A method for banding edges of furniture boards and a furniture board with banded edges

A method for bonding edges of furniture boards comprising a chip inner layer, wherein an edge cover is bonded with the furniture board by means of a glue heated to a certain temperature. The volume and temperature of the glue are individually adjusted for each bonded edge, depending on the parameters of the raw material of the chip inner layer determined by an analyzer of the image of the chip inner layer.
Description

[0001] The present invention relates to a method for bonding edges of furniture boards applicable to hutch furniture.

[0002] Hutch furniture consists of a set of furniture boards, which constitute walls and fronts of furniture, couplers i.e. screws or shanks and various other elements such as holders or legs.

[0003] The furniture boards of hutch furniture are manufactured from chipboards (particle boards) of MDF or HDF type. The main face areas of chipboards are covered by a coating material such as veneer, scaleboard or foil. Chipboards are cut to match the required dimensions of the final furniture board, and the edges of furniture boards are bonded with an edge cover such as tape or foil. The edge cover is bonded with the board by a suitable glue, which is usually heated when applying on the surface of the edge.

[0004] At high-volume production of furniture boards, wherein the boards are bonded with high speeds, they may occur manufacturing defects, such as imprecise bonding of the edges by the cover material or excessive amount of glue at the edge region. The manufacturing defects are caused by diverse quality of the raw material of the inner layer of the chipboard.

[0005] For example, boards made from conifers have physical properties different than boards made from deciduous wood. If the inner layer of furniture boards is made of recycled material, the boards of the same production batch may have different properties.

[0006] The aim of present invention is to develop a method for bonding edges of furniture boards, which provides high precision of finishing the edges of furniture boards with different properties of the inner layer, providing optimal usage of the glue.

[0007] The object of the present invention is a method for bonding edges of furniture boards comprising a chip inner layer, wherein an edge cover is bonded with the furniture board by means of a glue heated to a certain temperature, wherein the volume and temperature of the glue are individually adjusted for each bonded edge, depending on the parameters of the raw material of the chip inner layer determined by an analyzer of the image of the chip inner layer.

[0008] Preferably, the image of the edge of chip inner layer to be bonded is compared by the analyzer of the image of the chip inner layer with a set of reference images stored in a reference database, wherein the image which is most similar to the image of the edge of furniture to be bonded is selected, and thereafter the volume of glue and its temperature are adjusted according to data specified for the selected reference image.

[0009] Preferably, by means of the analyzer of the chip inner layer there is determined at least one parameter of the image of the edge of the chip inner layer, selected from a group containing: mean brightness of chips, mean size of chips, variations of brightness and size of particular chips, distribution of chips size, size of empty inter-chips spaces.

[0010] The object of the invention is also a furniture board with edges bonded according to the method of the invention.

[0011] The invention is shown by means exemplary embodiment on a drawing, in which Fig. 1 presents schematically the furniture board with an edge cover, Fig. 2A-2F present examples of different types of chipboards, and Fig. 3 presents a diagram of a process line for bonding edges of furniture boards according to the invention.

[0012] The furniture board 100 presented in Fig. 1 includes a chip inner layer 101 covered by outer face layers 102, 103 for example natural or plastic veneer. The edge cover 104, such as a tape or foil, is bonded to the edge of the boards.

[0013] Fig. 2A-2F present examples of boards of different types:

[0014] Fig. 2A presents a board having a compact structure with small empty inter-chips spaces, wherein the inner layer is made from softwood with a small addition of recycled material.

[0015] Fig. 2B presents a board having a compact structure with empty inter-chips spaces, wherein the inner layer is made from softwood with a higher percentage of large chips and a higher percentage of recycled material.

[0016] Fig. 2C presents a board having a quite loose structure with large empty inter-chips spaces, wherein the inner layer is made from softwood with a high percentage of recycled material.

[0017] Fig. 2D presents a board having a compact structure with small empty inter-chips spaces, wherein the inner layer is made from deciduous wood with small addition of recycled material.

[0018] Fig. 2E presents a board having a compact structure with large empty inter-chips spaces, wherein the inner layer is made from deciduous wood with a high percentage of thick chips and low percentage of recycled material.

[0019] Fig. 2F presents a board having a loose structure with large empty inter-chips spaces, wherein the inner layer is made from softwood with a high percentage of recycled material.

[0020] Fig. 3 presents a diagram of a process line for bonding edges of furniture boards according to the invention. The boards are fed from station 201 by a conveyor to a cutting and milling station 202, wherein the chipboards are cut to match the required dimensions of the furniture board, and edges of the boards are formed appropriately. Next, the parameters of the raw material of the inner layer are determined at the inner layer analysis station 203.

[0021] The analysis station 203 is equipped with a camera, which captures an image of the edge of the board fed by the conveyor. The parameters of the material of the inner layer can be determined by two methods.

[0022] The first method is realized by comparing the
image of the edge of the furniture board to be bonded with images from a reference database 204. For example, the database 204 may store, for each raw material to be analyzed, a set of images illustrating the appearance of the board, pre-determined by a system operator. The analysis station 203, using algorithms for image comparison and for determining image similarity, determines the image of the reference database 204, which is most similar to the image of the board fed by the conveyor and thereby determines the type of the raw material.

[0023] In the other method, the analysis of image is performed by defining image parameters such as mean brightness of chips, mean size of chips, variations of brightness and size of particular chips, distribution of chips size, empty inter-chips spaces etc. That parameters are used to define the material of the inner layer of the board, the level of compaction, the content of recycled material and other parameters, which are necessary to determine the parameters of the process for bonding the edges of furniture board.

[0024] Knowing the parameters of the inner layer material enables to determine the parameters of the process of bonding of the edge cover, which is performed on station 205, wherein two parallel edges are subject to the bonding process. There are adjusted, at least, the volume of the glue which is fed by the glue feeder 206 and the melting point of the glue which is heated by the heater 207. For example, in order to bond the board edges with a foil having a thickness of 0.4mm by means of spreading granulated, fusible glue, an exemplary MELT EB 1756 glue made by Follmann&Co, Minden, Germany can be used with the following process parameters:

- for the inner layer shown in Fig. 2E and Fig. 2B: the glue temperature shall be 195-200 °C and the volume of glue shall be 100 - 115 g/m²
- for the inner layer shown in Fig. 2F the glue temperature shall be 190 - 195 °C and the volume of glue shall be 100 - 115 g/m²
- for the inner layer shown in Fig. 2D the glue temperature shall be 200 - 205 °C and the volume of glue shall be 85 - 90 g/m²
- for the inner layer shown in Fig. 2A and Fig. 2C the glue temperature shall be 190 - 195 °C and the volume of glue shall be 85 - 90 g/m²

[0025] The board is then conveyed by a turn-table 208, which rotates it by an angle of 90°, to the next cutting and milling station 209 in order to process the remaining two edges of the board, in the same way as at the station 202. Afterwards, the edges are bonded on a bonding station 210 equipped with a glue feeder 211 and a heater 212, for which the process parameters are defined in the same way as for stations 205 - 207. The bonded boards are collected on a collecting station 213.

[0026] The method of the present invention enables continuous monitoring of the process of bonding of board edges and adjustment of parameters of the process to a particular raw material of the chip inner layer of furniture boards. Thus, the volume of glue used in the process and the energy supplied for heating glue is optimized, which results in reduction of production costs, reduction of amount of harmful substances (glue) contained in the manufactured boards and good quality of edge bonding as well as prevention from leakage of glue from edges of boards.

Claims

1. A method for bonding edges of furniture boards comprising a chip inner layer, wherein an edge cover is bonded with the furniture board by means of a glue heated to a certain temperature, characterized in that the volume and temperature of the glue are individually adjusted for each bonded edge, depending on the parameters of the raw material of the chip inner layer determined by an analyzer of the image of the chip inner layer.

2. The method according to claim 1, characterized in that the image of the edge of chip inner layer to be bonded is compared by the analyzer of the image of the chip inner layer with a set of reference images stored in a reference database, wherein the image which is most similar to the image of the edge of furniture to be bonded is selected, and thereafter the volume of glue and its temperature are adjusted according to data specified for the selected reference image.

3. The method according to claim 1, characterized in that by means of the analyzer of the chip inner layer there is determined at least one parameter of the image of the edge of the chip inner layer, selected from a group containing: mean brightness of chips, mean size of chips, variations of brightness and size of particular chips, distribution of chips size, size of empty inter-chips spaces.

4. A furniture board with edges bonded according to the method of any of claims 1 to 3.
Fig. 2D

Fig. 2E

Fig. 2F
Fig. 3
## DOCUMENTS CONSIDERED TO BE RELEVANT

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<tr>
<th>Category</th>
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<th>Relevant to claim</th>
<th>CLASSIFICATION OF THE APPLICATION (IPC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>DE 196 15 879 A1 (MEDIA PROFILI SRL [IT]) 24 October 1996 (1996-10-24)</td>
<td>4</td>
<td>INV. B27N/00</td>
</tr>
<tr>
<td>A</td>
<td>* abstract *</td>
<td>1-3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* column 5, lines 13-17 *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>US 6 618 492 B1 (ROMANS JAMES E [US]) 9 September 2003 (2003-09-09)</td>
<td>1-4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* abstract *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>WO 98/07023 A1 (QUEBEC CENTRE RECH IND [CA]; GAUTHIER PIERRE [CA]) 19 February 1998 (1998-02-19)</td>
<td>1-4</td>
<td></td>
</tr>
</tbody>
</table>

**TECHNICAL FIELDS SEARCHED (IPC)**

- B27N

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The present search report has been drawn up for all claims.

**Place of search**

The Hague

**Date of completion of the search**

2 August 2013

**Examiner**

Söderberg, Jan-Eric
This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on 02-08-2013.

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<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
<th>Publication date</th>
</tr>
</thead>
<tbody>
<tr>
<td>DE 19615879 A1</td>
<td>24-10-1996</td>
<td>DE 19615879 A1</td>
<td>24-10-1996</td>
</tr>
<tr>
<td>IT 1279290 B1</td>
<td>09-12-1997</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US 6618492 B1</td>
<td>09-09-2003</td>
<td>CA 2348303 A1</td>
<td>26-12-2001</td>
</tr>
<tr>
<td>WO 9807023 A1</td>
<td>19-02-1998</td>
<td>AT 287533 T</td>
<td>15-02-2005</td>
</tr>
<tr>
<td>AU 3844197 A</td>
<td>06-03-1998</td>
<td>BR 9711069 A</td>
<td>11-01-2000</td>
</tr>
<tr>
<td>DE 69732295 D1</td>
<td>24-02-2005</td>
<td>DE 69732295 T2</td>
<td>13-04-2006</td>
</tr>
<tr>
<td>NO 990652 A</td>
<td>11-02-1999</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NZ 334098 A</td>
<td>27-10-2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US 6122065 A</td>
<td>19-09-2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WO 9807023 A1</td>
<td>19-02-1998</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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