

**PROCESSING GUIDELINES**

Issue 2013

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[www.3ACorematerials.com](http://www.3ACorematerials.com)

Europe | Middle East | India | Africa  
Airex AG  
5643 Sins, Switzerland  
T +41 41 789 66 00 | F +41 41 789 66 60  
[corematerials@3AComposites.com](mailto:corematerials@3AComposites.com)

North America | South America  
Baltek Inc.  
High Point, NC 27261, USA  
T +1 336 398 1900 | F +1 336 398 1901  
[corematerials.americas@3AComposites.com](mailto:corematerials.americas@3AComposites.com)

Asia | Australia | New Zealand  
3A Composites (China) Ltd.  
201201 Shanghai, China  
T +86 21 585 86 006 | F +86 21 338 27 298  
[corematerials.asia@3AComposites.com](mailto:corematerials.asia@3AComposites.com)

## 1 Storage of BALTEK® end-grain balsa products

All BALTEK® products should be stored indoors at temperatures above freezing and less than 140 degrees F (60 °C) and 80% relative humidity. It should be kept dry at all times.

BALTEK® core should not be stored with solvents as the volatiles can be absorbed by the material.

While this does not affect the product, it can have adverse effects on laminate cure and properties.

It is recommended to keep the material in the shop a minimum of 24 hours before use. The polyethylene bag should not be removed until just prior to use.

The moisture content of the balsa should not exceed 12% before use. The moisture content can be checked with a pin-type moisture meter.

If removed from its packaging, it is recommended that the material be kept off the floor (on dollies or pallets) to prevent dirt and moisture pickup. A piece of cardboard should also be kept on top of the material to cover against moisture and dust contamination.

Packages of the contourable (CK) material should be opened with the scrim side down, so blocks are not pulled off when one sheet is lifted off the stack.

## 2 Flat Panel Fabrication with BALTEK® End Grain Balsa Core Material

### 2.1 Wet Lay Up FRP Face Skins

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

The recommended core configuration for vacuum bag compaction is BALTEK® AL600/10 rigid perforated.

The recommended core configuration for use in a Platen Press is BALTEK® AL600/10 rigid (Perforations are not required for a platen press).

The recommended core configuration for use with Contact Molding (without press or vacuum bag compaction) is BALTEK® contourable (CK). A double roller fabric resin impregnation machine can be useful for large panel or large volume wet lay up production.

BALTEK® LamPrep should have the down side pre-wet with standard catalyzed resin immediately before application into the CSM. BALTEK® AL-600/10 coated balsa does not require pre-wetting when being bedded into CSM. Prewetting is recommended for all contourable forms of BALTEK® cores to ensure proper filling of the kerfs.

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.

## 2.2 Contact Molding

Lay up the first skin using normal laminating techniques. Position the sheets of core, and use metal compaction rollers with moderate pressure to bed each sheet evenly into the laminate surface. It is important that no voids remain between the laminate and the core. Apply the second skin using normal laminating techniques.

## 2.3 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 sheets of BALTEK® core without 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.

## 2.4 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.

## 2.5 Prepreg Face Skins

See the processing guide for bonding BALTEK® balsa core with Prepreg Reinforcements, Precured skins, or metallic faces. Use BALTEK® rigid panels (AL600/10 coating is not required). 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.

## 2.6 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.

# 3 Processing BALTEK® Core with Prepreg Reinforcements

BALTEK® with LamPrep® surface finish is recommended for use with elevated temperature cure film adhesives.

## 3.1 Film adhesive

Typically a 250 gm/m<sup>2</sup> controlled flow thixotropic film adhesive can be used to successfully bond BALTEK® core. Confirm processing details with the film adhesive supplier. If contourable material is to be 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.

### **3.2 Second Skin**

Film adhesive of 400gm/m<sup>2</sup> is often used on top of the BALTEK® core prior to applying the second prepreg laminate. The moisture content of the 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 pin-type moisture meter and the end grain balsa vacuum or oven dried as required.

Contact us for further information about processing BALTEK® cores with prepregs.

## **4 Bonding End Grain Balsa Core with Epoxy Resin Systems**

Vacuum bag compaction is recommended when bonding BALTEK® core 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 BALTEK® CK (contourable end grain balsa), it is generally recommended to install the core scrim side up whenever possible. LamPrep® or AL600/10 end grain surface treatment can be used with epoxies. The AL600/10 will minimize resin absorption.

### **4.1 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. (If unsure, follow the resin supplier's recommendations and test bond to a sample section of the laminate prior to a full core installation) Precut and pre-fit the sheets before bonding in place, particularly when vacuum bagging. The sheets should fit together with minimal gaps.

### **4.2 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 BALTEK® core, a low density modifier such as Micro Balloons, which might be used to bed a low density foam core, could result in a bond line that would fail under stress before shearing the balsa.

Use a notched 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 CK, 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, 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.

### 4.3 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. Just prior to installation, pre-coat one side of the BALTEK® core sheet with laminating resin. The average amount of resin to wet out the surface is 1.5oz (40 grams) per sqft for LamPrep® surface treatment and 0.70-oz (2 -grams) per sq ft for AL600/10 coated. The resin is generally hand applied with a short nap or foam covered roller.

Female molding - Additional resin is usually required to wet out the kerfs of contourable BALTEK® 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.

### 4.4 Core Installation

Contact molding will require the BALTEK® core sheets to be positioned and then bedded using metal compaction rollers. Use 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 BALTEK® 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 then after a few minutes reduce the vacuum reading to 5 inches of mercury until the resin has cured.

### 4.5 Inside Skin

The surface and edges of the BALTEK® 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 BALTEK® core with a coat of laminating resin just prior to applying the laminate.

## 5 Bedding and Bonding BALTEK® cores with Chopped Strand Mat

Chopped Strand Mat (CSM) has been used for many years with polyester and vinylester resin systems to bed and bond BALTEK® core material in place. Contact Molding and Vacuum Bag consolidation methods can be used. Vacuum Bagging provides a consolidation not possible with contact molding, 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 contoured cores as well as core bonding adhesives. Filling

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

## 5.1 Laminate surface preparation

The cured laminate surface that the core is to be bonded to should be smooth. Remove any 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 this depends on the resin system and the amount of time after initial cure. 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.

## 5.2 BALTEK® core preparation

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

Contact Molding – BALTEK® LamPrep® should have the down side pre-wet with standard catalyzed resin immediately before application into the CSM. BALTEK® AL-600/10 coated balsa does not require pre-wetting when being bedded into CSM. Pre-wetting is recommended for all contoured forms of BALTEK® cores to ensure proper filling of the kerfs.

Vacuum Bagging – BALTEK® LamPrep 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 hot coat minimizes resin absorption into the core while under vacuum. Approximate coverage is around 1.5oz (40-grams) per sq.ft. Lay the BALTEK® 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 blocks together on a contoured sheet. BALTEK® AL-600/10 coated core does not require Hot Coating when being bedded into CSM.

Scrim Side Up - When using controllable BALTEK® balsa products, it is recommended to install the core scrim side up whenever possible. If the scrim side is placed down, it is best to pre-coat the scrim surface to displace air between the scrim weave, however in this case the pre-coating should be done within just 1 minute of installation to avoid the blocks of balsa from falling off the scrim. (Hot Coating ahead of time is not recommended).

## 5.3 Chopped Strand Mat Application

A layer of 1.5 oz/ft<sup>2</sup> (450 g/m<sup>2</sup>) 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 core material.) Set the catalyst rate so that the bed coat resin gels in 20 - 40 minutes. (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.

## 5.4 Core Installation

Contact Molding - use metal compaction rollers 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 or void. Fillet Strips used for edge detailing can be resin primed and bonded into place with CSM at the same time as the BALTEK® 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.

## **5.5 QC check**

Allow the cure to develop then check the bond. Tapping the core can reveal voids in the bond layer. Repair voids as necessary.

## **5.6 Preparation for the inside skin**

The surface and edges of the BALTEK® core should be smooth without ridges. Fill any voids in the core layer. Core bonding adhesive can be used. Any remaining sharp corners should be rounded or tapered to allow the (second) laminate to run over smoothly.

Pre-coating the top surface is recommended on contoured BALTEK® sheets just before laminating to reduce air entrapment within scrim and other surface irregularities. This helps 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