The invention relates to a method for producing a wood board formed from a number of veneer layers that are combined by means of glue. According to the invention, the glue is foamed into foamed glue in which the density is arranged to be between 0.3 - 0.8g/cm³ by adjusting the quantity of air, and the glue is arranged between the veneer layers by roll application. Furthermore, the invention relates to the corresponding wood board.
METHOD FOR PRODUCING A WOOD BOARD AND A WOOD BOARD

FIELD OF THE INVENTION

The invention relates to a method for producing a wood board defined in the preamble of claim 1 and to a wood board defined in the preamble of claim 6.

BACKGROUND OF THE INVENTION

Known from prior art are various kinds of wood boards, such as plywood and the like, and methods for their production.

Known from prior art are various kinds of gluing methods for gluing the veneers in wood boards together. The known gluing methods include for example line application, curtain application, spray application and roll application. These methods typically make use of a glue mix in the fluid state in which the binder polymer with the additives and curing agents is dispersed in an aqueous or solvent solution. One example is the glue mix of phenol-formaldehyde resin, which typically has a density of about 1.2 g/cm³ and a viscosity of about 500 - 1000 mPa*s. In line application, also a solid non-flowing foamed glue mix that contains air as a medium and has considerably lower density than a dispersion glue, namely about 0.2 g/cm³, is presently used. This foamed glue mix is difficult to make move with rolls and to pass from the roll to the veneer due to the low density. A foamed glue mix typically contains less water or solvent than a dispersion glue mix.

Problems of the previously known gluing methods include e.g. slow line speed, application problems and contamination of the surrounding area at high application speeds as well as large glue consumption.

Furthermore, when using a dispersion glue, breaking of
the glue joints in conjunction with hot-pressing, caused by vapour pressure due to the large amount of water, have proved problematic.

5 OBJECTIVE OF THE INVENTION

The objective of the invention is to eliminate the drawbacks referred to above and to disclose a new type of method for producing a wood board, and a corresponding wood board. One specific objective of the invention is to disclose the use of foamed glue in roll application.

SUMMARY OF THE INVENTION

The method for producing a wood board and the wood board according to the invention are characterized by what has been presented in the claims.

The invention is based on a method for producing a wood board, in which method a wood board comprising multiple veneer layers is formed of a number of veneers in such manner that the veneer layers are laid one above the other and combined together by means of glue. According to the invention, a glue or glue mix that can be foamed into a foamed glue is used. The glue is foamed and arranged between two veneer layers by roll application. The density of the foamed glue is arranged to be between 0.3 and 0.8 g/cm³ by adjusting the quantity or air. In this invention, less air is added to the glue mix compared e.g. with line application in which the density of the glue is very low and the glue therefore becomes solid and immobile. The foamed glue according to the invention is more fluent and has higher density, providing the possibility of applying the glue with roll evenly and quickly.

In foaming a liquid glue or glue mix, it is possible to use typical commercial homogenizers in
which the feeding of the glue mix and air and the adjustment of the temperature and pressure can be sufficiently controlled.

Further, the invention is based on a wood board formed from multiple veneer layers combined by means of glue. According to the invention, the glue that is used comprises foamed glue arranged between the veneer layers by roll application. The density of the foamed glue is arranged to be between 0.3 and 0.8 g/cm³ by adjusting the quantity or air.

In this context, a wood board refers to any wood board product, plywood product, composite product, beam, compressed board product or the like, formed from veneers and veneer layers and mainly from wood-based materials, in which the veneers are laid one above the other and glued together.

In this context, a veneer layer refers to any layer of material, typically a thin layer of material, used for forming a layered board. The layer of material may be formed from a wood-based material or other material applicable for the purpose.

In this context, foamed glue refers to any glue or glue mix known per se in the art that can be foamed and is typically used in different application methods. A foamed glue mix is more solid in mobility and has lower density than the traditional glue dispersion. In a foamed glue mix, water or solvent is partly replaced by air, which reduces the risk of breaking due to the vapour pressure in conjunction with curing, or of distortion of the board due to moisture.

In one embodiment, the glue that is used is in the form of a dispersion, which glue dispersion is foamed.

Preferably, the veneer layers are laid one above the other and the glue is arranged between the
veneer layers. Preferably, the wood board is compressed under heat and pressure after laying the veneers one above the other and gluing them in order to form a wood board of the desired kind.

In one embodiment of the invention, the density of the foamed glue is arranged to be between 0.4 and 0.5g/cm³. At the foamed glue densities according to the invention, the homogeneity of the glue mix is good. If the density rises considerably, the homogeneity and stability of the glue mix normally drop.

In one embodiment of the invention, the application volume of the glue is arranged to be between 90 and 130g/m². In one embodiment, the application volume of the glue is arranged to be between 110 and 125g/m².

Preparation of the glue mix, laying the veneers one above the other, gluing the veneers together and other typical phases in the production of a wood board may be preferably performed in manners known per se in the art.

In one embodiment, the glue contains phenol-, resorcinol-, melamine- and/or urea-based resin or derivatives thereof.

The wood board according to the invention may comprise veneer layers of different thickness. The thickness of the veneer layers may vary. The veneer layers may be arranged in the desired array, i.e. transversely or longitudinally in the desired order.

Preferably, any roll applicators known per se can be used in conjunction with the invention.

The wood board and the method for producing same according to the invention may be used in different embodiments.

Thanks to the invention, it is possible to use the foamed glue mix known per se in conjunction with roll application. The use of the foamed glue according to the invention in conjunction with roll ap-
Application reduces gluing problems and glue consumption considerably. With a roll, the glue can be applied very evenly and homogenously between the veneers. Furthermore, the line speed in gluing can be raised e.g. to a level of 100 - 200 m/min without considerably increasing e.g. splashing of the glue or other inconveniences.

The invention provides the advantage that the foamed glue contains less water or solvent than a glue dispersion. In this manner, problems relating to vapour pressure in conjunction with hot-pressing are decreased. Furthermore, absorption of the glue into the veneers is reduced, and the gluing process allows a higher mean moisture in the veneers.

The invention allows the use of the same foamed glue in different application processes. A further advantage is that more possibilities to use the glue are provided due to foaming and the application method.

DETAILLED DESCRIPTION OF THE INVENTION

In the following section, the invention will be described with the aid of a detailed example of an embodiment.

Example 1

In the test of this example, the plywood according to the invention was examined, which plywood was glued by foamed PF glue mix, and the glue mix was applied by roll application on both surfaces of the veneers.

A typical foamed glue mix suitable for birch and conifer plywood was prepared, containing phenol-formaldehyde resin (e.g. Prefere 14J021), a curing agent (e.g. Prefere 24J528), water and optionally a
surface-active agent. The FC6 viscosity of the glue mix was 27s/28°C.

The resin glue mixes for birch plywood and conifer plywood may differ in the amount and quality of the source materials. Essentially important factors for successful foaming of the glue dispersion include reduction of the surface tension and stabilization of the foam so that the glue mix receives air and stabilizes it for a sufficiently long period. Many commercial homogenizers are suitable for foaming the glue mix.

In preparing the foamed glue mix, air was added to the glue mix using a foamer, so that a homogenous foamed glue mix was formed from air bubbles having a size as small as possible during flowing through the foamer.

Typical control parameters of the foamer include:
- Glue feed 5-10kg/min
- Number of foamer rotations 150-300
- Air feed 2-31/min

Four plywood sample boards were produced, samples 1 to 4.

Boards 1 and 2 were formed from birch veneer; birch veneer 1.5mm, 9-ply, (moisture in face veneer about 5.9%, in extended veneer about 4.5%). The speed of the gluing roll was adjusted to 55m/min and the roll gap to 1.1mm. The volume weight of the glue mix at the foamer was adjusted to 0.44g/cm³. The foamed glue mix was applied on the veneers (about 115g/m²), and the veneers were laid one above the other. Finally, the veneers were pre-compressed and hot-pressed into plywood.

Boards 3 and 4 were formed by a composite structure from birch and spruce veneer; birch veneer
1.5πmm, spruce veneers 2.6mm (moisture about 4.0%), 9-ply. The speed of the gluing roll was adjusted to 55m/min. The volume weight of the glue mix at the foamer was adjusted to 0.34g/cm3. The foamed glue mix was applied on the veneers at about 123g/m². The veneers were laid one above the other, pre-compressed and hot-pressed into plywood in normal conditions.

In all samples, the open time was 10min and the closed open time was 77 - 102min. Pre-compression was performed at 0.8N for 3 minutes. The pre-compression grip was excellent in all samples. The hot-pressing time was 8min and the line time was between 90 and 115min. The application volume of the glue in samples 1 and 2 was 115g/m² and in samples 3 and 4 123g/m².

In summary, one can conclude that the glue mix applied by the roll was well distributed over the veneers and had an even coverage (e.g. when run at line speeds of 55 - 110m/min). The parameters that were used, such as the open time, pre-compression and line time, can be well controlled in production conditions. The pre-compression grip was excellent in all boards. If the glue spins on the roll without being applied for an unnecessarily lengthy period, its viscosity grows as water evaporates, increasing the amount of the applied glue.

The wood board according to the invention is suitable in different embodiments for different uses. The method according to the invention allows the manufacture of any type of wood board in which the combination of foamed glue and roll application can be used.

The embodiments of the invention are not limited merely to the examples referred to above; instead
many variations are possible within the scope of the accompanying claims.
CLAIMS

1. A method for producing a wood board wherein a wood board comprising multiple veneer layers is formed from a number of veneers in such manner that the veneer layers are laid one above the other and combined by means of glue, characterized in that the glue is foamed into foamed glue in which the density is arranged to be between 0.3 and 0.8g/cm³ by adjusting the quantity of air, and the foamed glue is arranged between two veneer layers by means of roll application.

2. The method according to claim 1, characterized in that the density of the foamed glue is arranged to be between 0.4 and 0.5g/cm³.

3. The method according to claim 1 or 2, characterized in that the application volume of the glue is arranged to be 90 - 130g/m².

4. The method according to any one of claims 1 to 3, characterized in that the application volume of the glue is arranged to be 110 - 125g/m².

5. The method according to any one of claims 1 to 4, characterized in that the glue is in the form of a dispersion.

6. A wood board formed from a number of veneer layers that are combined by means of glue, characterized in that the glue that is used is foamed glue in which the density is arranged to be between 0.3 and 0.8g/cm³ by adjusting the quantity of air and which is arranged between the veneer layers by roll application.

7. The wood board according to claim 6, characterized in that the density of the foamed glue is arranged to be between 0.4 - 0.5g/cm³.

8. The wood board according to claim 6 or 7, characterized in that the application volume of the glue is arranged to be 90 - 130g/m².
9. The wood board according to any one of claims 6 to 8, characterized in that the application volume of the glue is arranged to be 110 - 125g/m².
### A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC8: B27D, B05D, B27G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

FI, SE, NO, DK

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI, COMPDX, INSPEC, XPS

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:
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  - "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
  - "O" document referring to an oral disclosure, use, exhibition or other means
  - "P" document published prior to the international filing date but later than the priority date claimed
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  - "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
  - "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
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### CLASSIFICATION OF SUBJECT MATTER

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