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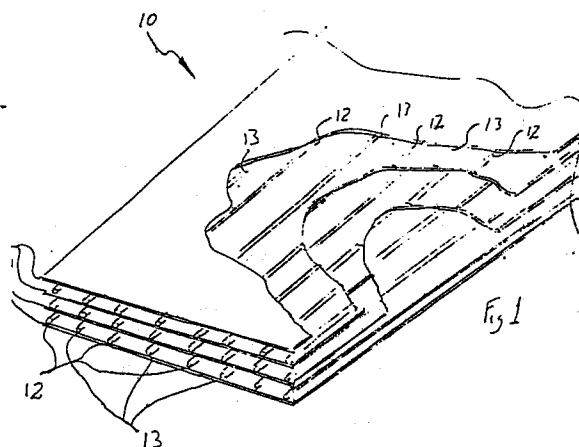
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(54) **Method for manufacturing plywood sheets.**

(57) A method of manufacturing plywood (10) includes providing at least two timber sheets (11) and securing the two sheets together by means of two adhesives (12, 13), with one of the adhesives (13) having a relatively quick curing time so that the sheets (11) are held together in a fixed relationship while the other adhesive (12) cures.



Description

METHOD FOR MANUFACTURING PLYWOOD SHEETS

The present invention relates to a method for the manufacture of plywood sheet.

Conventionally plywood has been manufactured by the following method. Firstly, dry sheets of timber veneer are passed either through rollers or past spray heads which apply a coating of adhesive to the surface's top and bottom. Interleaved with the sheets to which glue has been applied, are dry sheets of veneer, usually, but not always, with the grain direction running in the opposite direction to the glued sheets. The wet pack of veneer sheets are then placed into either flat or curved moulds and the moulds closed by hydraulic pressure. The pack is held in situ until the glues have cured by heating. The time the pack is cured is dependent on the thickness and type of glue used. Once the glue has cured, the sheets are then removed from the press.

The above described method is time consuming and requires expensive machinery. Accordingly this adds greatly to the cost of manufacturing plywood.

It is the object of the present invention to overcome or substantially ameliorate the above disadvantages.

There is disclosed herein a method of manufacturing a laminated sheet consisting of at least two layers secured together, said method including the following steps: providing at least two of said layers, applying an adhesive to at least one major surface of one of said layers, applying the other layer to said surface so that upon curing of said adhesive said layers are fixed together, and wherein the step of applying said adhesive comprises applying a first adhesive to portions of said surface which first adhesive has a predetermined curing time, and also applying a second adhesive to further portions of said surface, with said second adhesive having a shorter curing time than said first adhesive so that said second adhesive retains said layers in a fixed relative position while said first adhesive cures.

A preferred form of the present invention will now be described by way of example with reference to the accompanying drawings, wherein:

Figure 1 is a schematic perspective view of a plurality of layers to be glued together to form a laminated sheet;

Figure 2 is a schematic end elevation of a portion of the sheet of Figure 1; and

Figure 3 is a schematic end elevation of the portion of Figure 2 after the sheets therein have been pressed together.

It should be appreciated that in the preferred embodiment to be described, the description is with reference to the manufacture of plywood sheets. However, the present invention in its broad form, as well as in the detailed form described with reference to the following embodiment, is just as applicable to the manufacture of other laminated structures including those formed of sheets of cardboard and plastics material.

In the accompanying drawings there is schematically depicted a laminated sheet of plywood 10. The

sheet 10 consists of several layers of timber veneer 11 which are to be secured together to form a sheet of plywood. In Figure 1, the sheet 10 is actually a "wet" sheet with the glue still to be cured. The sheets 11 are to be fixed together by means of glue strips 12 and 13. The strips 12 and 13 are located between each pair of adjacent sheets 11. The glued strips 12 and 13 are alternatively arranged, however, other arrangements are contemplated for other materials.

The strips 12 consist of a normal adhesive used for cold setting bonding, ie. a PVA, or an EVA glue. The beads 13 are of a quicker setting glue, preferably a foamed hot melt adhesive as applied by the Nordson (Registered Trade Mark) applicators sold by Nordson Corporation, 350 Research Court, Technology Park/Atlanta, Norcross, Georgia 30092, USA. In the Nordson applicators, the material characteristics of most hot melt adhesives are improved by dissolving in the hot melt adhesive a gas such as nitrogen or carbon dioxide. The hot melt adhesive is volumetrically metered. When the hot melt adhesive, with gas dissolved, is applied to the veneer, the hot melt adhesive foams as it is exposed to atmospheric pressure. This provides the hot melt adhesive with an advantage in that the "open time" is increased. The open time refers to the maximum allowable time available between the deposition of the adhesive and joining of the layers so that a useful bond can still be formed. The hot melt adhesive still retains its fast setting time and it has been found that by foaming the hot melt, it is possible to shorten the set time.

Once the layers 10 are placed in a coextensive relationship, they are pressed together as seen in Figure 3. The strips 12 and 13 are of a predetermined size and are spaced apart so that the resulting glue layer will be generally continuous between any two abutting layers 11. In the manufacture of standard plywood sheets of 16 mm thickness and using hot platens, a curing time of 8 seconds for the strips 13 is all that is required. This is in contrast to 8 minutes in a conventional system. Thereafter, the glue strips 13 hold the sheets in a compacted configuration with the glue strips 12 cure.

The above described preferred embodiment of the present invention has the advantages that expensive moulds and heating equipment are not required. This reduces energy consumption and reduces the capital investment required to produce the plywood sheets. The sheets are formed quickly and cleaning of the glue applicators is considerably less in comparison to standard glue machines using thermal setting glues. In these standard machines, a great deal of maintenance is required. In using a foamed hot melt adhesive applicator, the applicators can be clean flushed relatively easily. eg. a flushing operation may only take 10 minutes and may need only to be performed every six weeks.

In the above described preferred embodiment, the sheets are depicted as forming a generally planar

plywood sheet. If the layers 11 are placed in a contoured mould, a shaped product can be produced.

It should further be appreciated that strips 12 could consist of an adhesive which is heat curable or curable by other means such as exposure to ultra violet light.

extending between the two layers (11).

Claims

1. A method of manufacturing a laminated sheet (10) consisting of at least two layers (11) secured together, said method including the following steps: providing at least two of said layers (11), applying an adhesive (12, 13) to at least one major surface of one of said layers (11), applying the other layer (11) to said surface so that upon curing of said adhesive (12, 13) said layers (11) are fixed together, characterised in that the step of applying said adhesive (12, 13) comprises applying to portions of said surface a first adhesive (12) having a predetermined curing time, and applying to further portions of said surface a second adhesive (13) having a shorter curing time than said first adhesive (12) so that said second adhesive (13) retains said layers (11) in a fixed relative position while said first adhesive (12) cures.
2. A method according to claim 1, wherein said first adhesive (12) is a cold setting glue.
3. A method according to claim 2, wherein said second adhesive (13) is a hot melt adhesive.
4. A method according to claim 2, wherein said second adhesive (13) is cured by exposure thereof to ultra violet light or heat.
5. A method according to any preceding claim, wherein said layers (11) are timber sheets.
6. A method according to claim 5, wherein said first adhesive (12) and said second adhesive (13) are applied in strips which are generally parallel, coextensive and transversely spaced apart.
7. A method according to claim 6, wherein the strips of said first adhesive (12) and said second adhesive (13) are alternately located across the width of said one layer (11).
8. A laminated sheet structure (10) comprising at least two coextensive generally parallel layers (11) of sheet material, a first adhesive (12) binding predetermined portions of said two sheets together, a second adhesive (13) bonding together further portions of said sheets together, and wherein said second adhesive (13) has a shorter curing time than said first adhesive (12).
9. A laminated sheet structure (10) according to claim 8, wherein said layers (11) of sheet material are timber sheets, said first adhesive (12) is a cold setting glue, and said first (12) and second adhesives (13) are located in strips

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