



**DORBY<sup>®</sup> MICA**  
IMAGINE. IMPLEMENT

# DORBY TECHNICAL GUIDE

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# 1 INTRODUCTION

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Dorby Laminates are a high-quality surfacing solution that offer excellent performance with a uniform composition, allowing for easy fabrication and maintenance compared to ordinary decorative materials.

Dorby laminates are supplied as a Single Side Decorated sheet in various sizes and thicknesses. These laminate sheets are machined, fabricated and installed as part of a panel assembly used in a variety of application areas such as cabinetry and furniture.

Such a panel assembly usually includes a shaped laminate sheet bonded using an adhesive to a suitable substrate, along with backing & lining sheets, fittings & attachments, and edge banding.

For details on how to fabricate and install a panel assembly using Dorby laminates, please check the Technical Guide.

## 2 PRE-FABRICATION

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Laminates are a resilient material, however carelessness during transport, handling and storage can cause issues which may affect the quality of the product and the final installation. To ensure best results, please keep in mind the following pre-fabrication guidelines.

### 2.1 TRANSPORT, STORAGE & HANDLING

#### 2.1.1 TRANSPORT

Dorby laminates can be transported rolled up or laid flat.

When rolled up, the decorative surface must remain on the inside. For laminates that are being transported in rolls, please ensure that the rolled-up cylinder is at least 550 mm in diameter.

Tie the roll using good quality material, ensuring that the material used to tie the roll down is applied at least at two points that are equally close to the end of the roll. A foam or an insulating pad can be used between the ties and the laminate.

Dorby recommends that laminate sheets over 1 mm are transported flat, instead of being rolled up.

#### 2.1.2 HANDLING

Laminate sheets should be handled carefully at all time to avoid damage to the product- especially the edges. The decorative faces may get damaged on sliding over other surfaces, including other laminate sheets. Therefore, sliding the sheets is not recommended, the sheets need to be lifted instead.

Dorby recommends the use of two workmen to lift the sheet, especially if the sheets are sized over 3.5 feet. Always ensure the workmen walk at a steady pace, holding the sheet along its length. Allow for limited slack only, as excessive bowing can strain the surface of the laminate.

Never allow the laminates to touch the ground or the walls while they are being carried.

If forklifts and similar mechanized vehicles are used to load or unload a vehicle, ensure that the pallets are clean and structurally sound.

### 2.1.3 STORAGE

#### **Horizontal Storage**

Laminate sheets should be stacked in pairs, in a back-to-back configuration. The sheet at the bottom of the stack must be placed with the decorative face downwards, and a flat, protective board placed below it.

The topmost sheet of the stack should preferably be placed with the decorative side downwards. Additionally, a similar-sized board may be placed over the topmost sheet, to maintain a uniform pressure on the underlying sheets and prevent any warpage in bulk stock.

#### **Vertical Storage**

If space constraints don't allow for horizontal storage, laminates may be stacked at an angle close to the perpendicular. A heavy board should be used on the free end to prevent any slippage and damage.

## 2.2 PRECONDITIONING & THE ENVIRONMENT

Preconditioning is one of the most important considerations for achieving a quality product installation.

Pre-conditioning is the process of minimizing differences between materials, especially those which are influenced by environmental conditions. Laminates and substrate materials expand differently in different dimensions, and the expansion depends on humidity and temperature. Generally, the moisture content of most wood-based materials is around 9%, and the laminates' moisture must be approximately the same for best results. Since a standard moisture meter can't effectively be used on laminates, it is prudent to follow pre-conditioning guidelines carefully.

To properly pre-condition the laminate sheets and the substrate, the best approach is to make sure both sides of the laminate sheet as well as the substrate experience the exact same conditions. The two key factors that matter are humidity and temperature, especially for laminates which are essentially 70% cellulose.

The method involves laying the laminate as well as all related products in fabrication (substrate, adhesive, liner, backer), in a room for a minimum of 48 hours. The conditions in the room must match that of the final installation area, and are usually recommended as 24C and 55% relative humidity.

This allows all the materials to reach moisture equilibrium. Please note the number of hours for conditioning may vary based on the location and the weather, e.g. if the final installation area remains hot for long durations, the laminate must be preconditioned at a higher temperature.

Also, if the final panel assembly uses a backer sheet to balance the laminate sheet, the best practice would be to condition the two as a pair. In case another laminate sheet is used for balancing, condition them together- laying them in pairs, with the decorated side facing outwards and the sanded side facing each other.

The place of storage should be well ventilated and protected from moisture. Laminates should never be in direct contact with the floor or outside walls. Provision should be made for effective air circulation in the room and humidity control at all times. Stored stock of laminate should be rotated such that older sheets are used first.

## 2.3 SUBSTRATES & ADHESIVE GUIDANCE

Laminates are a surfacing material that are required to be bonded to a substrate for their final application. There are many types of substrates available to the specifier and the customer, with the final choice dependent on a variety of factors.

### SUBSTRATES

Key expectations from a good substrate are-

Expectation	Explanation
Mechanical Backing	Laminates are a homogenous material. Therefore, a rigid, flat material with a uniform thickness and uniform composition is recommended for use with laminates.
Surface Compatibility	To ensure proper adhesion between the substrate and the laminate, there must be compatibility between both surfaces. An appropriate amount of roughness and minimal undulations, bumps, ridges and knots would help in the adhesion process.
Dimensional Compatibility	Laminates are composed of fibers and shows dimensional behavior. It usually expands twice as much along its length compared to the expansion along the width.

Other factors when choosing a substrate may include performance points such as water resistance, fire retarding properties), costs etc. For detailed guidance, please get in touch with your nearest Dorby Distributor or our Technical Team.

A general overview of technical constraints of substrates will be helpful before deciding to fabricate a Laminates panel in a project. Essentially, HPL has grain direction (as it is composed of fibers) and shows dimensional behavior similar to wood. Laminates usually expands twice as much along its length compared to its width.

## 3 FABRICATION

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Dorby laminates can be fabricated using Power tools as well as Manual tools.

Both techniques can provide great results if adequate care and preparation is undertaken. Please follow the fabrication guidelines closely for best results.

For most applications, the fabrication process generally involves the following steps-

- a. CUTTING
- b. BONDING & TRIMMING
- c. INLAYS, CUTOUTS & HOLES
- d. EDGE PROFILING & FINISHING

### **A. POWER TOOLS**

Fabrication of laminates for most residential and commercial applications is preferably done using power tools. When using power tools, both handheld and stationary (table-mounted) tools can be used.

Typical tools used in HPL based product fabrication include- Saws, Routers, Trimmers, Drills. Please note these general guidelines for using power tools-

- Most tools and accessories that are used for woodworking can be used for laminates. However, because laminates have a hard surface compared to wood, tool wear will be higher.
- Get rid of sawdust and other byproducts, preferably using extractors, to avoid health hazards or damaging the decorative surface.
- Cutters and saws should be TCT (Tungsten Carbide Tipped) or PCD (Polycrystalline) based whenever possible.
- As far as possible, the tools should remain stationary while worktops are allowed to move. In case the worktop is fixed, take care to prevent laminates and substrate from sliding while being processed.
- When cutting the laminate to size using a stationary or table saw, ensure the sheet is flat on the saw table. The decorative face should face up, and the material should be aligned in same running direction.
- The use of a scoring blade in a climb cut configuration can help improve the quality of the cut and reduce the possibility of damage to the laminate.
- Always ensure that the finished side is facing upwards and pay close attention during fabrication. Most mishaps occur during moments of carelessness and overconfidence.

### 3.1 CUTTING

Always start by cutting the largest size required from the laminate stock. Edging and backplash sizes are cut later, as this helps reduce wastage. Laminate sheets are always supplied oversized by a few millimeters, as Dorby leaves some tolerances.

Dorby laminates are impregnated with melamine formaldehyde resin on the decorative side and phenol formaldehyde resin on the backing side. This makes the material highly homogenous and hard, and can cause accelerated tool wear if not fabricated properly.

To cut a laminate, any of the following tools can be used-

- Saws
- Routers

- Laminate Trimmers
- Laminate Scissors

## SAWS

Saws come in several varieties:

- Depending on the form factor- Stationary saws (or table saw), portable hand saws (or hand saws)
- Depending on the blade- circular saw, jigsaw, bandsaw.

Two important factors to keep in mind while using any form of saw are- the saw blade choice and the feed speed. The choice of saw for cutting a laminate depends on the project considerations as well as fabricator's familiarity and tooling.

A band saw is recommended for making curved or straight cuts, with higher likelihood of chipping. Choose the widest blade possible based on the cuts being made. When cutting curves, the width of the blade will determine the smallest radius that may be cut. Smaller width blades are used for smaller radius cuts, allowing for making curves on the laminate. To smoothen edges on curved cuts, cut oversized parts and finish the edges using a combination of routing and filing. Feed speed for bandsaws can range from 5000-8000 surface feet/minute. Use a fine-tooth blade, with a suggested pitch of 18 tooth per inch. Straight cuts require a blade width of 1inch and above. Teeth with options to cut straight lines as well as contours are recommended. Always make sure the teeth are adequately sharp and do not cause any burn marks in the laminate. Avoid using band saws on bonded laminates.

Circular saws can also be used to make cuts into the laminate sheets. Both bench saws and portable saws can be used, though bench saws may produce better results and higher reproducibility. Keep in mind the following specifications for cutting using circular saws:

Feed Speed: 20-30m/min

Tool Speed: 3,000 to 4,000 rpm

Tooth Pitch: 10 to 15mm

Tip Speed: 60 to 100m/s

Saw blades should be fine toothed and close pitched, with blades that are alternative teeth top bevelled (ATB). Another option is HiATB, which is a modified ATB blade, with higher bevel angles. The higher bevel angles create a scoring effect on the surface, producing clean cuts. However, these blades dull the fastest and are difficult to sharpen. The blades should be of adequate thickness, otherwise they lose stability in operation and can cause improper cuts.

As a flat tooth saw blade may cause splintering on thicker laminates, a Trapezoid Flat Tooth blade can be used in such cases. For thin laminates, a flat tooth blade may be used, keeping in mind chances of average finish quality.

If cutting double sided sheets, a scoring blade is also highly recommended. Such a scoring blade is smaller in size than the main blade, cuts to limited depth and rotates in opposite direction (along the direction of the feed) to that of the main blade.

Care must be taken to prevent kickback or backlash. The height of the saw plate is important, as larger height creates a favourable entrance angle, and can lead to a cleaner cut. Use a sacrificial

board and add a guide to serve as a fence, this helps reduce flutter during movement of the sheet through the saw blade. Always make sure the decorative side faces away from the rotation of the blade. On most table saws, this means that the decorative face should face upwards. Always ensure that the blade cuts cleanly through the surface, and that the blade doesn't become too hot.

Ensure that saw blade teeth cut smoothly into the decorative face and at least 3 teeth are always in contact during each pass. There are also a number of special saws now that are manufactured exclusively for cutting laminates, check with the manufacturer.

### **ROUTERS**

Routers can be used to cut as well as mill the laminate. Recommended router speeds range from 16000 rpm to 22000 rpm. Always choose a router with adequate horsepower. The sharpness of router cutters should be maintained. Use a router with a guide when cutting large lengths of laminate.

### **LAMINATE TRIMMERS**

Laminate trimmers are specifically designed for quick and easy laminate trimming. With a smaller footprint compared to routers, they also spin at a higher rpm- varying between 25,000-30,000 rpm, though typically smaller sized bits are used.

Their low footprint allows for easily to carrying them to the job site along with easy handling, such as one hand operation and use in tight corners. An important distinction from a router is the use of an isolated bearing which is attached to the router base instead of being on the router bit. This design takes the movement of the router to the router base, and not so much to the laminate, reducing chatter and flutter. The bearing doesn't spin with the bit and doesn't damage the surface that it is pressed against. Since the bearing doesn't need to spin at high rpm like the router bit, it also lasts much longer, reducing tool wear.

## **3.2 BONDING & TRIMMING**

Always follow the Prefabrication checklist for choosing the appropriate substrate and adhesives for the project. Prior to bonding, laminates must be prepared by sanding and cleaning to remove dust, grease and any contamination, especially around the cuts on the edge.

### **Application Guidelines-**

The two key steps to a good bond are Surface Preparation and proper application.

To prepare the surface, the substrate must be as clean as possible, and the bonding process must be carried out in a clean environment. The presence of dust oil or particles between the laminate and the substrate may cause issues later.

Ensure proper application of the adhesive, and make sure the adhesive has been processed as per manufacturer guidelines. Multi-part adhesives should always be stirred thoroughly and applied evenly as a proper coating on *both* the substrate and the laminate.

Most bonding issues result from one or more of the following-



a. Improper application

Use the appropriate pressure as recommended by the adhesive manufacturer. A rough guideline for pressing laminates for bonding to substrate is application of 30-80 psi of pressure, (in comparison veneer layers need about 200 psi pressure to bond). Pressure should be applied over the entire laminate sheet, ensuring the edges are clamped closely together. To remove any air bubbles, hand rollers or J-rollers can be use, moving them from center towards the edges.

Use of dowels is recommended to ensure the laminate aligns properly with the substrate.

While applying the adhesive, the adhesive needs to be uniformly applied on both surfaces. A uniform spread of adhesive will not have any marked variation in appearance. In case there is any variation in appearance of the adhesive, recoat the surface. The substrate edges can be double coated with adhesive as they have higher porosity.

b. Improper Environmental Conditions

Adhesives as well as laminates and are sensitive to environmental conditions.

Unsuitable temperature and humidity may affect the pot life of the adhesive, and lead to adhesive being overly dry or overly wet.

For example, a combination of high temperature and humidity above 85% can cause condensation, leading to poor bonding results. In such a scenario, air-dry the surface. Ensure the temperature and humidity of the chosen adhesive are in accordance with the environmental conditions of the fabrication and installation site.

When fabricating vertical panels onsite, limit the laminate sheet to 2.5 feet width, larger panels should be fabricated in a workshop. If contact adhesives are used, panel width should be restricted to a maximum of 600mm. If ambient conditions for the installation remain warm and dry, contact adhesives should be avoided.

Once the rough cut laminate has been bonded to the substrate, it should be allowed to set for a few hours before attempting any further fabrication.

Trimming is needed to remove the projecting edges of the assembled panel. Routers with flush bits are recommended for this process. Stationary Routers can be used for edge trimming and even making cutouts and grooves. Portable Routers are great for edge trimming and can also be used for cutting holes and working on edges. When using a portable or hand router, always prefer conventional milling over climb milling.

Following the trimming process, edges must be routed smooth.

### 3.3 DRILLING

Some guidelines-

- When it comes to tool selection, an electric drill with HSS bits is the tool of choice for most kinds of drilling applications. Another important selection to be made is the type of bits used in the drill. While TCT bits may prove to be economical due to their long life, Rectified HSS bits are sharper. Longer tool life helps improve reproducibility while sharper blades improve the quality of the cuts.

- In case of non-stationary drills, it is important to ensure the appropriate pressure is applied.
- Recommended Drill bits for decorative laminates are HSS based steep spiral drills for plastics. The spiral (rate of twist) in a drill bit controls the rate of chip removal. Additionally, these bits have a point (nose) angle of 60° to 90° (opposed to the 120-135° angle of standard bits) and a low helix angle of 0° to 20° with a wide flute for efficient chip removal. The bits must be sharp for best results. For drilling larger holes with a standard drill, a starter hole is recommended, preferably 1/8" in size.
- In case the project conditions demand the use of a standard steel bit, ensure regular removal of the drilled material from the drill hole. Cobalt drill bits are not recommended for laminates.
- As laminates are homogenous material, Drill bits without a centering point or pilot point are preferred when drilling small holes. For larger holes, specialized tools with a centering point such as hole cutters, milling cutters are recommended.
- Drill oversized holes (at least 0.5 mm or 0.02" larger in diameter) for screws and bolts. This allows the screw to adjust with the slight dimensional movements of both the laminate and the screw, preventing cracks around the hole.
- A countersink is a conical hole drilled into a material, which allows for the head of a countersunk screw or bolt to be placed flush with the top surface. When aiming for countersunk holes, use a lower rotational speed.
- When drilling through-holes, ensure a hardwood panel is placed at the exit face. This prevents any splintering or shocks to the material surface when the drill exits the material.
- By controlling the feed speed of the drill, the panel is less likely to be damaged. A drill feed speed of 0.03-0.05mm per revolution is recommended.
- Edges of the hole should be smooth and cleaned after drilling.

When working on a project that demands high reproducibility, drilling templates should be used. For such mass production scenarios, reproducibility may be the most important factor during machining and fabrication. Dorby recommends using a stationary drilling machine with an automatic feed. For such stationary drills, the use of a TCT drill bits is recommended over that of HSS as TCT drill bits last approximately twice or thrice as long.

#### Troubleshooting Drilling Issues

Observation	Possible Cause	Solution
Exit splinters and material breakouts	<ul style="list-style-type: none"> <li>▪ Poor support to the panel</li> <li>▪ Improper feed rate</li> </ul>	<ul style="list-style-type: none"> <li>▪ Use a hardwood panel for support and ensure the drill is retracted after coming to a complete stop</li> <li>▪ Reduce the feed rate</li> </ul>
Drill wears out quickly or poor-quality holes after some time	High rpm	Reduce rpm

Smell, production of smoke or burn marks	Burn marks on material	Ensure drill is retracted without touching the surface or the sidewalls  Check drill rpm
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### 3.4 CUTOUTS, EDGE PROFILING & FINISHING

**Cut-outs:** Cut-outs and slots e.g. for switches or access openings, always should be rounded, as sharp corners can cause in formation of cracks. All internal corners and cut-outs should be rounded as far as possible. A radius of 3 mm (1/8") or larger in the corners is recommended to minimize stress cracking. For larger sized cuts, the radius must also be increased. All cut-outs should be routed or filed to ensure smooth edges.

The use of non-rigid, elastomeric adhesives such as contact adhesives may cause stress cracking. When contact adhesives are used, the minimum radius for inside corners must be 5mm.

For making cutouts, especially in worktops and countertops, Dorby recommends a jigsaw saw or a circular saw with the teeth pulling upward. Before starting with the jigsaw, use a drill to make pilot through-holes in each corner or use a plunge cut tool (such as a multi-tool with plunge cut blades, preferably with oscillating motion). Then, with the decorative side facing down, cut from the pilot holes using a jigsaw.

Sometimes constraints of space don't allow for a full-sized jigsaw to be used. Such a scenario would be when making cutouts near the edge of a countertop, e.g. near a backsplash. In such a case, an oscillating multitool can be used with a half-moon saw blade, followed by a plunge cut blade. Sometimes use of such a tool can cause burning of the substrate and the edges, so a Japanese style blade with large tooth can be used to create a wider kerf for a pilot scribe. In case the project involves refabricating an existing worktop, which may have nails or other metal fixtures, we recommend using a Bimetal blade.

**Edge Profiling:** Dorby recommends some form of edge protection to ensure the edge remains protected. Some options to finish an edge include-

- Edge banding tape
- Profiled edge with sealant
- Profiled edge with edge banding tape
- End caps

Sharp corners and edges should be chamfered to eliminate the chance of injury and chipping. Numerous edge profiling options are available. Check with Dorby Distributor or Technical Team for more details.

## 4 POST FABRICATION

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During fabrication processes, the protective film must be left on. Once all the fabrication processes have been completed, and the worksite cleaned, it is recommended to remove the film.