

## HOLOGRAPHY PROCESS

Please follow the attached chart that shows the flow of the equipment processes.

- 1) **Origination:** This is the most difficult part of the process because it requires creativity and vision and technical skills. Origination is the creation of the image that you want to become a Hologram or diffractive pattern. The image you create must then be Laser Etched into an emulsion coated glass (Photo-Resist) substrate. The Hologram or diffractive image is really a micro-groove structure that you are creating so that the image you create has different properties at different angles of light.
  - a. DOT MATRIX origination- Once you have your design created on the computer, you simply mount the glass to the machine and it will dot by dot laser etch the image onto the glass.
  - b. 3D LABORATORY- This process delivers a true 3D image but you must first have or create a model. Then that model's image can be shot (via lasers) on the glass. The technical skill and environment are critical for this process to work well, a poor setup, dust or vibration will make for a bad image creation.
- 2) **SPRAY BOOTH:** The spray booth is accompanied by several specially designed spray guns and has several chemical spray processes. The glass from the origination and the plastic from the recombination are non-conductive surfaces. The electroforming process requires conductive surfaces in order to grow an image. When the spray is applied it leaves a very thin silver (conductive) layer on the surface of the substrate, that allows you to grow from in an electroforming tank.
- 3) **RECOMBINATION:** The recombining machine allows you to replicate an image that has been created. Using a step and repeat process with heat and pressure, an image is placed onto a plastic substrate several times to achieve the desired length and width to accommodate the embossing machine being used. This machine can also be used to create new patterns, add features to your shims like registration and eye-marks, cross-hairs, racing strips and they can be added in either matte or optical format.
- 4) **ELECTROFORMING:** The electroforming system process has one primary goal of growing Nickel shims. The secondary but equally important goal is to grow the correct thickness shim to accommodate the recombining machine and the embossing machine. Electroforming is an electro-chemical process where by pumping high current into relatively pure Nickel in a Nickel solution, you can replicate an image if that image is conductive. The basic process has been used for many decades. We have added features such as computer control to the process to make it more user friendly, decrease the use of some potentially dangerous chemicals, decrease the amount of human interface while increasing accuracy in shim thickness and growth repeatability.

The systems we offer consist of:

  - a. 1-**Cleaning tank** that passivates and cleans Nickel shims for growth in the tanks.
  - b. 1-**Soft tank** that allows metallized glass and plastic to grow master shims.
  - c. 1-**Hard tank** that is used to produce production shims for the embossing machine.
  - d. 1-**Computer Rack** that controls all of the rectifiers for the tanks.

- 5-8) **COATING MACHINE:** This machine is used to place a coating on your plastic film. The coating which allows you to emboss or place an image on the foil is called an emboss coat. There are several layers of coats that need to be added to obtain a good embossable foil that will have a quality image, will not pickoff during embossing and will not scratch after embossing and in the case of the Hot Stamp foil Size (Adhesive) coat it should release onto the required substrate properly.
- 6) **EMBOSSING MACHINE:** This machine uses Nickel shims (with a an image) and using heat and pressure embosses or places an image into millions of meters of foil. The Embossing process is nothing new, it is the ability to emboss a micro-groove structure with high quality, high speed and high repeatability over hundreds of thousands of meters tha defines this machine. The embosser should be built of rugged reliable materials, and the user should have easy access to the control systems and access to the rollers for speedy shim replacement and roller polishing.
- 7) **METALLIZING MACHINE:** This machine places a layer of metal onto the foil / film or paper product, this is how the mirror or shiny background is achieved. This process can be done before the embossing process for use with hard embossers, because the hard embosser can emboss into the metal coat. The recommended procedure is to add the metal coat after embossing, using either a hard or soft embosser, because this will deliver the brightest image.
- 9) **LAMINATING MACHINE:** This machine basically uses 2 nip rollers to apply the embossed product to the desired substrate, it could be sized hot stamp foil to board stock or a pressure sensitive adhesive backed product for labels. The lamination can be done with or without heat depending on the product.

## HOLOGRAPHY FLOW CHART:

