Title: A CHIP BOARD AND A PROCESS FOR THE PREPARATION THEREOF

Abstract: A chip board including an intermediary layer (1) and a layer (2) of large chips positioned on both sides of said intermediary layer. An outer layer (3) is provided on the outer surface of each layer of large chips. In addition to the chips, the layers include an adhesive. The intermediary layer (1) includes a mixture of wood chips having chip fractions of a chip size of 0.1 to 20 mm, and the chips of this layer are randomly oriented. The individual chip in the layer (2) of large chips presents the following characteristics: a length of approx. 50 to approx. 130 mm, a width of approx. 4 to approx. 40 mm and a thickness of approx. 0.2 to approx. 2.0 mm. The chips within each layer (2) of large chips are all oriented in one and the same direction. As a result, a chip board is obtained which demonstrates a significantly higher E-module and stiffness in flexure than hitherto known despite a reduced consumption of material.
Title: A chip board and a process for the preparation thereof.

Technical Field

The present invention relates to a chip board including an intermediary layer and a layer of large chips positioned on both sides of said intermediary layer, as well as optionally an outer layer positioned on the outer surface of each layer of large chips, said layers including an adhesive in addition to the chips.

Background Art

A chip board is known which has an intermediary layer and an auxiliary layer on each side of the intermediary layer. The intermediary layer includes wood chips and a binder, while the two auxiliary layers include chips. A chip board of this type is not completely satisfactory because the E-module thereof is between 2000 to 3000 N/mm² when it is bended, while the flexural strength of said chip board is 10 to 15 N/mm², which is not entirely satisfactory.

Disclosure of Invention

The object of the present invention is to provide a chip board of the above type, which demonstrates a significantly higher E-module and stiffness in flexure than hitherto known despite a reduced consumption of material.

The chip board according to the invention is characterised in that the intermediary layer includes a mixture of wood chips having chip fractions of a chip size of 0.1 to 20 mm, and that the chips of the intermediary layer are randomly oriented, while the individual chip in the layer of large chips presents the following characteristics: a length of approx. 50 to approx. 130 mm, a width of approx. 4 to approx. 40 mm and a thickness of approx. 0.2 to approx. 2.0 mm, and that the chips within the individual layer of large chips are all oriented in one and the same direction.
According to the invention, the intermediary layer may include a mixture of wood chips having chip fractions of a chip size of 0.1 to 20 mm, while the chips of the layers of large chips may be oriented in the longitudinal direction of the chip board, whereby a particularly high E-module is obtained.

According to the invention, the individual chip of the layer of large chips may present the following characteristics: a length of 70 to 120 mm, preferably 80 to 110 mm, a width of 5 to 30 mm, preferably 10 to 20 mm, and a thickness of 0.2 to 2.0 mm, preferably 0.4 to 1.0 mm. These chip dimensions have turned out to be particularly advantageous.

In addition, according to the invention the chips may be kept together by 8 to 15 % by weight of adhesive, preferably 10 to 13 % by weight of adhesive, preferably urea-formaldehyde adhesive, i.e. UF adhesive, melamine-urea-formaldehyde adhesive, i.e. MUF adhesive, melamine-urea-phenol-formaldehyde adhesive, i.e. MUPF adhesive, isocyanate adhesive, i.e. PMDI adhesive or tannin adhesive or combinations thereof. As a result, the chip board is provided with a particularly good cohesion ability.

Furthermore, according to the invention, the chip board may be produced by means of a press with a timing device or by a continuous pressing procedure at a temperature of 150 to 230°C and a pressure of 20 to 50 bars, the pressing period being 5 to 15 seconds, preferably 8 to 13 seconds, per mm of the thickness dimension of the chip board.

An embodiment of the chip board according to the invention where an outer layer is provided on the surface of each layer of large chips is characterised in that the outer layers include a chip mixture having chip fractions of a chip size of 0.1 to 10 mm, preferably 0.1 to 5 mm. As a result, the stiffness in flexure is particularly high, and
the lateral faces of the chip board are fine and obtain a structure suitable for foiling, application of coating layers or the like.

The present invention also relates to a process for the preparation of chip boards according to the invention, and this process is characterised by different chip mixtures being scattered on a press plate, a wire, or a scatter band to form an intermediary layer, a layer of large chips positioned on both sides of said intermediary layer, as well as outer layers positioned on the outer surface of the layers of large chips, every chip of the intermediary layer and optionally of the outer layers being randomly oriented during scattering, while the chips of the individual layers of large chips being oriented in one and the same direction, said process being further characterised by the layers being compressed by means of an intermittent press or by a continuous pressing procedure at a temperature of 150 to 230 °C and a pressure of 20 to 50 bars, the pressing period being 5 to 15 seconds, preferably 8 to 13 seconds, per mm of the thickness dimension of the chip board. This process has turned out to be particularly advantageous for preparing the chip board according to the invention.

Finally, according to the invention, the components of the chip board may be compressed to such an extent that the chip board achieves a density of 600 to 800 kg/m³, preferably 650 to 750 kg/m³. In this manner, a particularly strong chip board is obtained. When a 12 mm chip board is used as a rigid furniture board, it can tolerate the same load as a conventional 18 mm furniture board, such as a bookcase shelf. This is possible despite a reduced consumption of material.

**Brief Description of the Drawings**

The invention is explained in detail below with reference to the drawings, in which

Fig. 1 is a diagrammatic cross sectional view of a chip board according to the invention having an intermediary layer and two layers of large chips, and
Fig. 2 is a diagrammatic cross sectional view of a chip board according to the invention having an intermediary layer, two layers of large chips and two outer layers.

Best Modes for Carrying out the Invention

The chip board shown in Fig. 1 includes an intermediary layer 1 and a layer 2 of large chips positioned on both sides of said intermediary layer. In addition to the chips, the layers also include an adhesive.

The intermediary layer 1 includes a mixture of wood chips having chip fractions of a chip size of 0.1 to 20 mm, the chips of the intermediary layer being randomly oriented. Each chip of the individual layer 2 of large chips has a length of approx. 6 to 130 mm, a width of approx. 4 to approx. 40 mm and a thickness of approx. 0.2 to approx. 4.0 mm. The chips of each layer 2 of large chips are all oriented in one and the same direction.

The intermediary layer 1 can include a mixture of wood chips having chip fractions of a chip size of 0.2 to 17 mm, the chips in the layers 2 of large chips being oriented in the longitudinal direction of the chip board.

Each chip of the individual layer 2 of large chips can present the following characteristics: a length of 70 to 120 mm, preferably 80 to 110 mm, a width of 5 to 30 mm, preferably 10 to 20 mm, and a thickness of 0.2 to 2.0 mm, preferably 0.4 to 1.0 mm. The chips can be kept together by 8 to 15 % by weight of adhesive, preferably 10 to 13 % by weight, preferably urea-formaldehyde adhesive, i.e. UF adhesive, melamine-urea-formaldehyde adhesive, i.e. MUF adhesive, melamine-urea-phenol-formaldehyde adhesive, isocyanate adhesive, i.e. PMDI adhesive or tannin adhesive or combinations thereof.

As shown in Fig. 2, the chip board can include 5 layers: the innermost layer being an intermediary layer 1 and on the outer surface thereof a layer 2 of large chips. Two
outer layers 3 are then positioned on the outer surface of the layers 2 of chips. These outer layers can include a chip mixture having chip fractions of a chip size of 0.1 to 10 mm, preferably 0.1 to 5 mm.

5 Each chip board can be prepared by means of an intermittent press or by a continuous pressing procedure at a temperature of 150 to 230°C and a pressure of 20 to 50 bars, the pressing period being 5 to 15 seconds per mm of the thickness dimension of the chip board.

10 The preparation of a chip board according to the invention can include the following steps:

- First, a chip mixture is scattered on a press plate, a wire, or a scatter band to provide an outer layer 3, then a chip mixture to provide a layer 2 of large chips, then a chip mixture to provide an intermediary layer 1, then a chip mixture to provide a layer 2 of large chips and finally a chip mixture to provide an outer layer 3, every chip of the intermediary layer 1 and optionally of the outer layers 3 being randomly oriented during the scattering, while the chips of each layer 2 of large chips being oriented in one and the same direction during the scattering,

- The layers are compressed by means of an intermittent press or by a continuous pressing procedure at a temperature of 150 to 230 °C and a pressure of 20 to 50 bars, the pressing period being 5 to 15 seconds per mm of the thickness dimension of the completed chip board.

The components of the chip board can optionally be compressed to such an extent that the chip board achieves a density of 600 to 800 kg/m³, preferably 650 to 750 kg/m³.
Subsequent to the pressing, the chip boards are cooled, whereafter they are optionally polished to obtain a final desired surface structure and to maintain a predetermined thickness tolerance.

Example

A chip board was prepared having a density of 700 to 750 kg/m³.

The Bending E-module was measured to be 10,000 to 13,000 N/mm². The Bending E-module for a conventional furniture chip board is in the range of 2,000 and 3,000 N/mm².

The flexural strength was measured to be 60 to 90 N/mm² for the rigid chip board compared to the usual 10 to 15 N/mm² for conventional furniture chip boards.

In other words, when a 12 mm rigid chip board according to the invention is used as a furniture board, it can tolerate the same load as a conventional 18 mm chip board, for instance used as a shelf, despite a reduced consumption of material.

When the thickness of the chip board is maintained, the distance of support can be increased by 40%, for instance from 700 mm to 1000 mm as far as a shelf is concerned.

When the density was decreased to 400 to 500 kg/m³, the resulting chip board presents properties similar to those of a conventional chip board having a density of 700 kg/m³. This variant can be used when it is desired to reduce the weight of a product while maintaining the strength of the product.

The remaining technical values of the furniture chip board according to the invention were at a level similar to those of an ordinary, conventional furniture chip board.
The invention can be varied in many ways without thereby deviating from the scope of the invention as expressed in the following claims.
Claims

1. A chip board including an intermediary layer (1) and a layer (2) of large chips positioned on both sides of said intermediary layer, as well as optionally an outer layer (3) positioned on the outer surface of each layer of large chips, said layers, in addition to the chips, also including an adhesive, characterised in that the intermediary layer (1) includes a mixture of wood chips having chip fractions of a chip size of 0.1 to 20 mm, and that the chips of the intermediary layer (1) are randomly oriented, while the individual chip in the layer (2) of large chips presents the following characteristics: a length of approx. 50 to approx. 130 mm, a width of approx. 4 to approx. 40 mm and a thickness of approx. 0.2 to approx. 2.0 mm, and that the chips within the individual layer of large chips are all oriented in one and the same direction.

2. A chip board according to claim 1, characterised in that the intermediary layer (1) includes a mixture of wood chips having chip fractions of a chip size of 0.2 to 17 mm, and that the chips in the layer (2) of large chips are oriented in the longitudinal direction of the chip board.

3. A chip board according to claim 1 or 3, characterised in that the individual chip of the individual layer (2) of large chips presents the following characteristics: a length of 70 to 120 mm, preferably 80 to 110 mm, a width of 5 to 30 mm, preferably 10 to 20 mm, and a thickness of 0.2 to 2.0 mm, preferably 0.4 to 1.0 mm.

4. A chip board according to claim 1, 2 or 3, characterised in that the chips are kept together by 8 to 15 % by weight of adhesive, preferably 10 to 13 %, preferably urea-formaldehyde adhesive, i.e. UF adhesive, melamine-urea-formaldehyde adhesive, i.e. MUF adhesive, melamine-urea-phenol-formaldehyde adhesive, i.e. MUPF adhesive, isocyanate adhesive, i.e. PMDI adhesive or tannin adhesive or combinations thereof.
5. A chip board according to one or more of claims 1 to 4, characterised in that said chip board is produced by means of an intermittent press or by a continuous pressing procedure at a temperature of 150 to 230°C and a pressure of 20 to 50 bars, the pressing period being 5 to 15 seconds, preferably 8 to 13 seconds, per mm of the thickness dimension of the chip board.

6. A chip board according to one or more of claims 1 to 5, and where an outer layer (3) is provided on the surface of each layer (2) of large chips, characterised in that the outer layers include a chip mixture having chip fractions of a chip size of 0.1 to 10 mm, preferably 0.1 to 5 mm.

7. A process for the preparation of chip boards according to one or more of claims 1 to 6, characterised by different chip mixtures being scattered on a press plate, a wire, or a scatter band to form an intermediary layer, a layer of large chips positioned on both sides of said intermediary layer, as well as outer layers positioned on the outer surface of the layer of large chips, every chip of the intermediary layer (1) and optionally of the outer layers (3) being randomly oriented during scattering while the chips of the individual layer of large chips being oriented in one and the same direction during the scattering, said process being further characterised by the layers being compressed by means of an intermittent press or by a continuous pressing procedure at a temperature of 150 to 230°C and a pressure of 20 to 50 bars, the pressing period being 5 to 15 seconds, preferably 8 to 13 seconds, per mm of the thickness dimension of the chip board.

8. A process according to claim 7, characterised by the components of the chip board being compressed to such an extent that the chip board achieves a density of 600 to 800 kg/m³, preferably 650 to 750 kg/m³.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7  B27N3/14

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)

IPC 7  B27N

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

Electronic database consulted during the international search (name of database and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Patent family members are listed in annex.

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