

Processing Guidelines BALTEK® Balsa

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1. Flat Panel Fabrication with End Grain Balsa Core Material

1.1 Wet Lay Up FRP Face Skins

Flat panels are best made in a press or with vacuum bag compaction.

Vacuum bag compaction - The use of perforated, AL600/10 coated, rigid sheet end grain balsa (with 1/16 inch diameter holes on 4 inch centers) is recommended.

Platen Press - The use of AL600/10 coated rigid sheet end grain balsa is recommended. (Perforations are not required for a platen press.)

Contact Molding - Use Contourkore (scrim side up) to make flat panels by hand without press or vacuum bag compaction.

A double roller fabric resin impregnation machine can be useful for large panel or large volume wet lay up production.

AL-600/10 coated end grain balsa sheets do not require pre-coating when used with wet lay up resin systems.

LamPrep end grain balsa sheets require priming, with a light coat of catalyzed laminating resin, before the face skins are applied to avoid a possible dry bond line.

If Polyester or Vinylester resins are used, a layer of 0.75oz to 1.5oz Chopped Strand Mat (CSM) is recommended next to the core to improve laminate peel strength. The mat can be part of a knitted fabric such as an 18oz 0/90 with a 3/4oz mat backing. Epoxy resin systems typically do not require this layer of CSM for adhesion purposes.

Removable peel ply used on each face could well reduce subsequent surface preparation.

1.2 Contact molding

Lay up the first skin using normal laminating techniques.

Position the sheets of Contourkore, and use metal compaction rollers with moderate pressure, to bed the sheet evenly into the laminate (CSM) surface. It is important that no voids remain between the laminate and the core.

Apply the second skin using normal laminating techniques.

1.3 Vacuum Bagging

Use a smooth flat nonporous surface prepared with a release agent. Allow an extra 6 - 12 inches around the perimeter of the panel blank for vacuum bag attachment.

Lay up the first skin using normal laminating techniques.

Position the rigid sheets with out gaps. Apply the second skin.

Normal vacuum bag techniques apply and they could include a layer of perforated release film, a layer of breather/bleeder cloth and then vacuum bag. If possible, evacuate the vacuum bag from the edge of the panel. If the panel is large, use multiple vacuum hose connections or a perimeter manifold. First pull 10 - 15 inches of mercury, for initial compaction, then reduce the vacuum to 5 inches of mercury, to avoid excess resin bleed, until cured.

1.4 Platen Press

A release film, in place of a release agent can often be used in a platen press.

Follow lay up procedure for vacuum bagging.

Apply 15-20 psi platen pressure until cured.

1.5 Prepreg Face Skins

See [Processing End Grain Balsa Core with Prepreg Reinforcements](#)

1.6 Pre cured skins or sheet metal face skins

The use of rigid sheet end grain balsa is recommended.

Adhesive selection is critical. The adhesive's compatibility with the face skin and core should be evaluated, as well as the ability to obtain a 'void free' bond line.

24.06.2005

2. Processing End Grain Balsa Core with Prepreg Reinforcements

LamPrep surface finish end grain balsa is recommended for use with elevated temperature cure film adhesives.

Film adhesive - typically a 250 gm/m² controlled flow thixotropic film adhesive can be used to successfully bond end grain balsa. Confirm processing details with the film adhesive supplier.

If contourable end grain balsa sheets are used, it is recommended that the scrim, which holds the sheet together, is removed during the core application process, so as not to interfere with the wet out and adhesion of the film adhesive.

The properties of film adhesives from different manufacturers can vary widely. When using these materials for the first time, it is essential to prove out the suitability of these materials prior to proceeding.

Second Skin - Film adhesive of 400gm/m² is often used on top of the end grain balsa core prior to applying the second prepreg laminate.

Important note:

The moisture content of the end grain balsa core should be held between 3% - 6% during the lay up and cure of the second skin. This is to avoid the potential of moisture or steam affecting the second skin during the elevated temperature cure cycle. The moisture content can be checked with a suitable moisture meter and the end grain balsa vacuum or oven dried as required.

Contact Alcan Baltek for further information about processing end grain balsa with prepreg.

24.06.2005

3. Bonding End Grain Balsa Core with Epoxy Resin Systems

Vacuum bag compaction is recommended when bonding end grain balsa to a laminate surface using epoxy resins, as vacuum bagging provides the most weight efficient bond line consolidation. The long open times available with epoxies also allow large areas of core material to be bonded at one time.

When using contourable end grain balsa, it is generally recommended to install the core scrim side up whenever possible.

LamPrep® or AL600/10® end grain balsa surface can be used with epoxies. The AL600/10® will minimize resin absorption.

3.1 Laminate Surface and Core Preparation

Laminate surface preparation is important when bonding to a cured epoxy surface. If peel ply was not used, then the entire surface will require machine sanding with 80 grit paper to leave a mat finish without areas of gloss. If peel ply was used, then sand smooth raised edges and ridges that could hold the core material away from the surface.

Precut and pre-fit the sheets before bonding in place, particularly when vacuum bagging. The sheets should fit together with minimal gaps.

Important notes:

If unsure, follow the resin suppliers recommendations and test bond to a sample section of the laminate prior to a full core installation

3.2 Mixing and Applying the Adhesive

An epoxy adhesive can be blended from a suitable epoxy resin thickened to non-sag consistency using a thixotropic modifier such as Cabosil or Aerosil. Note: Due to the high strength of the balsa end grain, a low density modifier, such as Micro Balloons, which might be used to bed a low density foam core, could result in a glue line that would fail under stress before shearing balsa.

Use a Baltek Trowel at approximately an 80 degree angle to the surface.

Flat surfaces - apply the adhesive in a uniform thickness of approximately 0.04-inch. (1-mm)

Curved surfaces with scrim up. Areas of high curvature will use more adhesive to fill open kerfs. The amount can be determined on site and troweled in place as required. Core materials over 1-inch thickness may require additional adhesive to be applied to open kerfs of balsa sheets, after resin coating, while the sheet is back curved over a drum.

Filling the kerfs improves the integrity of the core layer and prevents possible moisture collection if the skins are ever compromised.

Male molding or scrim down core application does not require filling of open kerfs at this time.

3.3 Priming the Core

With larger applications, particularly when vacuum bagging, steps 2 and 3 can occur concurrently to fully utilize the available working time of the epoxy.

Pre-coat one side of the end grain balsa sheet with laminating resin just prior to installation. The average amount of resin to wet out a LamPrep surface is 1.5oz (40-grams) per sq.ft. An AL600/10 coated surface uses 0.70-oz (20-grams) per sq.ft. The resin is generally hand applied with a short nap length or foam covered roller.

Female molding - Additional resin is required to wet out the kerfs of Contourkore end grain balsa sheets. Lay the sheets over a large drum and use a laminating brush to coat the open kerfs. Turn the sheet 90 degrees to coat the open kerfs in the other direction. Coating the open kerfs will help the epoxy adhesive to flow in and fill the kerfs during the bonding process. (Cover the drum with a plastic cover to prevent paint transfer and allow easy clean up).

Male Molding - If bonding the core with the scrim side down there is no need to wet out open kerfs at this time.

3.4 Core Installation

Contact molding - will require the end grain balsa sheets to be positioned and then bedded using metal compaction rollers with moderate pressure to bed the sheet evenly into the epoxy adhesive and fill any open kerfs. It is important that no voids remain between the laminate and the core.

Avoid excessive pressure or walking on the core before the adhesive has cured. Over-squeeze out of the adhesive can occur resulting in a localized dry bond.

Fillet strips or low density epoxy filler can be used to close out the edges and fill any gaps. Fillet strips can be resin primed and bonded into place at the same time as the end grain balsa core.

Vacuum bagging - The open time of the epoxy adhesive, which varies with film thickness and workshop temperature, will determine the amount of working time available when vacuum bagging. The vacuum bag must be sealed and evacuated before the epoxy adhesive starts to gel. First pull 10 - 15 inches of mercury for initial compaction, and then after a few minutes reduce the vacuum reading to 5 inches of mercury until the resin has cured.

3.5 Inside Skin

The surface and edges of the end grain balsa core should be smooth with no ridges. Fill any voids in the core layer. Sharp corners should be rounded for laminate to run over without lifting or crimping and any steps tapered for a smooth transition.

Male molding - open kerfs can be filled at this time with a low density epoxy paste and sanded smooth.

Prime the surface of the end grain balsa core with a coat of laminating resin just prior to applying the laminate.

24.06.2005

4. Bedding and Bonding End Grain Balsa with Chopped Strand Mat

Chopped Strand Mat (CSM) has been used for many years with polyester and vinylester resin systems to bed and bond end grain balsa core material in place. Contact Molding and Vacuum Bag consolidation methods can be used.

Vacuum Bagging provides a consolidation not possible with contact moulding, which can enhance the overall quality of the core to skin bond.

All open kerfs in the core layer are best filled during the core installation. On tightly curved surfaces the resin / CSM combination does not fill open kerfs of ContourKore as well as Baltek-Bond. Filling the kerfs improves the integrity of the core layer and prevents possible moisture collection if the skins are ever compromised.

4.1 Laminate surface preparation

The cured laminate surface that the core is to be bonded to should be smooth without raised edges or ridges that could hold the core material off the surface. Overall sanding with 80 grit paper may also be required for good adhesion, depend on the resin system and the amount of time it's been cured. Remove any sanding dust from the surface before proceeding.

If unsure follow the resin supplier's recommendations and test bond to a sample section of the laminate prior to a full installation.

4.2 End grain balsa core preparation

Precut and pre-fit the sheets of core material before bonding in place, particularly when vacuum bagging. The sheets should fit together with minimal gaps and any edges that do not butt to another surface should be bevelled at a 3-1 slope (See Fillet Strips) to minimize fiber crimping and voids, which are inevitable when trying to laminate around sharp corners.

Contact Molding - LamPrep end grain balsa should have the down side prewet with standard catalyzed resin immediately before application into the CSM. AL-600/10 coated balsa does not require prewetting when being bedded into CSM.

Vacuum Bagging - LamPrep end grain balsa should have the down side (Hot coated) at least 2 hours ahead of time with resin catalyzed to a 10 minute per 100 gram cup gel time. This resin coat minimizes resin absorption into the core while under vacuum. Approximate coverage is around 1.5oz (40-grams) per sq.ft. Lay the balsa sheets flat and spray apply or hand apply the resin with a short nap length roller. Be careful not to over coat, even if the surface looks dry and avoid gluing the small ContourKore blocks together. AL-600/10 coated balsa does not require Hot coating when being bedded into CSM.

Scrim side up - When using contourable end grain balsa, it is recommended to install the core scrim side up when ever possible. If the scrim side is placed down, it is best precoat the scrim surface to displace the air between the scrim weave, however in this case the precoating should be done just within 1 minute of installation - to avoid the blocks of balsa from falling off the scrim. (Hot coating ahead of time is not recommended)

4.3 Chopped Strand Mat Application

A layer of 1.5 oz chopped strand mat is applied to the laminate surface and rolled out with compaction rollers to remove all air entrapment. This is an important step as any voids in this layer will result in poor bond line properties and could allow water transfer to the end grain of the balsa core material. Set the catalyst rate so that the bed coat resin gels in 20 - 40 minutes.

4.4 Important note:

The bed coat gel time may vary slightly from a cup gel time, especially when the catalyst rate is less than 0.75% of 60%-MEKP.

The CSM layer should have a higher than normal resin content of 80/20 - resin/glass by weight to help ensure a saturated bond line.

4.5 Core Installation

Contact molding - use metal compaction rollers used with moderate pressure to bed the core material evenly into the layer of CSM. It is important no voids remain between the laminate and the core.

Avoid excessive pressure or walking on the core before the CSM has cured. Over-squeeze out of resin can occur resulting in a localized dry bond.

Fillet Strips used for edge detailing can be resin primed and bonded into place with CSM at the same time as the end grain balsa core.

Vacuum Bagging - The vacuum bag must be sealed and evacuated before the CSM / resin layer starts to gel. Start with 10 inches of mercury for initial core compaction, measured from the bag then after a few minutes reduce the vacuum to 5 inches of mercury until the resin has cured.

4.6 QC check

Allow the cure to develop, and then check the bond. Tapping the ContourKore blocks can reveal voids in the bond layer. Repair voids as necessary.

4.7 Preparation for the inside skin

The surface and edges of the end grain balsa core should be smooth without ridges. Fill any voids in the core layer. Any remaining sharp corners should be rounded or tapered to allow the (second) laminate to run over smoothly.

Precoating the core surface is recommended just before laminating to reduce air entrapment within scrim and other surface irregularities to help produce a void free bond line.

A 3/4oz (minimum) Chopped Strand Mat is recommended next to the core as the first layer of the inside skin. This will help fill small variations in the core surface and add significant peel strength to the laminate core bond line.