



E3 SYSTEMS LTD.

YOUR ONE STOP MARKING AND DECORATING SOLUTION PROVIDER SINCE 1975



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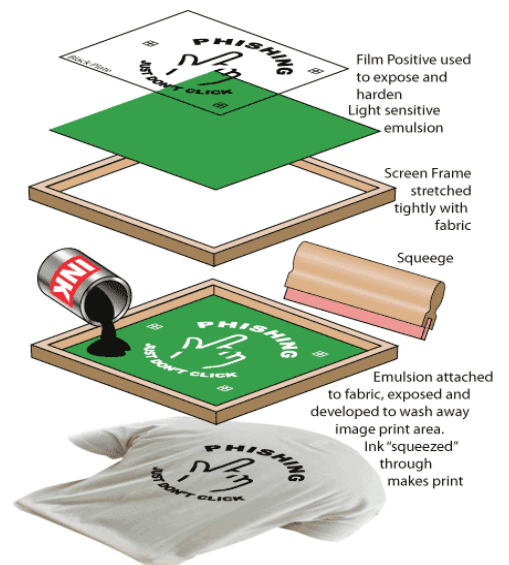


TYPES AND PROCESS OF MARKING AND DECORATING PRODUCTS

Pad Printing is a printing process that can transfer a 2-D image onto a 3-D object. This is accomplished using an indirect offset (gravure) printing process that involves an image being transferred from the printing die plate (cliché) via a silicone printing pad onto a substrate (surface to be printed). Pad printing is used for printing on otherwise impossible products in many industries including medical, automotive, promotional, apparel, electronics, appliances, sports equipment and toys. It can also be used to deposit functional materials such as conductive inks, adhesives, dyes and lubricants. Physical changes within the ink film both on the cliché and on the pad allow it to leave the etched image area in favour of adhering to the pad, and to subsequently release from the pad in favour of adhering to the substrate (material being printed). The unique properties of the silicone pad enable it to pick the image up from a flat plane and transfer it to a variety of surface (i.e. flat, cylindrical, spherical, compound angles, textures, concave surfaces, convex surfaces).



Screen Printing is a wet process where ink is squeezed through a fine mesh material onto the part to be decorated. A film positive is made of the artwork and then laid over a fine mesh material which has been tightly stretched and fastened to a frame. The mesh material has been coated with a light sensitive emulsion and the film and screen are then exposed to a mercury vapour light. This exposure hardens the emulsion on the screen creating a solid barrier. The portion of the screen that was covered by the film positive remains soft and is washed off the screen with a pressurized water spray.



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The completed screen now allows ink to pass through this washed out area while preventing ink from passing through the hardened emulsion. This washed out portion of the screen is now an exact duplicate of the artwork to be placed on the part.

The screen is then mounted in the screen printing machine and clamped in place. A fixture is mounted under the screen which is designed to hold the part to be printed in the correct location. The part is then placed in the fixture and ink is added to the screen. The ink is squeezed through the screen with a rubber squeegee while the part is moved under the screen, allowing the ink to be placed on the part.

Water Transfer printing starts with pre-printed high-definition patterns on a water-soluble transfer film. From there, several important steps must be followed to develop a successful print:

1. Preparation. Depending on the substrate, some or all of the following steps may be necessary: chemical pre-treatment, fill and sanding, masking, application of spray chemical adhesion promoters, plasma treatment, or corona flame treating.
2. Tooling and Fixtures. Parts are attached to a specific fixture, which holds the parts during the dip process. Generic fixtures can host many different parts but occasionally, engineers have to design custom fixtures to host unique parts.
3. Primer Painting. A coat of primer paint is applied to the part. This paint serves as a bonding agent between the part and the transferred inks. The paint color typically becomes part of the background contrast color as well.
4. Ink Transfer or Dipping. The fixture part is now dipped through the inks, which are floated on water in a specialized processing tank. As the parts are immersed through the inks into the water, displacement of the water carries the inks around the three-dimensional shape of the part.
5. Wash and Rinse Process. Parts travel through a hot water wash line to remove excess processing chemicals. The last stage of the wash line dries the part.



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6. A detailed inspection of the ink transfer and adhesion is completed. On occasion, parts with extremely complex geometry may require manual touch-up using the transfer inks.
7. Sealing Top Coat. Based on the customer's specifications, either a high gloss, satin, or flat top coat of clear Urethane finish is applied to seal the inks. One or more coats may be applied and in some cases, buffing and polishing is required between coats.

Label is a process where a printed, self adhesive paper is applied to the finished molded part. This method typically relies on the printing process such as screen-printing, ink-jet, laser printing and typically used in the appliance and automotive industries. It is inexpensive and very easy to use but the label can be peeled off very easily. Additionally, the applied label will not look like part of the molded product and will exhibit "witness" lines where the label ends and the molded part begins.

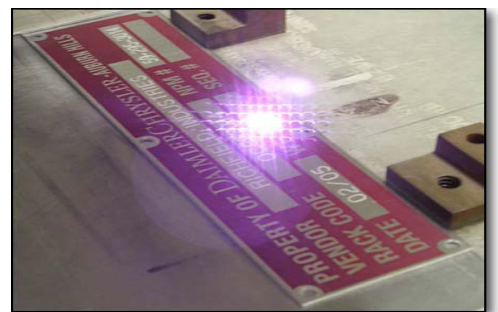


Pressure Sensitive Labelling as the name suggests, labels are produced on rolls and an adhesive is applied to the back of the label. The label roll is then mounted on a machine that applies this label to the part. The machines used are specifically designed to apply different types of labels.

Some machines apply full wrap labels to a round bottle or jar. Some machines have the same function except that they register the label to the bottle seam. Some machines apply labels to oval bottles and jars. The application process is basically the same with a specific mechanical handling system designed to the type of bottle or jar to be labelled.



Laser Etching is most often used in conjunction with spray painting to etch graphics on plastic or elastomers. The laser etching process can be used to mark a variety of materials that would otherwise be difficult, if not impossible, to mark mechanically. It is ideal for products requiring intricate decorative work however, it is a slow process and not recommended for high volume applications.



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Hot Stamping is a dry printing process. In hot stamping, metallic or color pigmented hot stamping foil is applied to the part by trapping the material between a heated die and the part. Heat and pressure is applied and the foil is released from the carrier and is permanently bonded to the part. Hot stamping machines are specific to certain types of applications. Flat hot stamping machines are designed to be used exclusively on flat parts or flat areas of a part. Roll hot stamping machines are designed to rotate a round or oval part under the die to print on these types of surfaces allowing for 360 degree printing on round cylindrical shapes and front or back printing on oval shapes.



Heat Transfer is a dry printing process like hot stamping where a pre-printed graphic image is trapped between a heated plate and the part. Heat and pressure is applied to the part and the graphic is then permanently bonded to the part. The advantage over the Heat Transfer process is that multi-color graphics can be applied to a part in one pass; therefore the customer can have the benefit of a multi-coloured print while only having to pay the cost of a single application. Although this process has many advantages, it is usually only cost effective in higher volume applications because of the cost associated with setting up and screening the transfers.



In-Mold Decorating / In-Mold Labelling

The definition of In-Mold Decorating (IMD) / In-Mold Labelling (IML), in the most general terms, is described as any technology which applies text, patterns, or graphics to a plastic molded part during the molding process.



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