



International Network for Bamboo and Rattan

# BAMBOO MAT BOARD

WEAVING A WAY OUT OF POVERTY

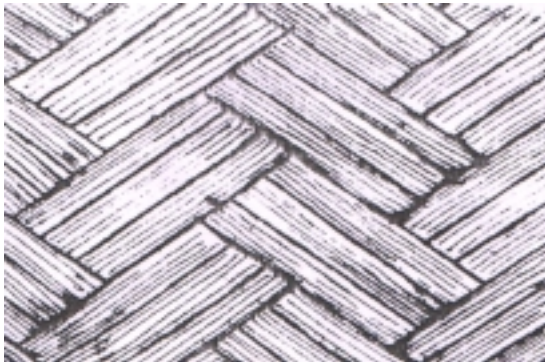
**Source of the Technology**  
**Expected Benefits**  
**Suitable for**

Indian Plywood Industries Research and Training Institute (IPIRTI), Bangalore, India.  
Gender insensetive employment, environmental amelioration, skills enhancement  
Community enterprises, individual female weavers.

**Key Words**

Bamboo MatBoard, Splitting and Slivering, Weaving.

## Bamboo Mat Board



Bamboo Mat Board (BMB) has similar properties to plywood, and is sufficiently rigid and flexible to substitute for it in a wide range of applications. BMB can be used for paneling, ceilings, prefabricated shelters, packing cases, storage bins, roofs, doors and door panels, furniture and household utensils such as trays and plates. BMB is also used in concrete formwork. BMB is much more flexible than wood-based-plywood and can be used in structural applications such as stressed skin panels, wall bracings and web beams for which plywood is not suitable.

The technology for producing BMB has been developed in a number of countries, particularly China and India, and it is presently being produced in over 20 factories in these countries.

### Impact on Poverty

Producing mat boards is a good way of reducing poverty and developing sustainable livelihoods. There are many stages involved in the production of mat board, and the early stages are highly suitable for rural peoples – The growing and sustainable management of bamboo benefits the environment and provides income opportunities for paid workers, as well as a raw material that can be turned into cash when it is sold. Splitting bamboo into thin slivers that can be woven into mats can be done either by hand at home by the weavers or their families, or on a larger scale in a splitting and sliver making unit established specially to supply the mat board factory. This way finances also benefit the others.

Weaving mats is a relatively simple process and with a small amount of training almost anyone can weave. Indeed, weaving skills may already be present in the community. Weaving can be fitted into the normal daily routine if there is time available, and is particularly suitable for home-based women. Payment for mats is usually done on a piece-work basis, so there is considerable freedom for the workers to choose when and how they work. Alternatively, weaving centres can be established in villages. These would offer opportunities for socialising, skills improvement from fellow weavers, and could become focal points for the provision of community and self-help services. A simple half-day hands-on training session in weaving techniques should suffice, and can be easily conducted at community level.

Some aspects of production must be done at the factory – soaking the mats, pressing them into boards and trimming to shape are not easily accomplished in the community. However by establishing the factory as a community-based enterprise, with equal shareholding of all interested members, the benefits can be shared by all. The factory itself will employ a significant number of people, and require semi-skilled labour for preparation of chemicals, machine operation and servicing, and white-collar staff. The whole operation can therefore involve a wide swathe of the community from landless poor to those with management or industrial experience, and fits well into multi-echelon development strategies.

A bamboo mat board unit producing 129, 000 1 x 1.2 m sheets per year can provide employment or income-earning opportunities for:

- Up to 50 bamboo growers
- 400 bamboo mat weavers (especially suitable for women)
- 98 factory staff (4 management, 29 professional, 65 labourers)
- Miscellaneous transporters (poles, slivers and finished mats) and retail staff.

### Key points for success

A bamboo mat board factory can be very successful and bring significant long-term benefits to poor rural communities. The forwards and backwards linkages required for sustainability of the business support many more people than work at the factory itself.

- Availability of raw bamboo
- Availability of skilled bamboo weavers, or people willing to be trained.
- Coordinated means of transporting bamboos to decentralised weavers and mats from weavers to the factory.
- Reliable electricity supply.
- Suitable markets and marketing mechanisms for boards
- Start-up capital

### **Producing bamboo mat board**

The process of producing bamboo mat board involves six steps:

1. Bamboos are split into thin slivers
2. Slivers are woven into mats
3. Mats are soaked in adhesive resin
4. Mats are allowed to drain and dry
5. Mats are pressed together under high temperature and pressure to form boards
6. Boards are trimmed to shape.

The main materials are bamboo slivers to produce the bamboo mats and adhesive resin in which to soak the mats. A resin applicator is needed, and a drying chamber is optional.

#### Making mats

Some bamboos are more suitable than others for mat-making - those with long internodes are preferable. Shorter-internoded species tend to require more resin to bond them firmly together. Splitting by hand takes some skill to keep an even thickness of split, but with a little practice most people can do it. Splitting machines are also available and offer rapid throughput. Splits for weaving are usually produced about 0.6 mm thick and approximately 1.5 cm wide.

Before weaving slivers are dried to approximately 15% moisture content. Mats are usually produced with cross woven slivers, either at 90 or 45°. Sometimes slivers can be placed side-by-side in string jigs that form the longitudinal supports, however the mats produced this way are less sturdy, and producing them requires more facilities and space. The size of mats is determined by the final size of the board to be produced – placing mats side-by-side is not possible, so the boards produced are always slightly smaller than the mats used to form them.

#### Soaking mats in resin

Phenol formaldehyde or urea formaldehyde resins are used for manufacturing mat board. Producing resin requires some experience, as its viscosity, solids content and water tolerance should all be within set parameters. Resin can be produced in batches and stored for up to three weeks.

Mats can be soaked in resin in specially designed applicators or simple tanks can be used, but care should be taken over safety. The amount of resin applied to each mat, the length of time of dipping and the mode of application all have a

significant bearing on the quality and economy of the process.

After dipping, the mats are allowed to “stabilise” - they are laid on top of each other for about two hours to allow the impregnation of the resin. They are then dried in a drying chamber or industrial band driers until the moisture content falls to about 10%. They can then be stored, or used immediately.

#### Forming boards

Metal plates are coated with a non-stick agent, and three, five or seven boards are placed vertically on top, with another coated metal plate at the very top. This whole assembly is loaded into the pressing machine, where the mats are pressed firmly together at high temperatures. The high temperatures reliquify the resin in the mats, and the pressure ensures strong bonds. Finally after pressing, the newly-formed boards are trimmed to shape with a circular saw.

### **Uses and Markets**

Bamboo mat board has significant uses in low-cost bamboo housing. It can be used as a plywood substitute in all the uses to which that is put. If pressed between corrugated pressing plates, corrugated roofing sheets can be formed.

Establishing a mat board factory requires some understanding of the local market for matboard to ensure its sustainability. Mechanisms to identify suitable markets and promote the sale of bamboo mat board may be beneficial.

### **References and further reading**

Bamboo Mat Board and Bamboo Splitting and Slivering Unit Transfer of Technology Models. Available from INBAR via <http://www.inbar.int/totem/totemmain.asp>.

<http://www.bamboocomposites.com> – IPIRTI's bamboo subsite, with contacts therein.

Or contact: [livelihoods@inbar.int](mailto:livelihoods@inbar.int)

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