Building Materials II

Lecture 9

Block Board

Block board is built up with a core of solid elongated blocks of softwood bonded together with adhesive and covered with a sheet of plywood on either side. Alternative facing materials inner thin layers of MDF or chipboard. Let's look at the structure of a block board. Of softwood glued together and faced with veneers. Now these strips as you see in the images these are soft wood strips that long softwood strips and where one softwood strip ends the other softwood strip again with the same pattern continues. Strips are about 12mm to 25 mm in width. Usually when these strips are placed alternatively growth rings and finally when these chips are placed facing is done either by fly board, MDF board or chipboard. Here is alarger image of the structure. This block board does not split that easily. Block board types can be broadly classified into based on the location where is used and the type of wood that is used. Location there is exterior grade which is also known as BWR grade. That is boiling water resistance. This grade of block board obviously has better water resistance compared to the interior grade block board which is called MR grade or moisture resistance grade in block board. The interior grade is suitable only for indoor use. Based on the wood we have soft wood block boards and hard wood block boards. Majorly block boards have only soft wood in the core but in some block boards because of the requirement they also give hardwood in the core.

Block board advantages are

It is lighter in weight because it uses softwood in its Core.

It is Very strong due to the directions of the veneer.

It does not split easily.

It also comes in large sizes and also large thicknesses.

It has lesser tendency to sag or bend.

It cost less than compared to plywood’s and other boards

You can screw the block board into the edges. Now what does it mean means, basically if you have a wall here this is the block board you have you can screw this to the edges which is not the case with plywood because, if you have a plywood you need to have a kind of support system yeah like an angle section or L angle or T angle.

Block Board is better than particle board even than medium density board.

It has a very good resistance to attack from water, heat, chemical, fungi and insect attack,

Disadvantage of block board is

It is not as strong as plywood or not even does not even compare with good quality of solid wood.

The nails Sometimes, when you name the block board into for a furniture or some interior sometimes the nails may enter the gaps in between the soft wood in which case it will form a defect. It will not be very strong joint.

And the edges. The age of the soft wood must be covered.

If you see a block board this is a soft wood core or you have plywood or MD or chip board on top. So this edge is still, this edge which you see in red still softwood and it is susceptible and it has lesser resistance to wear and tear. So this edge has to be covered. This is usually covered with a veneer or again a piece of plywood or strip of wood.

Use and application of block board

Block board is widely used in furniture's long bookshelf, tables and benches. Basically any board that covers a larger area because it has got good structural stabilityKitchen storage, interior finishing, shop fittings.Block board is also used to construct door and a solid core flush as well. Itis used for wall cladding where lengthy wall panels are desired.Block board is also used for ship interiors and theatre stages.

Lamin boards:

Compound wood board consisting of a thin strip of softwood placed side by side and sandwiched between veneer panels. Often of hardwood. Considered to be higher quality than blackboard.

Let's look at the structure of lamin boards:

The central Court consists of 5 mm wide strips with vertically arranged growth rings. Individually interlocked. This results in a particularly even surface and high material stability. So when you see Block board and lamin boards what is the difference? The difference is in the softwood core. While if we cut a cross section of block board the softwood cores will be 12-35 mm wide while for a lamin board the strips are 5 mm in a width. So this gives a more structural stability and better quality for lamin boards when compared to block boards.

Let's look at particle boards:

This is made up of small chips of wood bonded together with resin. Resin mostly use urea and formaldehyde. And then this is formed into sheets buy compression in hot press. It is not as strong as plywood and block board but it is not as expensive also. Chipboard is often covered with plastic laminate wood veneer and used in furniture. Particle boards are also called as chipboards.

Properties and uses of particle boards:

Advantage is:

We get a uniform thickness of particle boards

It is very lightweight compared to plywood or block board or lamin board.

It is also ecofriendly because it is made up of waste wood particles which is left over when you

Are manufacturing plywood or block board and lamin board. Particles which cannot be used in that can be chipped and used for particle board also.

Disadvantages of that:

They are not very durable the age does not last very more but 5 years.They are very sensitive to water and moisture. Even if they usually come in contact with little bit of water it usually spells.The Indian Standards quality specification for particle board is IS: 3087 and IS: 12823.

Uses of particle boards are:

It is used to make Ready furniture.

Kitchen cabinets it is used to make false ceiling.

Wall panels and partitions.

One more disadvantage of particle board is when you are using it to construct kitchen cabinets and all when you are screwing it, the screw will not hold very tightly to the particle board as tightly as it will hold with plywood or lamin board or Block board because will give away easily the fault in which the screw is placed loser and then hole will become bigger and the screw will get loser might come off. The types of particle board that I mentioned earlier, particle board has to be laminated. So if it is laminated on one side 1nly it is called one side lamination. And if it is both side it is called both sided lamination. Side of the is the top surface or show surface is laminated. And these are used in the places where the bottom is not aesthetically, it need not be aesthetically pleasing or anything. For example the tables and all bottom portion of the table you do not see. And both side laminated portions are used for wall paneling or interior places or places where you see the both sides of the particle board.

Hard boards:

This is made from wood fibers that have been pulped. It is not as strong as any of the other boards.

Howit is manufactured:

Hard board is made up from wood pulp.Water is added to the pulp.The mixture is then pressed under high temperature and the water is removed.The sheets are smooth on one side texture on the other side like you see in this image. One side is smooth while the bottom portion is textured. Usually these boards are available from 3 to 9 mm thickit almost looks like a cardboard sticker and more former form of cardboard. The properties of cardboard: It is available in thin sheets like I mentioned earlier one face is smooth and the other is textured.Open it is placed with plastic laminate.It is used for back of cabinet’sbase of drawers and all. It is only suitable are used in interiors. It cannot be used in exterior because it has very less wear and tear. It does not have any resistance to master at all.

Fiber Boards

Fiber boards are quality boards which are relatively cheap. This board is composed of fine wood dust and resin pressed into a board. This material can be worked, shaped and machine easily. Paint can be applied to it without the need for an under coat primer. It is used in the building and furniture trades and it has a variety and wide range of use.

Let's see how fiber board is manufactured:

Wood is first chipped into fine particles.These are then mixed with adhesives. This mixture is pressed into sheets. The sheets are sanded. Then cut into standard sizes. The sheets that we get out of this process is fiber board.

Properties and uses of fiber board are:

It is a very popular board material

Often it is faced with Veneer or plastic laminate.

It is made with fine wood fibers in three layers

Need to drill into face before nails or screws are inserted. Basically means that since it is made with fine wood chip or wood particles, the nail will not hold very well into this board. So you have to drill a face of the nails before you drill a nail. So that the face off the nail will hold the nail into place all the fiber board will be held in place. And won't become loose enough. This problem happens when you have fiber boards doors kitchen cabinets floor where you have the fiberboard shutters and all and the Hinges which is attached with the shutters there were it loosens because of composition of the fiber board and there were this problem happens.
Fine dust coming from the fiber board is very harmful.
Similar color to hard board but it is much stronger than hard board.
Fiber board is manufactured from fibers mixed with synthetic resin Binder.
No water is used for pressing temperatures are lower than for hardboard.
In a fiber board both sides have a smooth finish or boards can also be pasted with veneer.

The Indian quality specification for fiber board isIS: 12406 and IS: 14857,

Types of fiber board:

Three major types of fiber board are available in market.HDF, MDF and LDF you would all have come across these terms because MdF boards and HDFboards are the most widely used board’s kind of other boards in market.HDf - high density board, MDF medium density fiberboard, LDF low density fiberboard. The density of low density fiberboard from 600 to 700kg/meter cube. For medium density fiberboard it is 700- 1450 kg/meter cube. And for High density fiberboard density is more than 1450 kg/ meter cube. From these MDF, LDF and HDF boards MDF are the most widely used fiberboards. So let us see a little more in detail about that.

Advantages of using MDF boards:

Some varieties are less expensive than many natural woods but they have the same strength of a natural wood

They are Isotropic that is the properties same in all direction so no tendency to split.

There is no defects. It shows none of the defects natural Timber shows.

It has Consistent strength and consistent in size as well.

MDF boards are quite Flexible. They can be used for curved walls or surfaces.They are easy to work. It Shapes Well.MDF boarders have Stable dimensions they won't expand or contract like woodthey are Easy to finish. You can directly apply a paint on MDF board. It is not like, you have to apply, natural Timber you have to first primate and then put a varnish and then you have to put , you don't have to go through all these process here .MDf can directly take a paint. MDF boards are stronger and hence costlier than plywood, particle boards and block boards.

Disadvantages of using MDF boards:

Low grade MDF may swell and bake when saturated with water.

They may warp or expand if not sealed properly.

Dulls blades more quickly than many woods.

They are weaker strength wise compared to plywood.

Subject to significant shrinkage in low humidity environment.

Similar to particle boards, mDF boards are also not nailed. Screws are used instead

Veneer

Now let us see veneer:

It is a thin sheet of layer of natural wood. Usually a similar thickness to cardboard it is produced from a tree trunk in a number of ways.

Characteristics of veneer are:

Thinner than 3 mm

Available in standard sizes same as laminates.

Gives a timber product a wood finish using much lesser solid wood. So reducing the cost as well. It is usually glued on to the surface of a cheaper manmade board giving the illusion of expensive natural wood.

Due to its flexibility wooden finished furniture can be made in any shapes. It could be curved or spherical shapes. Any shapes and size which were not possible using solid wood.

What are the veneer manufacturing methods?

Basically there are two types of veneer manufacturing methods' ne is rotatory cut veneers and the other is role veneers. In this type the logs are horizontally rotated and peeled. The second type is sliced or sheet veneers. In this the logs are sliced. Compared to rotatory cut veneers, it is more expensive but we get a better quality veneer also. Now let us see how Veneers is manufactured through roll veneers. Roll veneers or rotating cut veneers is most popular method, where the layer is peeled of thin wood. So what happens is the log of wood is inserted into a cutter where optical scanners is placed centrally in the cutter while the tree trunk revolves a knife a large latte or life is inserted and the nice just peels off log as it rotates. So you get a continuous sheet of veneer and when it reaches the central Core of the log. The rotation stops, core is removed is replaced by another block of wood. And then the process continues. So one advantage in role veneer is you get a continuous sheet of veneer with uniform thickness. The next type of veneer from manufacture is sheet veneers. A veneer sheet can be cut into several different ways. First is plain sliced method in which you see the log of wood here the curved portions are already cut off, straight cut start cutting the veneer. Veneer sheets in horizontal fashion. So the grain you get from this kind of cutting is called a Cathedral pattern you see here. This type is quarter sliced. You have seen the quarter conversion where the whole log is cut into 4 portions and then the further conversion is done. The same thing happens here. From a quarter portion which you see zoomed out here, sheets of veneer is cutout in horizontal fashion. So the grains you get from this kind of cutting is, you get something like this, it is all straight. Is called a natural stripe pattern. The next type is called rift cut where again it is a type of quarter cut. But instead of going straight, this is what happens. The knife is first inserted, the knife first peels like this then it is rotated 15 degree, then it cuts like this then again it gets rotated 15 degree and then it cuts like this. Finally what you get is a plane sheet but then it is cut like that 15 degree rotation like this than 15 degree rotation. The next type of cutting is rotation of flitch. Basically the knife, you see the life going like this, then that, then this and this. Only difference in this is the portion of timber, is held by a machine which rotates the timber and the knife is placed in 1 position and it cuts in that way. And this one is a plane simplest way of cutting. A square or rectangular piece of timber is taken and then simply it just cuts a sheets of veneer from that. So why do we have so many different types of slicing method. So when you compared rotatory cut methods and sheet veneer, rotatory cut methods are rotatory cut veneer you get a long sheet of veneer, which is easier to cut. Then why do we have to go for sheet veneers. Why do we need a different method? Why do we need so many different methods for cutting a veneer? Well slicing method and the slicing location determines the veneer pattern. So we saw the slicing method. So when you have a rotatory cut method you have a rotatory cut veneer. We have a very general pattern like this. While sheet veneer according to the type it is cut it will have grains like this or it will have grains like this. So based on the method of cutting veneer pattern is determined. So if you want a particular type of grain you will cut that veneer in that particular method, that you will get that type of grain. Also the location where you slice the grain, the location also determines the veneer pattern. So here we see in a tree, which portions we get type of grains. So if you see in the branch portion are in a portion where the branch juts out, you get bur or bur veneers. These veneers end grains growth type which occurs on some trees. These are highly valued type of patterns. And normally if you see the normal trunk, if you have a Crown or flat cut, sliced veneer, you get

something like this, pattern like this. If you have a rift cut you have like this. If you do a quarter cutting, you get a straight lines like this. And if you get a rotatory cut as I showed you before, you would get grains like general grains or wavy grains like that. Depending on the slicing method and slicing location we get different veneer pattern. Now iron on veneer. Iron on veneer is purchased in the form of Rolls. It is supplied in a range of width length and Woods. One side is natural wood and the other is a layer of glue or adhesive...

So how do we use iron on veneer:

So where do we use iron on veneer. A strip of veneer face cut slightly longer than the edge of the board. So where do we use iron on veneer. Iron on veneer is used on the edges of boards. Boards like block board, lamin board and all where it just needs to be covered and protected. So in these cases we use strips of veneer to cover those edges. How it is used or how are the strips applied on the edges of the board. A strip of veneer face cut slightly longer than the edge of the board. It is positioned on the edge of manmade board. Natural wood side facing upwards hot iron is placed top of the veneer this warms and melts the Glue. As the Iron is pushed along the strip, theveneer is glued to the edge of manmade board. A craft knife is used to trim the veneer to the exact size.
Inits simplest form a role of iron on veneer can be used to glue along the edge of a board. Example particle board, lamin board, providing a quality finish and hiding the cheaper board beneath.
Laminates: A wood laminate is a thin sheet of material used to cover the core of a wood project in order to change the appearance of the material.

Characteristics of laminate:

The advantage to laminate is that they help to road construction cost while still providing the same sort of a static beauty as solid hardwood cabinets.

A disadvantage is that a laminate cabinets is slightly more difficult to refinish in the future and the overall cabinet lacks the strength of the hardwood it is being made to resemble. So basically if there is a hard wood furniture already laminated to re laminate it is difficult.

Applications:
Laminates have a wide variety or wide ranges of furniture's, interiors, doors and windows. Even you have laminated doors. You have laminates for wall cladding. In these 2 images bottom you see the laminated doors.

How is laminate manufacturer?

First let us look at the ingredients of laminate:

Brown paper, everybody think that there is some wood in laminate, it is actually not good, and it is made of Brown paper. It is also known as Craft paper.

And the resin is phenolic resin which is made from phenol and it is the basic material used for making plastic.

Decorative printed paper. This will have the printed decorative design for the face of the Sun mica/ laminate sheet.

Melamine resin a clear transparent resin for creating the decorative paper. Clear translucent paper which forms the topmost overlay of the decorative laminated sheet.

Laminate manufacture:

Step 1 the brown paper is soaked in the phenolic resin such that it is fully saturated with resin. Step 2 the paper is dried, paper which was earlier you can tear it off is now become brittle. Step 3 now the paper is cut into desired sizes

Steps 4 you have the brown paper, you have the decorated printer paper on top you have the melamine resin, you have the clear translucent paper. All these layers together are put under high pressure and heat such hay they bond.

Step 5 sanding is done on that nondecorative side to get a plain surface Step 6 testing is done and if it is satisfactory, it is packed and then shipped.Laminate types: According to manufacture process you have a pressure laminates, low pressure laminates, thickness- regular laminates and compact laminates, usage- decorative use and industrial use. So high pressure laminates are commonly used by carpenters over plywood while making the furniture. Low pressure laminates are directly bonded to particle boards or fiber boards. Regular laminates thickness ranges from .6-1.5mm. It is glued using Favicol or other adhesives. Compact laminates, thickness ranges from 3 mm to 30 mm. These are self-supporting and hence do not need to be glued. Decorative use, importance is given to aesthetic texture and color whereas industrial use- importance is given to high strength, durability slight properties like wear and tear, resistance to wear and tear resistance to scratches, antibacterial and hydrophobic laminates.

Some facts and measurements of laminates: Few leading laminate brands in India: Sun mica, Formica, green lamp, laminates, and merino laminates, century sundeck, asis, Virgo, durian, delta laminates, kit vitsa. You Might have heard of some of these names. Available sizes are 27.33

Laminate boats are also called as mica boards. And usually the market rates of laminates ranges from rs.28 -rs 390 per sq.ft. Depending on the type of texture are special property desired.