional brochure, or carton face.

Holograms are produced either as registered or random (wallpaper) patterns. If the pattern or image is registered, it requires tight alignment controls for the hot stamping process. This is to insure that the hot stamp die strikes each registered image precisely, so that it is transferred completely onto the print material. Random patterns, however, are continuous throughout the foil material with no beginning or ending points. Therefore, when a random pattern is stamped into the stock, there is no need to be concerned for exact registration of the hot stamp die onto the foil pattern.

Four types of holographic images are available for a print project:

- *Patterned Images* are geometric designs throughout the foil in either a repeated or random pattern.
- *2 and 3-Dimensional Images* are realistic 3-D illusions of various inanimate objects.
- *Multiple Plane Images* are layered and repeated several times to create a 3-dimensional effect.
- *Stereogram Images* are 3-dimensional images of live objects presented in active sequences. Generally, the stereogram image is the most expensive hologram to produce.



A hologram will have an animated appearance when it is viewed from several angles. The animation shown in this graphic represents how the hologram moves as the human eye moves.

3. Planning Tips for Foils

a. *Stock Selection*

- Coated stocks such as clay or cast coated papers are the best paper materials for foil stamping since they are the most workable. They generally allow for greater area coverage without distortion or breakup of the foil. However, large areas of solids can lead to complications, such as gas trapping, which can cause the foil to bubble on the surface of the stock if the die has not been sandblasted prior to use.
- Vellum surfaced stocks with 25% rag content are excellent stocks for stationery products.

- Use caution if the printed piece is to have a coating applied prior to foil stamping. UV coatings or varnishes containing a high level of wax are not receptive coatings for foil stamping. Aqueous coatings or wax free varnishes provide the best surface results for foil stamping.
- If foil is being applied to laminated sheets, make sure the surface tension, also referred to as the dyne count, is higher than 40. Less than 40 will result in the sheet cracking and tearing.
- A coated and smooth stock is the best choice for hologram images. Uncoated or textured stocks will provide a dull or broken appearing image, destroying the true effect of the hologram.

b. Foil Selection

- Use caution when selecting a foil to be used on any document that will be imprinted on a laser printer. Choose a foil that has a high resistance to heat.
- Consult a Pantone Foil Color Selector when making a color selection from the hundreds of foils available.
- If two different foils are to be used and are to overlap, make sure the foils are compatible. Some foils will not adhere to other foil materials, so check this before foil stamping.

c. Artwork Preparation

- Set copy or create images with fonts above 8 point and lines thicker than 2 point. Use images that are more open and have fewer thin lines. Foils will have a tendency to fill in small, enclosed areas, thin lines, or closely kerned text. Thin serifs do not hold foil well unless the copy is stamped twice with the foil, which becomes time consuming and costly for the job.
- It is generally best to prepare images slightly larger than the size desired. This is to compensate for the resulting dimensional effect that occurs because the paper thickness tends to change the size of the image.
- Copy or images with very close registration may involve extra work and greater cost. Be careful not to use trapping techniques on any artwork appearing adjacent to foil stamping.
- Screened copy and images with changes in tones do not reproduce effectively into dies.
- If a bevel die is to be used, the artwork for the image and copy may need to be slightly enlarged to compensate for the image and copy reduction that occurs due to the beveled edges.
- On foil holograms, create and imprint the image with rounded corners to provide the best results.
- Keep images at least 1/2" away from the edge of the stock being foil stamped in order to eliminate wrinkles that will occur if the image is too close to the edge of the stock.

- For pattern holograms, provide line art of the desired pattern or shape.
- For 3-dimensional images, provide an actual item that is to become the image in the hologram. Laser technology will then be used to reproduce the image.
- For multiple-plane holograms, line art will be required for all 2-dimensional planes. For 3-dimensional planes, an actual item in the actual size will be required for reproduction.

d. Image and Die Preparation

- If film negatives are to be made for the dies, they must be prepared *emulsion up*.
- If the image has no appearance that easily indicates the direction of the image, mark the film "*right read*" to show which side prints up. Identify the top or bottom of the image so the engraver will understand how the die must be positioned for proper foil stamping.
- Color key proofs, used for viewing the proper image direction, are of much assistance to the engraver when building a die.
- Make sure the film image is not distorted or changed in size from the original copy.
- If stock is to be embossed and also foil stamped, prepare a separate piece of film or separate digital artwork for each image.
- For multi-level or dimensional dies, an engraver must be provided with a solid, opaque, film for each layer to be embossed. The opaque film identifies the silhouette area of each layer. The engraver must also receive film for the line art that will contain the images to be embossed. Provide a set of color keys that will be in register with the film and visually show the intended image layers in registration.
- As a general practice, make sure the engraver has a color key, a mock-up of the design, and any samples illustrating and defining the edges, shapes, and levels of the image in order to assist with identifying exactly how the image is to appear when foil stamped or embossed.

e. General Use of Foils

- Foils can be used for logos or accents surrounding logos, borders or highlights surrounding images, and elegant accents for distinctive symbols, images, graphics, or lines.
- Foils provide security for tamper resistant seals and security for documents. Holograms and foils have been used as seals for software or video products, and security on negotiable documents because they effectively display a tear if a foil seal is opened or torn.
- Documents that are not to be reproduced or counterfeited, such as background images in driver's licenses, membership cards, credit/debit cards, or personal identity badges, utilize foils and holograms for security. Foils and holograms are difficult to reproduce.

Note: Before creating a foil die for use in a project, consult with the organization doing the hot stamping to insure that the stock and the image desired are compatible.