Mounting – General Notes

Mounting, laminating and bonding are terms that are often times interchanged. For this document mounting is defined as the attachment of the graphic to the substrate. Lamination is the application of a covering (film or liquid) over the mounted item to either protect the graphic or provide a certain appearance i.e. matte or glossy finish. Bonding also conveys affixing one thing to another. This can involve a graphic to a substrate or one substrate to another. This document uses the term "mounting" to convey affixing as opposed to bonding. A paper, foil, plastic or fabric graphic can be mounted to the substrate.

With regard to adhesive, mounting consideration should follow the adhesive manufacturer's instructions. In general, determine the minimum amount of adhesive lay down to attain the desired adhesion level. It is advisable to leave the boards for a period of time to setup. Consult the adhesive manufacturer's instructions to see what specific times are recommended. Please refer to Appendix I for additional adhesive information.

1. A Note on Archival Mounting (Conservation Framing)

a. The substrate is not suitable for Archival Mounting.

b. Conservation or archival mounting requires the selection of materials that are pH neutral to use in conjunction with the substrate and the artwork. This includes matting material, hinges, and adhesives. Matboards, particularly those in contact with the art, should meet the Library of Congress specifications. Art must never be mounted in contact with the glass. If long-term preservation is the goal, only UV protection glass should be used. Finally, it is a good practice to seal the back of the frame with a dust cover or barrier paper.

2. Methods for Mounting

a. There are a variety of methods (adhesive, pressure, etc.) for mounting a graphic to a substrate. For this document, mounting will be broken into two groupings; hot or cold mounting, with discussion on the various methods of applying pressure.

   i. Hot mounting provides a heat source to activate the adhesive. Typically, this is accomplished with a heat source associated with either a vacuum press or a roller press.

   ii. Cold mounting typically utilizes a spray or pressure-sensitive film or coating in combination with a roller press.

b. Printed papers, foils, and fabrics can all be mounted to the substrate provided that the proper types of adhesives are selected. Mounting can be accomplished on most standard equipment capable of applying adhesive and laminating sheets or roll stock to rigid boards.

3. Surface Preparation

a. Surface should be cleaned and free of any surface contaminates (i.e. oils, dust particles, etc.) prior to commencing.

b. If surface has become soiled or scratched, it may be lightly hand sanded with a silicon carbide dry paper 180 grit or finer. Ensure that any remaining loose dust is completely removed from the substrate.

4. Other Considerations

a. Care should be taken when using laminate films on only one side of the mounted graphic. Moisture pickup will be sealed on one side while the other side in not protected from moisture pickup. Bowing may occur because of moisture imbalance.

b. Additionally, care should be taken when mounting only one side with spray adhesives. As the mount cures out, tensile forces within the adhesive may cause the substrate to bow. It may be necessary to apply a counter-mount of comparable strength on the backside.

c. Finally, one must use the minimum amount of tension when mounting with film or pressure sensitive adhesives as too much tension will cause the substrate to bow; too little will cause the graphic to wrinkle.

Hot Mounting – General Notes

The substrate can be hot mounted utilizing dry mount tissues. The following settings are recommendations; trialing is necessary before commercialization:

- Maximum temperature not to exceed 200°F.
- Maximum time not to exceed two-to-three minutes
- Panels in excess of 3/16" should be placed in the press and pre-heated prior to mounting
- Be sure to follow the adhesive supplier's recommendations.

Cold Mounting – General Notes

1. Getting Good Adhesion

a. To cold mount pressure-sensitive adhesives, you need sufficient pressure. You also must make sure that proper spacers are used. Because effective mounting depends on equal force exerted across the entire width of the substrate being mounted, the top roll must move down evenly left and right. Even contact between the top and the bottom mounting rolls is essential.

b. Adequate pressure helps squeeze out air from between the adhesive, the substrate and the print.

c. The mount obtained after 3 hours will generally allow for processing. Maximum mount is usually obtained within 24 hours after mounting.

d. To test adhesion, flex the finished mount. It should not come loose in the center.

e. Moisture can become trapped between layers of porous material (such as paper) and cause blisters. The level of moisture in the atmosphere should be reduced before press work. Prints may even have to be pre-dried.

f. When tacking prints to the substrate, some shops will hang a number of tacked pieces in an upside-down position until they are ready to pass them through. As a precaution, it is advisable not to hold them any longer than 10 minutes or the prints may absorb moisture, change in dimension and cause bubbles and wrinkles.

g. Please contact the film manufacturer for recommendations concerning the use of their respective laminating material in conjunction with the substrate as film choice is the most important consideration.

h. It is advisable to use a film with a high "green tack" strength. When using pressure sensitive films, the substrate should be at room temperature to achieve optimal results.

2. Demounting Bad Mounts

a. Pressure-sensitive adhesives may be demounted if done within 5 minutes after mounting. The print will probably be ruined, but the substrate may be reused.

b. Beyond 5 minutes, the adhesive has set and other methods will have to be used, such as a hot air gun or a hair dryer to peel off the laminate. The remaining adhesive may be taken off with isopropyl alcohol or mineral spirits.

3. Avoiding Wrinkles and Surface Blemishes

a. Wrinkles can be caused by misalignment of adhesive roll, too much pressure, or unparallel rolls.

b. Small bumps, particularly visible with Cibachrome or glossy prints, are caused by trapped dirt or hardened adhesive. Good housekeeping and an ionizing static eliminator on the press are important to minimize dirt pick-up. During mounting, the back of the print should be checked and wiped down before it is processed. If bumps are caused by hardened adhesive (cut open to check), use a fresh roll or sheet of transfer adhesive. To prevent strikethrough, one might also consider using a print made with thicker paper (.007+).

c. Pressure roller applicators can compress the leading edge of the mounting substrate. In order to keep the leading edge from rounding as it goes through the roller, use a plastic lead or guide of the same thickness of the mounted substrate.

4. Clear Overlays

a. Clear high-gloss overlays enhance color and protect against fading indoors and outdoors. To avoid blistering, do not use overlays, clear coatings, or sprays which contain solvents.

Cold Mounting Procedures

There are several techniques for cold mounting to the substrate:

1. Cold Mounting by Hand Using Transfer Adhesive

a. Take a sheet of transfer adhesive (both sides covered by release paper) and fold back release paper on one side approximately 1/2" from one edge.

b. Tack on edge of print to exposed adhesive.

c. Lift the print slightly, remove the rest of the release paper and use a roller or squeegee to smooth the print onto the adhesive. The back of the print is now coated with an adhesive which is protected by release paper.

d. Before mounting to the substrate, remove excess air between print and adhesive. This is done by turning the print over so that the release paper is up and smoothing out from the center with a squeegee.

e. Now peel off approximately 1/2"–1" of release paper from upper edge and fold back.

f. Tack on to the substrate, lining up edges.

g. Using a hand roller or squeegee, closely follow the removal of the liner to eliminate bubbles caused by air entrapment. Work with a small surface at a time (approximately 12"). Continue this step until the mounting is complete.

2. Cold Mounting by Hand or Press Using Spray Adhesive

a. Select a spray mounting adhesive that is safe to use with polystyrene and the artwork to be mounted; solvent based adhesives should be used with caution.

b. Spray adhesive on the back of the piece to be mounted. Spray 6"– 8" away from the surface. A double coat is best, with the second coat applied in a cross direction to the first coat. For mounting most art materials, adhesive need only be applied to one surface, preferably the print. Avoid using excessive bonding adhesive

c. Before mounting, allow adhesive to dry to the touch; the adhesive must be aggressively tacky. If there are blisters due to trapped solvent, allow slightly longer than 4 minutes of drying time.

d. Carefully position piece on the substrate and smooth out if possible to eliminate any wrinkles and trapped solvent.

e. If using a press, simply turn on the press to complete the mount.

e. If mounting is done by hand, place a clean sheet of the substrate over the laminated piece and weigh down for 15 minutes to obtain the maximum bond. Depending upon the type of adhesive, allow 24 hours for maximum cure out before exposing the laminate to sudden temperature or humidity changes.

3. Cold Mounting by Roller Laminator with an Adhesive-backed Graphic

a. Adjust rollers to the thickness of the substrate to provide adequate pressure for mounting.

b. Peel off a 1/2"–1" section of release paper from the upper edge of the preprinted adhesive backed paper.

c. Tack on to the substrate, lining up edges.

d. Feed tacked edge into nip of rollers keeping printed piece bent away from the substrate.

e. As it passes through the rollers, strip away the release paper. (Make sure there are no wrinkles or trapped dirt.)

4. A Note on Cold Mounting Non-Porous Graphics

a. For non-porous material such as PVC, other plastics or metal, the following types of contact adhesive with solvent may be used.

   i. Neoprene, nitrile, polyurethane or other synthetic rubber types

   ii. Adhesive must be applied to both faces. Parallel beads of adhesive are often preferred because it allows evaporation of solvent providing faster cure.

   iii. For mounting the substrate to flexible PVC sheets, only plasticizer-resistant types of adhesives should be used.

5. A Note on Cold Mounting Porous Graphics

a. For porous materials such as paper, textiles, fabrics or wood, the following adhesives may be used.

   i. Contact adhesive with solvent: Same systems as for non-porous materials.

   ii. Construction mastic, structural silicone adhesives.

b. Considerations such as expected temperature ranges (expansion/contraction), porous material, and size of substrate should be taken into careful consideration when deciding on a method of attachment.

6. A Note on Cold Mounting with Pressure Sensitive Tapes

a. Pressure sensitive tapes can be used for:

   i. Less demanding applications that are stress-free.

   ii. Adhering parts during installation work.

   iii. Holding parts while the primary adhesive is curing.

b. Trial pressure sensitive tapes prior to use.

Gatorfoam and Gatorblanks are not recommended for Repositioning Vinyl, however Gatorplast can achieve this fabrication method.

Vinyl – General Notes

Major market brands of vinyl films work well with the substrate. These vinyl films are, for the most part, flexible PVC films and are produced in various thicknesses, color shades, and gloss levels. They can also be un-pigmented to act as a U.V. inhibitor. These films have a layer of adhesive and a siliconized sheet of cover paper. These films generally have excellent adhesion to the substrate. Final selection of a particular vinyl film should be made after consultation with the manufacturer to ensure conformity for its application.

For thinner gauge substrates (1mm-2mm), the technique of "counter-balancing" should be considered. A vinyl sheet may be required on the back side of a vinyl covered substrate to prevent the possibility of bowing.

As a rule, take caution to avoid too much tension when applying vinyl, as excessive tension may lead to bowing of the substrate.

1. Surface Preparation

a. Surface should be cleaned and free of any surface contaminates (i.e. oils, dust particles, etc.) prior to commencing.

b. If surface has become soiled or scratched, it may be lightly hand sanded with a silicon carbide dry paper 180 grit or finer. Ensure that any remaining loose dust is completely removed from the substrate

2. Repositioning the Vinyl

a. Identify any misaligned or improperly adhered vinyl graphic.

b. Using a sharp edge or razor blade held at a 45-degree angle to the substrate, begin to lift the vinyl, taking care to not scratch the substrate surface.

c. After lifting enough of the vinyl surface in order to grab between the fingers, continue to peel back the graphic by hand, proceed with a proper speed so as to not tear or damage the vinyl graphic.

d. Once completely removed, lay the vinyl graphic face-down smoothly on transfer paper.

e. Reposition the vinyl graphic face-up in the proper location on the substrate and gently rub the transfer paper to re-adhere the vinyl graphic.

f. Remove the transfer paper and gently press out any wrinkles or bubbles within the vinyl graphic by hand.

Gatorblanks are not recommended for Direct Digital Printing, however Gatorfoam and Gatorplast are recommended for this fabrication method. Please see the fabrication guide on Page 8 for suitable fabrication techniques.

Direct Digital Printing – General Notes

Large format digital printing on flatbed printers has excellent application for the substrate. Although the substrate is available in a wide range of colors that all demonstrate excellent ink adhesion, the predominant substrate color is white when direct digital printing. However, colored variations of the substrate may provide vibrant color contrasts depending upon the availability of a white print head on the printer.

1. Surface Preparation

a. Surface should be cleaned and free of any surface contaminates (i.e. oils, dust particles, etc.) prior to commencing.

b. If surface has become soiled or scratched, it may be lightly hand sanded with a silicon carbide dry paper 180 grit or finer. Ensure that any remaining loose dust is completely removed from the substrate.

2. Suitable Inks

a. Actual ink type depends upon the printer make and model. Consult the printer owner's manual for recommendations. Trialing for ink compatibility is always recommended.

b. The substrate readily accepts all types of inks including:
   i. Aqueous
   ii. Solvent-Based
   iii. UV-curable

Gatorblanks are not recommended for this fabrication method. Please see the fabrication guide on page 8 for choosing the best recommended product.

Direct Screen Printing – General Notes

Large format screen printing has excellent application for the substrate. The substrate is available in a wide range of colors that all demonstrate excellent ink adhesion.

1. Surface Preparation

a. Surface should be cleaned and free of any surface contaminates (i.e. oils, dust particles, etc.) prior to commencing.

b. If surface has become soiled or scratched, it may be lightly hand sanded with a silicon carbide dry paper 180 grit or finer. Ensure that any remaining loose dust is completely removed from the substrate

2. Suitable Inks

a. When screen printing with the substrate, the following inks may be suitable:
- Solvent-based
- Vinyl/Acrylic
- UV-cured

b. Screen Printing inks should be tested in a manner which duplicates your printing process before initiating production. It is advised that you contact the equipment and ink supplier to provide you with specific recommendations to achieve maximum results. It is strongly recommended to consult the appropriate ink manufacturer regarding any required ink additives such as catalyst for proper adhesion and exterior use.

3. Ink Curing

a. The ink, once applied, must be given proper time and treatment to completely adhere and cure.

b. Oven temperature must be controlled to a maximum of 180°F to prevent deterioration of the foam and possible warping.

Painting – General Notes

Painting is a suitable fabrication option for the substrate, whether for artistic expression or more commercial applications. On some projects that involve the substrate, a small quantity of "custom color" may be required that is often not practical to obtain from the factory and post painting is a viable option.

1. Surface Preparation

a. Surface should be cleaned and free of any surface contaminates (i.e. oils, dust particles, etc.) prior to commencing.

b. If surface has become soiled or scratched, it may be lightly hand sanded with a silicon carbide dry paper 180 grit or finer. Ensure that any remaining loose dust is completely removed from substrate.

2. Suitable Paints

a. The substrate readily accepts the following:
- Poster colors
- Acrylic paints
- Tempera
- India ink
- Latex-based pigments
- Lacquers
- Vinyls
- Some water-based paints may also be suitable, depending upon the application.

b. Lacquers, shellacs, and solvent-based paints should be used only when not allowed to penetrate the liner or contact the foam edge. These types of paints are likely to attack and deteriorate the glue line and the polystyrene foam. Excessive coating of solvent based paint will weaken the glue line and in the extreme cases, cause the Gatorfoam to delaminate. Therefore, trialing is recommended before full scale commercialization.

3. Application

a. Paints can usually be applied with a brush or roller, although conventional air spray equipment will provide a more consistent appearance.

b. Consult paint manufacturer's literature for recommended application technique and thinning requirements.

c. Spray coating normally offers the best all-around results with smoother, more uniform coverage. Curtain coating is not recommended due to a bubbling action created in the paint. The bubbling is caused by an air displacement and solvent flashing situation when applying a high volume of paint so quickly. This problem may be minimized by specifying flat pigment and slower solvents in the paint or by using water based paints.

4. Drying

a. For drying and cure times, consult paint manufacturer's literature.

b. Due to the wide variety of paint products on the market, testing is recommended for the initial use of any coating system before commercialization.

Cutting – General Notes:

There are many different methods in which "cutting" can be accomplished. This guide focuses on five primary cutting methods:

- Knife Cutting
- Shearing
- Saw Cutting
- Routing
- Die Cutting/Punching

When necessary, laying out a pattern on the surface of the substrate is best achieved with a soft pencil.

1. Knife Cutting

Only Gatorplast in thickness of 3/16" can be fabricated by this method.

The substrate can be cut by hand with mat knives, utility knives, and razor blades. Mat cutters make smooth, excellent cuts, either right-angled or beveled. Cardboard and glass cutters also work well. The key to getting a smooth, clean cut is to use a very sharp thin blade held at as low an angle as possible to the board, which reduces friction. If a straightedge is being used as a guide, it may be practical to make the cut in more than one pass.

2. Shearing

Large-scale straight-line cutting of the substrate can be done in several ways, including automated razor blade cutters or power shearing with guillotine cutters. Though not generally recommended because they can compress and fray the edges of the board, a guillotine cutter can be used to cut one or more sheets at a time. Caution must be observed to prevent the foot-clamp from indenting the board's edge. A stop block placed on each side of the foot-clamp may be necessary. A sheet of cardboard on top of the substrate may reduce compression. The blade must be maintained sharp and cut with a scissor-like motion.

3. Saw Cutting

Gatorfoam is made with man-made wood veneer facers and may be easily cut with standard table and band saws as well as woodworking saws. Band saw blades should be thin and with the finest teeth possible

4. Routing

For irregular cuts and shapes, cuts can be easily accomplished with a standard wood router. The tool should have as many wings as possible with positive rake hook angle and face shear for smooth, clean cuts.

5. Die Cutting/Punching

Only Gatorplast is recommended for this fabrication method. Please see the fabrication guide on page 8 for choosing the best recommended product.

Die cutting and/or Punching is a method for the rapid production of flat shapes or cutouts. Typical applications would include the die cutting of:

- Letters and shapes.
- Openings in a sheet used as part of an assembly
- Puzzle pieces

Die cutting and punching processes are similar in that they both can provide a curved shape by cutting through a substrate. Die cutting, however, uses one steel rule die that comes in contact with a flat platen, whereas, a punch has two designed shapes, a male and a female that cut the shape when pressed together.
Die cutting is typically used with lighter weight paper or foam type materials, where punches are used for heavier materials.

Prior to die cutting, the substrate can be painted or screen printed.

1. Steel Rule Die Cutting Process

a. The key elements to consider when die cutting are: the substrate, the press, the steel rules, and the ejection rubber. Each of these elements must be selected properly to yield satisfactory results.

b. Although various methods such as using punches and "high-dies" are applicable to die cutting the substrate, cutting with steel rule dies (SRD) is the most common.

c. SRD work basically the same way as a cookie cutter. They are made of a 1"-wide strip steel with one pre-sharpened edge. The cut strips are called "rules." The strip steel is typically made in a thickness range of .014"–.166". The strips are bent to the shape of the design's trim line and held in place in a block called a "die body."

d. In order to facilitate ejection of the part, strips of a compressible material such as neoprene are glued along the perimeter and protrude above the cutting edge of the rule. The strips can also be glued to the top or bottom platen to hold the substrate in position.

e. During die cutting, the SRD assembly is fixed under the top platen, and the substrate is placed on a steel bottom platen. Pressure is applied to force the rules of the SRD through the substrate.

f. The platens are then opened and the parts removed. In some cases, additional work such as finishing the cut edge might be required.

2. Press Considerations

a. The substrate is typically die cut on flat bed presses, which can be either a "moving platen" type or a "clam shell" type. Either type may be utilized without affecting the quality of the die cut.

b. The key press consideration is proper "make ready", or preparing the press bed (anvil) to assure that the steel rule cuts evenly through the substrate without dulling the steel rules.

c. Typically, the substrate is cut on a "hard anvil." Make ready for this type of die cutting utilizes carbon paper. The press is lowered to the point where the steel rule just touches the anvil. The places where the rule fails to touch the anvil are built up with one-mil thick shim-tape. This process is repeated until a complete imprint of the steel rule is apparent.

d. Make ready is very important because the platen of the press does not necessarily close evenly. This can be caused by misalignment, uneven cutting loads or by deflection of the platen. As a rule of thumb, a four-post press will deflect one mil per foot. Steel rules that have been dulled by improper make ready will cut poorly, have increased cutting loads and can contribute to cracking problems.

e. Back-Up Plate
   i. One problem with steel plates is that the die might not completely penetrate the substrate which can result in fracturing at the base of the cut. An alternative to a steel plate would be to use additional substrate or chipboard as a back-up. This would allow the die to penetrate beyond the thickness of the substrate so that a cleaner cut could be obtained.

3. Steel Rule Considerations

a. Steel rules are flat strips of steel with a very uniform height. One edge of the steel rule is honed to yield a cutting surface. The key properties of cutting rules are hardness, flexibility, bevel type, thickness, uniformity of height and edge preparation

b. Steel rules that apply to this substrate are listed below:

i. Cutting Rules

1. Cutting rules are the most common when die cutting the substrate. These rules are used to cut the edge. Cutting rules are either center bevel or side bevel, which indicates where the cutting edge is located.

a) Center bevel rules result in equal forces being placed on both sides of the piece to be cut and are used when both the inside and the outside of a cut needs to be saved, e.g., as in a puzzle. This distribution of forces can be important when attempting to minimize cracking

2. Side bevel rules have one side that is essentially flat and the opposite side is sloped or beveled. The flat side should be placed toward the substrate that will be kept, with the bevel facing the scrap piece. This results in additional compressive force being placed on the scrap side. Cracking tends to be directed in this direction.

c. Edge Preparation

i. The edge of the steel rule can be prepared in either two methods:

1. Grinding
   a) Ground edge rules have micro-scratches on the cutting edge. This can result in a blade that has a reduced cutting force.
   b) The disadvantage of this type of rule is that it is difficult to maintain the uniform blade height.

2. Drawn Edges
   a) Drawn edge blades are made by drawing the blade through a die.

   b) This produces a uniform blade height and a smooth blade surface.

ii. Although the knife has been hardened to 57-59 RC (Rockwell), after numerous die cuts, the cutting edge will become dull and may result in rough and/or incomplete cuts. Generally, it is not a good idea to resharpen the knives. Resharpening will often result in an uneven knife length. This in turn can cause uneven penetration or no penetration when the cut is made.

4. Strippers / Ejectors

a. Ejection and Stripping Rubber

Ejection and stripping rubber is essential when cutting the substrate. It serves two purposes. The first purpose is to eject the part from the die after the press opens. The second purpose is to prevent cracking.

Section VII: Embossing

Embossing

The substrate is not recommended for this fabrication method. Please see the fabrication guide on page 8 for choosing the best recommended product.

Section VIII: Forming Curves

Forming Curves

The substrate is not recommended for this fabrication method. Please see the fabrication guide on page 8 for choosing the best recommended product.