



FABRICATION & INSTALLATION GUIDE

MONARC is a new product from 3A Composites Americas developed for wet-wall applications as well as other interior design solutions such as kitchen backsplashes, accent walls, etc. It is comprised of 3A Composites' aluminum composite material (ACM) that has been decorated with realistic images of natural stone, tile, and other materials, utilizing proprietary materials, technology, and processes. This fabrication and installation manual has been developed to assist installers working with 3mm MONARC material in the most efficient and effective manner.

MARCH 2022

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INTRODUCTION

Product Information

MONARC from 3A Composites Americas

MONARC is a new product from 3A Composites Americas developed especially for wet-wall applications as well as other interior design solutions such as kitchen backsplashes, accent walls, etc. It is composed of 3A Composites' Aluminum Composite Material (ACM) panels that have been decorated with realistic images of natural stone, tile, and other materials, using proprietary materials, technology and processes. These 3mm thick panels are lightweight, durable, dent-resistant, and easy to fabricate and install.

The following installation instructions are focused on wet wall installations in residential structure. There is additional information on the fabrication of ACM on 3ACompositesUSA.com.

GETTING STARTED

Fixtures

For bathrooms requiring a new tub or shower base it is important that the new plumbing fixture is installed as per the manufacturer's recommendations and that it is installed as level and square with the walls as possible.

Plumbing Valves

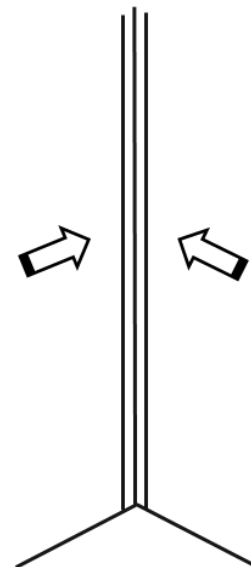
When a new tub/shower valve is being installed, make sure to install the new plumbing valve to align with the center of your plumbing fixture. Also, when installing a new shower head, adjust the height of the shower head so that the escutcheon cover plate for the new shower head can completely sit on the MONARC wall panel or sit completely on the finished wall above the MONARC shower wall panel. This can be accomplished by making sure that the shower head height is 2 inches above or below the finished MONARC shower wall height.

Backer Materials

MONARC wall panels are designed to be installed over any type of a securely mounted wall or wall substrate. This would include any type of sheetrock or other solid wall backer materials. Before installing MONARC wall panels make sure that MONARC panels and the walls they will be covering are clean, dry and free of any oils, dust, loose paint, or other contaminants that could prevent the MONARC shower wall panels from adhering to the desired installation wall.

Corner Seal Protector

Corner Seal Protectors, or **CSP's**, are an optional corner reinforcement and two stage joint fault protection. To install CSP's apply a bead of caulk adhesive into any inside corner where two MONARC shower wall panels will meet together. Apply caulking just short of the measured height that the MONARC wall panels will be covering. Then take the flat pre-embossed CSP and fold it over on itself making a V shape and cut it to desired length. With a putty knife push the V shaped CSP into the adhesive and center it in to the corner of the wall. Using the same putty knife flatten each side of the CSP to each of the adjoining walls and spread the adhesive smooth making a nice sealed and smooth corner.



SHOWER WALL INSTALLATION

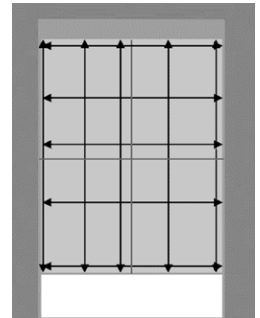
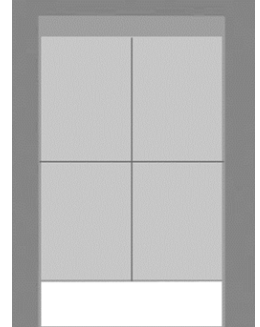
Wall Panel Installation

Using the Plumb & Level Method

Step 1: Draw two plumb vertical lines on the outside walls that indicate where the shower wall edges will be once the MONARC shower wall panels are installed. Draw a level line on each of the three walls indicating where the top of the shower panels will reach. If the kit is going to the ceiling, the ceiling will act as this line.

Step 2: Next draw a level horizontal line across the middle of each of the three walls to receive MONARC shower wall panels. Finally draw a plumb line that is centered in the middle of the back wall of the installation.

Step 3: Measure and write down the measurements from the plumb, level, and perimeter lines to the ceiling, tub/shower pan, and adjoining walls in multiple places across the wall.

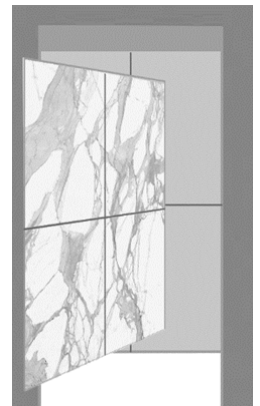


Back Wall Panel Installation

Step 4: Starting with the MONARC shower wall back panel, draw one vertical and one horizontal line down the middle on the protective film of the MONARC shower wall Panel.

Step 5: Transfer the measurements to the MONARC shower wall back panel. Using a jigsaw, router, or powerplane, you can cut the panel to size and make the adjustments as needed for a perfect fit.

Note: If installing panels with a grout line, you can align the grout line to the plumb and level lines. This will help to ensure that your grout lines are installed both plumb and level. Use this same process for end walls ensuring that grout lines align where the panels come together in the corners.



SHOWER WALL INSTALLATION

Back Wall Panel Installation (cont'd.)

Step 6: After the MONARC shower wall back panel has been dry fitted and trimmed to a perfect fit, clean the back side of the panel with denatured alcohol. This will eliminate contaminants from interfering with the adhesion of the MONARC shower wall panel to the wall backer board.

Step 7: Now that the panel is ready to install, spray contact adhesive on the shower wall backer board along with the back side of the MONARC shower wall. Make sure to always follow the adhesive manufacturer directions. Reference **General Adhesives & Double-Sided Tape Guidelines** on page 16. Testing is strongly recommended before large scale production.

Optionally, non-contact spray adhesives may be used such as a polyurethane or one hundred percent silicone adhesives. Double-stick tape can be used around the edges of the panel in conjunction with non-contact adhesives allowing panels to be held in place while the adhesive dries.

Step 8: Install and push panel by hand into place and roll with a roller to ensure a good bond.

Step 9: After the back wall has been installed and rolled into place, run a bead of one hundred percent silicone down each corner ensuring that it is sealed to the walls in each corner. Using a silicone spreading tool, clean and smooth the silicone joint prior to installing the MONARC shower wall side panels.

Side Wall Panel Installation

Non-Plumbing Wall

Step 10: Similar to the back wall installation, draw one horizontal line across the middle of the MONARC shower wall panel on the protective film.

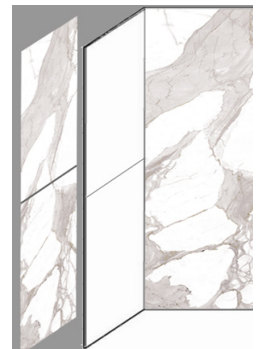
Note: The outside edge of the MONARC shower wall panel and the outside perimeter vertical line located on the installation wall will act as the plumb line for the side wall installations.

Step 11: Using the level line and the outside perimeter vertical plumb line on the installation wall, write down multiple measurements to the ceiling, tub/shower pan, and back wall.

Note: If using wall panels with grout lines make sure to measure and transfer measurements to grout lines as well to ensure the alignment of grout lines between panels.

Step 12: Transfer the measurements to the MONARC shower wall side panel. Using a jigsaw, router, or powerplane, you can cut the panel to size and make the adjustments as needed for a perfect fit.

Step 13: Repeat Steps 6, 7, and 8 for adhering MONARC shower side wall panel to the wall.



SHOWER WALL INSTALLATION

Side Wall Panel Installation (cont'd.)

Plumbing Wall

Step 14: Repeat steps 10, 11, and 12 for the MONARC shower plumbing side wall panel to be installed on the plumbing fixture wall.

Step 15: After achieving a perfect fit on the plumbing wall mark and cut holes for plumbing fixture valve and shower head.

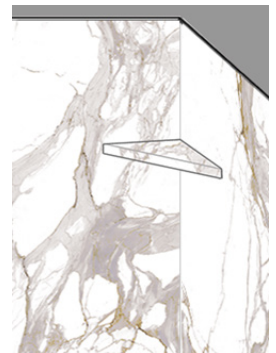
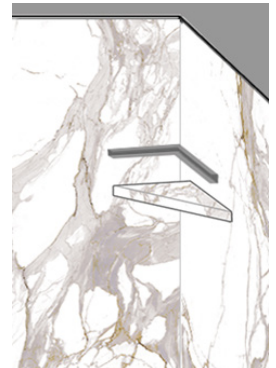
Step 16: Repeat Steps 6, 7, and 8 for adhering MONARC shower plumbing side wall panel to the wall.



Installation of Corner Shelf (Optional)

Step 17: Remove protective masking at desired corner shelf location. Measure and mark location of the corner shelf on MONARC back and side shower walls. Install corner bracket on MONARC shower walls with double face tape and mechanical fasteners. Allow for 1/16th of an inch fall from back corner of bracket to the front edges of the bracket. This will eliminate any puddling or excess water remaining on the shelf during and after use.

Step 18: Trim and adjust MONARC corner shelf to fit squarely and securely over the top of the installation bracket. Apply adhesive to the bracket and clamp the MONARC corner shelf over the top of the adhesive covered corner shelf bracket.



WALL PANEL INSTALLATION

MONARC wall panels are the perfect choice when it comes to decorative interior walls due to their smooth surface, high-resolution imagery, strong impact resistance, easy cleanability & installation, and surface versatility & customization.

Mounting Surface

MONARC panels can be installed over solid wall surfaces such as wood, drywall, backerboard, etc. All surfaces should be **clean, flat, dry and smooth**. Uneven wall surfaces must be corrected before the installation of MONARC wall panels.

Panel Preparation for Adhesives

There are several methods and recommendations for adhering MONARC panels to wall surfaces. Make sure both surfaces are clean and dry. It is recommended that Isopropyl Alcohol is used to clean the back side of the MONARC panels before the adhesive is applied. This removes any dust, oils and other contamination that could cause poor adhesion.

Contact Adhesive Method

The use of a contact adhesive is recommended and typically sprayed on both the backside surface of the MONARC panel as well as the wall surface to be adhered. The adhesive should be allowed to flash off before the panel is applied to the wall surface (reference the adhesive manufacturer's guidelines). Once the panel is placed on the wall, it is then recommended that a "J" roller be used to remove any air pockets or bubbles. This ensures that good contact is made between the MONARC panel and the wall. It is recommended that only medium pressure is used to make good contact between the panel and the wall. It is also recommended to roll from the middle of the panel out so that no air bubbles are trapped behind the panel.

****Important** - remember that contact adhesives produce an immediate & permanent bond, so it is crucial that the panel is installed at the desired area as it cannot be adjusted once applied.

Polyurethane & Silicone Adhesive / VHB Tape Method

The use of a polyurethane or silicone adhesive can be used in conjunction with VHB tape (3M VHB or very high bond double sided tape). It is recommended to apply quarter sized beads of the polyurethane or silicone adhesive liberally to the back side of the panel, or apply a running bead approximately 3/8" wide back and forth across the back side of the panel. This will ensure good adhesion of the panel to the wall. It is also recommended that 3M's VHB double sided tape (or equivalent) be used to secure the panel in place until the polyurethane or silicone adhesive has cured. The tape can be applied directly to the back side of the MONARC panel in between the adhesive that has already been applied. It is recommended that the tape be applied near the edges of the panel and throughout the middle. Once the panel has been applied to the wall, it is recommended that a "J" roller be used to ensure good contact has been made between the panel, the adhesive and double-sided tape, and the wall.

****Important** - Remember that VHB tapes produce an immediate & permanent bond, so it is crucial that the panel is installed at the desired area as it cannot be adjusted once applied.

WALL PANEL INSTALLATION

Fasteners

Fasteners or screws can also be used to attach MONARC panels to the wall. It is recommended that either aluminum or stainless steel be used to attach the panels to the wall. It is not recommended for copper, brass, iron, bronze or steel fasteners to be used as this will create the possibility of corrosion due to electrolysis of dissimilar metals.

FABRICATION TECHNIQUES

Routing & Folding for Corners

MONARC material “pan” is easily fabricated by routing all four sides, notching the corners (shown in **Figure 3** and **Figure 4**), and folding or returning each of the routed sides (**Figure 1**). This type of fabrication is commonly referred to as “Rout and Return”.

Figure 1 - Routing

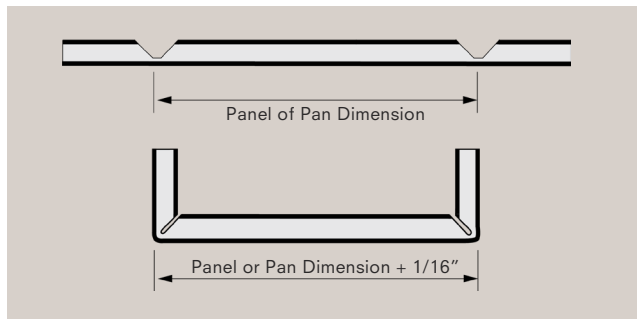
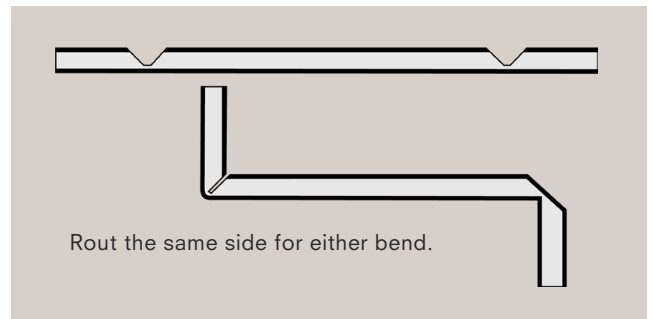


Figure 2 - “V” Routing



By routing only one side, MONARC material can be bent either upward or downward to create both an inside or outside corner (**Figure 2**).

Figure 3 - Square Corner Cutouts

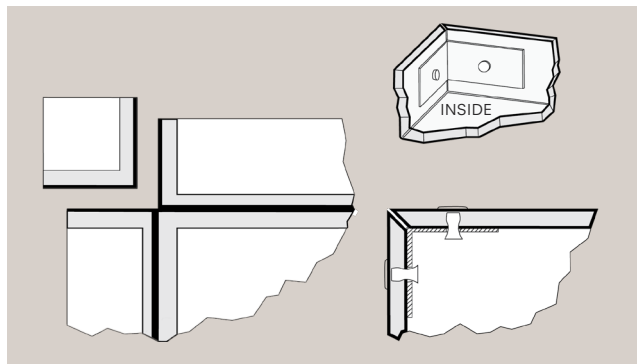
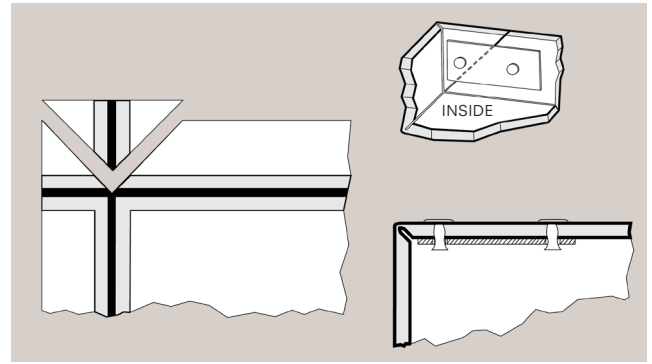


Figure 4 - Envelope Corner Cutouts



Notes:

The material is most easily bent when the rout is made at least one inch or more from the edge of the panel.

As a result of the slight radius produced when bending, your finished panel dimension will be 1/32” to 1/16” larger when folded. This is determined by the profile of the cutter used to make the rout. Trial cuts should be made prior to full production to determine any necessary adjustments in layout dimensions (reference **Figure 1**).

FABRICATION TECHNIQUES

Sealing Corners and Joints

Step 19: Remove all protective masking from the MONARC shower wall panels and corner shelf.

Step 20: Clean with denatured alcohol all corners, edges, and joints where MONARC shower panels and seams will be sealed. This would include all places where MONARC shower wall panels meet corner shelves, tub/shower pans, plumbing fixtures, finished walls, and other MONARC shower wall panels.

Step 21: Using 100% silicone, seal all joints of MONARC shower wall materials that previously have been cleaned. These would include all joints and corners where MONARC shower walls meet corner shelves, tub/shower pans, plumbing fixtures, finished walls and other MONARC shower wall panels.

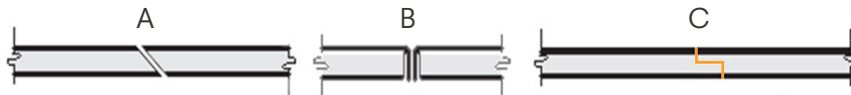
Step 22: (Optional) Latex caulk can be used instead of 100% silicone where MONARC shower wall panels meet the finished wall in order to facilitate the ease of painting that joint in the future.

Step 23: (Optional) Finish all caulk and silicone lines with a caulk tool for a neat, uniform caulk line.

Trim and Variations (Optional)

Step 24: For walls that are larger than the 60 inch maximum MONARC panel width, there are several options for finishing larger walls as described below:

1. Butt the panels together and silicone the joint between the panels. Below are three different options for joining.



2. Make a batten strip that will overlap the joint between two panels.



3. Overlap the panel with a finished end panel that spans to the edge of the wall.



FABRICATION TECHNIQUES

Trim and Variations (cont'd.)

Step 25: Variations for finishing the edge of the panel at the wall:

1. Raw panel edge finish.



2. Rolled edge finished to wall.



3. Finished trim over edge of panel.

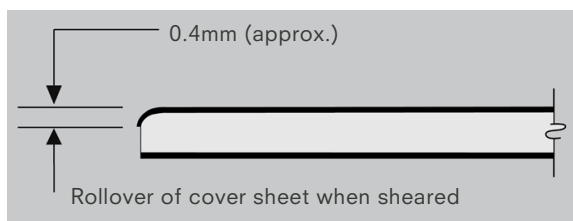


ADDITIONAL FABRICATION TECHNIQUES

Shearing

The ACM substrate can be easily sheared. However, a slight roll-down of the aluminum cover sheet may occur on the impact side. This “roll-down” area is often referred to as the “edge zone.” In this area, the poly-ethylene core is compressed and can lead to increased stress between the core and the aluminum cover sheet. The curled edge could be used as an edge for caulking to the wall.

Figure 5 - Shearing



Saw Cutting

The ACM substrate is manufactured with a Polyester paint finish. Care should be taken to protect the finish during any sawing operation. In some cases it is best to move the saw blade rather than the substrate when sizing the panels.

Blades

1. CIRCULAR BLADES

Blades should be Carbide tipped or High Speed Steel designed for cutting non-ferrous materials, ground thinner from the rim towards the center to prevent pinching. The blades should have angled or circular teeth, alternate beveled, triple ground with the tooth gap wall rounded. The chip angle should be 5 to 15 degrees with a clearance angle of 10 to 30 degrees and a tooth spacing of 3/16” to 1”. Cutting speeds of 5,500 RPM and feeds of 16”/second are possible.

NOTE: Table saws are not recommended for cutting sheets larger than 4’x4’ in size.

2. RECIPROCATING BLADES

Reciprocating saws work well for cutouts. Care should be taken with portable and reciprocating saws to prevent damage to the substrate surface. Blades should be high speed steel, .03” to .047” thick, 3/16” to 9/16” wide, with hook or circular teeth with alternate angles, set or waved at a spacing of .010” to .250”. Cutting feeds up to 4”/second are possible.

ADDITIONAL FABRICATION TECHNIQUES

Drilling

The ACM substrate can be drilled with twist drills usually used for aluminum and plastics, and on drilling machines customarily used for metals. Drill bits should be high speed twist drill with a tip angle of 100-140 degrees, or counter-bore grind with centering tip. Cutting speed of 164 RPM to 984 RPM.

*Quick removal of chips can be achieved by a high RPM, slow feed speed and occasional lifting of the bit.

Routing

The ACM substrate can be cut to size using either portable commercial or automated routing equipment. Bits should be carbide tipped and kept sharp. Single or multiple flutes may be used.

Routing for Bending

The ACM substrate can be accurately folded by hand after a simple routing operation is done on the back skin. This fabrication method is called Rout and Return. It is unique to metal composite panel fabrication. Do not use a press brake for tight folds of the substrate. The material may be routed by using one of the following methods:

1. Hand operated routers equipped with modified 90-105 degree "V" bits (See **Figure 6**) can be used effectively to remove material for folding.
2. Table or circular saws can be equipped with a special blade (See **Figure 7**); these blades refer to as "V" routing blades produce very close tolerances at a much faster rate than hand routers.

Figure 6 - Router Bits

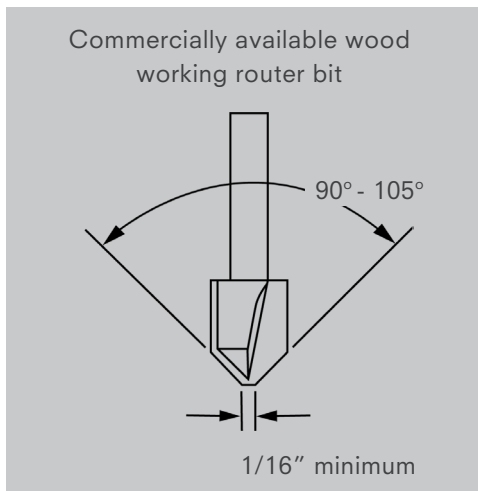
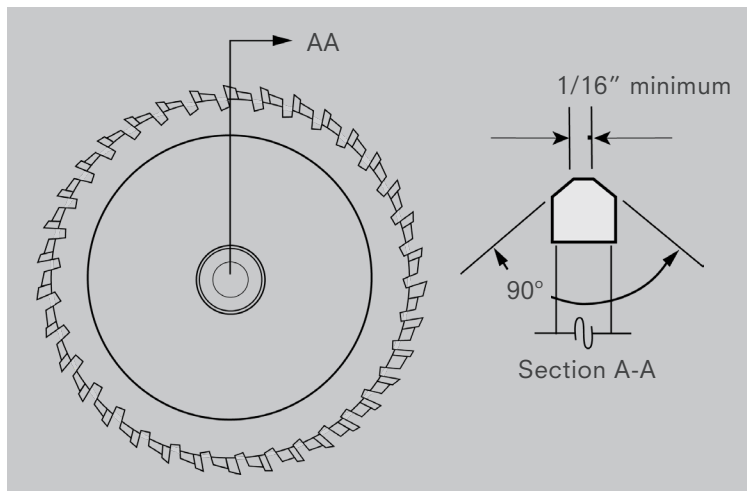


Figure 7 - Routing Saw Blade ("V" routing blade)

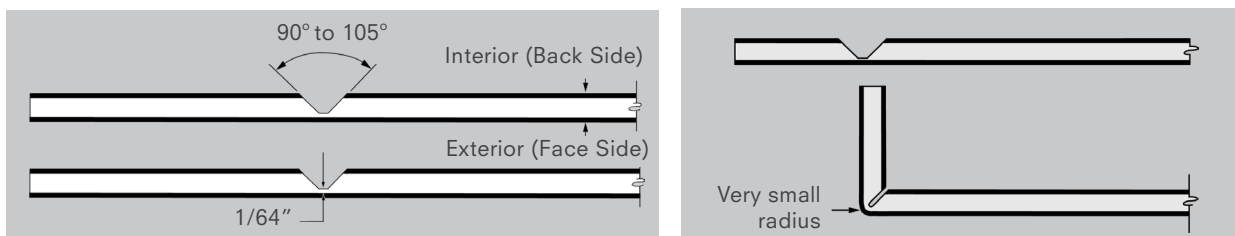


ADDITIONAL NOTES

Routing for Bending - Small Radius

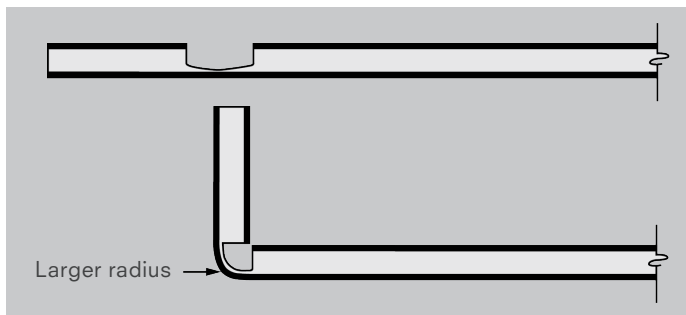
A very small radius can be achieved by “V” routing and folding. The depth of the “V” rout is critical. As general guide line, the exterior aluminum skin should be visible through the polyethylene core at the valley of the rout; this visual appearance should be consistent along the entire length of the rout (See **Figure 8**). Constant depth of the rout ensures a good smooth line when the fold is made. Extreme care should be taken not to score the exterior aluminum skin with the cutter.

Figure 8 - “V” Routing



By changing the shape of the cutter used, a larger radius can be achieved. A flatter, wider cut will result in smoother bend (See **Figure 9**).

Figure 9 - Flat Routing



90° Corners

The most common corner is a 90° Rout and Return. This corner is made by folding a V-Routed panel to a 90° angle. It is critical that the modified V-Rout is made to the correct depth to create a good return angle. “Spring back” will occur if the rout is not deep enough, however, extreme care should be taken not to score the exterior aluminum skin with the router bit or blade during the routing operation so that the aluminum is not weakened. The depth is correct when the exterior skin is intact with approximately 1/64” of polyethylene in the bottom of the V-Rout and the return does not “spring back” when folded.

ADDITIONAL NOTES

Fastening

Joining ACM

Typical methods of joining the ACM substrate are the use of threaded fasteners, rivets, adhesives and double-faced high strength tapes. Proper consideration should be given to the thermal expansion characteristics of ACM. See Thermal Expansion Section. Use the general guidelines listed below when other elements come in direct contact with the surface of the substrate. It is always recommended to trial application various joining techniques to ensure success.

ACCEPTABLE JOINING ELEMENT MATERIALS

- Aluminum
- Plastic
- Stainless Steel

UNACCEPTABLE JOINING ELEMENT MATERIALS

- Copper
- Brass
- Bronze
- Iron
- Raw Steel

Unacceptable materials may cause corrosion of joining surface due to electrolysis of dissimilar metals.

Threaded Fasteners

Threaded fasteners will allow the removal of the panel if needed. The use of a large flat washer will aid to minimize surface pressure and possible compression due to cold flow of the core material. Placement of the threaded fasteners should not be less than 0.75" from the edge of the sheet. It is not recommended to torque fasteners due to the cold flow of the core material, one turn past finger tight is common practice.

Rivets

Panels of the ACM substrate can be fastened together or joined to aluminum extrusion profiles with rivets common to aluminum construction. Rivet connections are well suited for parts that may be subjected to vibration. Colored plastic concealment caps can be used to conceal the exposed rivet head. Consult the rivet manufacturer for details.

ADDITIONAL NOTES

Thermal Expansion

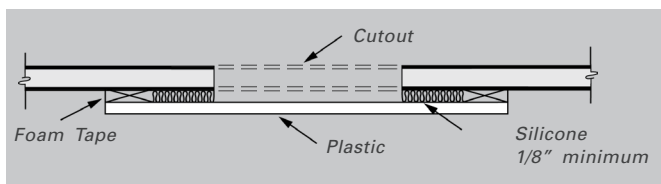
Thermal expansion should always be considered in designs using aluminum composite materials. The ACM substrate has been tested and has a rate of expansion of .000156"/FT/°F. That translates into approximately a 1/8" movement in an 8' panel with a 100°F temperature change. Temperature differences must be considered between shop (fabrication) temperature and the highest and lowest panel temperature. Care should always be taken to avoid restricting thermal movement of the panel to eliminate unacceptable bowing or over stressing of the fasteners.

The coefficient of expansion for unlike materials should be considered in joint design.

Adhesives

For interior design purposes, high strength contact adhesives that do not require lengthy setting times can be used. Where moderate cure times are acceptable, construction adhesives and silicones can be used to obtain a stronger bond than with contact adhesives. Silicones take a good deal of time to cure before a load can be applied whereas the faster curing adhesives do not have the movement capabilities to meet the project needs. In these instances, a combination of double sided foam tape and adhesive is often used. When using an adhesive to hold dissimilar materials, select one that will allow thermal differential movement without shearing. Use a low modulus sealant where greater amounts of movement are expected (i.e., plastics to ACM), and medium modulus sealants if minimum movement is expected (i.e., bonding aluminum to ACM). See **Figure 10**.

Figure 10 - Adhesive & Tape Placement



Tapes

For stress-free applications and to hold parts while the primary adhesives cures, double-faced foam tapes are effective (**Table 1**). Both surfaces to be bonded must be clean and dry. It is important that the tape manufacturer’s directions are followed for best results.

TABLE 1

| | |
|---|-------------------------------------|
| 3M - Industrial Tape & Specialties Division | VHB Double Coated Acrylic Foam Tape |
| Avery Dennison - Specialty Tape Division | FasTape Acrylic Foam Tape |
| Mactac - Technical Products Division | MACmount Double-Coated Foam Tapes |
| Norton - Norton Performance Plastics Corp. | Normount |

ADDITIONAL NOTES

General Adhesives & Double-Sided Tape Guidelines

1. To achieve reliable bonding, it is imperative to follow the adhesive manufacturers's application instructions.
2. Although many adhesive materials work well on MONARC material, no product, either adhesive or tape, has been found that will adhere to the core materials. All attachments should be made through contact with the aluminum facers of MONARC material.
3. Care must be taken in the selection of an adhesive regarding the expansion of the materials to be joined. Where significant thermal expansion can occur adhesives should be of medium or low modulus materials to allow for movement without shear or loss of bond. For interior applications where thermal expansion is not a consideration, high modulus adhesives can be used to join materials.
4. Cure time is generally a consideration in the choice of adhesives. Silicones take a good deal of time to cure before a load can be applied whereas the faster curing adhesives do not have the movement capabilities to meet the project needs. In these instances, a combination of tape and adhesive is often used.

Example: Two pieces of MONARC material must be connected for a strong permanent bond in a short period of time. The adhesive area is 2" x 36".

Many times a strip of double-sided tape (approx. 3/4" wide) will be applied next to a bead of silicone adhesive. For the near term, the tape holds the MONARC material. For the longer term, the silicone adhesive will cure and relieve the load applied to the tape, which now acts as a joint filler.

The following adhesives have been shown to adhere to MONARC material. Please refer to the adhesive manufacturer guidelines or contact 3A Composites Technical Services.

Isopropyl alcohol two-cloth cleaning method is a minimal surface preparation for all adhesive bonding.

1- part Silicones, Adhesives and Sealants:

- Dow 995: 1-part silicone structural adhesive
- Pecora 864, 890, 895: 1-part silicone sealant
- Tremco Spectrem 1, Spectrem 2, Proglaze SG: 1-part silicone sealant
- Schnee Morehead SM5731: 1-part silicone sealant
- GE SCS2800, SCS9000, SCS2000, SCS2900, GE7000: 1-part silicone sealant

1-part Silicones or Urethane Adhesives/Sealants Requiring a Primer:

- Dow 790, Dow 795: 1-part silicone sealant
- Surface preparation: Solvent wipe and Dow Corning 1200 Prime Coat required
- Tremco Dymonic: 1-part polyurethane sealant
- Surface preparation: Isopropyl alcohol two-cloth cleaning method, primer #6

2-part Methacrylate, Urethane and Epoxy Adhesives:

- Lord 406/19 (methacrylate), 7542AB, 7545AB (urethane)
- IPS Weld-On 45, Weld-On SS515 (methacrylate)
- Scotch Weld 3M 2216 (epoxy with long working time): Scuffing required

The adhesive manufacturers have reported that Lord 406/19 and IPS Weld-On 45 may also be used on unprimed aluminum.

Synthetic Rubber and 1-part Urethane Adhesives:

- Lord 7610 (1-part urethane): Scuffing required
- Schnee Morehead SM7108 (1-part urethane)
- Liquid Nails LN-901 (synthetic rubber)

It is important to follow the guidelines listed above and to experiment with any new adhesive or technique prior to generating the final product.