The moisture in the balancing layer contributes to the increased balancing capacity of the balancing layer in several ways. The moisture in the balancing layer facilitates and improves heat transfer from the heated press plates into the balancing layer, thus accelerating and/or increasing cross-linking of the thermosetting resin. The moisture content also influences curing of the thermosetting resin by increasing or facilitating floating of the thermosetting binder, which may result in a higher degree of cross-linking. The moisture content of the balancing layer may also influence the core of the building panel. The moisture content of the balancing layer may make the core, for example, a core of a wood-based material, more formable during pressing. A small convex backward bending of the core may be achieved, counteracting an upward bending of the edges of the surface layer.The method may comprise adjusting the moisture content of the balancing layer and/or the surface layer such that the moisture content of the balancing layer is higher than the moisture content of the surface layer.

The step of adjusting the first moisture content of the balancing layer may comprise applying water or steam to the first surface of the core prior to applying the balancing layer.

The step of adjusting the first moisture content of the balancing layer comprises applying water or steam to the balancing layer. Adjusting the first moisture content of the balancing layer may also be performed by applying water or steam to both the first surface of the core and to the balancing layer prior to curing by applying heat and pressure.

The first moisture content of the balancing layer may be about 6-30%, preferably 8-20% of the total weight of the balancing layer prior to curing.

The thermosetting binder may be of the same type in the surface layer and in the balancing layer.

The thermosetting binder of the surface layer and/or the balancing layer may be melamine formaldehyde resin. The thermosetting binder of the surface binder and/or the balancing layer may also be urea melamine formaldehyde or a combination of urea/melamine formaldehyde. Any other amino resin is also possible, such as phenol formaldehyde resin.

The thermosetting binder may be of the same type in the surface layer and in the balancing layer.

The thermosetting binder of the surface layer and/or the balancing layer may be melamine formaldehyde resin. The thermosetting binder of the surface binder and/or the balancing layer may also be urea melamine formaldehyde or a combination of urea/melamine formaldehyde.

The sheet impregnated with the thermosetting binder may be a paper impregnated with the thermosetting binder, preferably a melamine formaldehyde impregnated paper.

The surface layer may comprises a décor paper, preferably a resin impregnated décor paper, more preferably a melamine formaldehyde impregnated décor paper. The surface layer may also comprise an overlay paper, preferably a resin impregnated paper comprising wear resistant particles.

The surface layer may comprise a layer comprising a thermosetting binder and at least one pigment.

According to third aspect of the invention, a method of producing a building panel is provided. The method comprises

providing a core,

applying a balancing layer on a first surface of the core, wherein the balancing layer has a first moisture content and comprises a B-stage thermosetting binder,

applying a surface layer on a second surface of the core, wherein the surface layer has a second moisture content and comprises a B-stage thermosetting binder,

adjusting the first moisture content of the balancing layer such that the first moisture content of the balancing layer is higher than the second moisture content of the surface layer prior to curing by applying heat and pressure, and

curing the thermosetting binder of the surface layer and the balancing layer to C-stage by applying heat and pressure.

Thermosetting binders may be classified as A-, B-, and C-stage according to their extent of reaction compared to the extent of reaction at gelation. In an A-stage thermosetting binder, the extent of reaction is less

The first moisture content of the balancing layer may be about 6-30%, preferably 8-20% of the total weight of the balancing layer prior to curing.

The thermosetting binder may be of the same type in the surface layer and in the balancing layer.

The thermosetting binder of the surface layer and/or the balancing layer may be melamine formaldehyde resin. The thermosetting binder of the surface binder and/or the balancing layer may also be urea melamine formaldehyde or a combination of urea/melamine formaldehyde. Any other amino resin is also possible, such as phenol formaldehyde resin.

The balancing layer may comprise a sheet impregnated with the thermosetting binder, preferably a paper sheet impregnated with thermosetting binder.

The step of applying the balancing layer may comprise applying the thermosetting binder in powder form.

The balancing layer may comprise at least 80 wt% of the thermosetting binder, preferably at least 90 wt% of the thermosetting binder.

The amount of the thermosetting binder in the balancing layer may be lower than the amount of the thermosetting binder in the surface layer.

The surface layer may comprises a décor paper, preferably a resin impregnated décor paper, more preferably a melamine formaldehyde impregnated décor paper. The surface layer may also comprise an overlay paper, preferably a resin impregnated paper comprising wear resistant particles.

The surface layer may comprise a layer comprising a thermosetting binder and at least one pigment.

Brief description of the drawings

The present invention will by way of example be described in more detail with reference to the appended schematic drawings, which show embodiments of the present invention.

Figs. 1a-e illustrates a method of producing a building panel according to an embodiment of the present invention.

Figs. 2a-e illustrates a method of producing a building panel according to an embodiment of the present invention.

The amount of the thermosetting binder in the balancing layer may be lower than the amount of the thermosetting binder in the surface layer. The amount of the thermosetting binder in the balancing layer may, for example, be about 80% of the amount of the thermosetting binder in the surface layer.

Thermosetting binder of the balancing layer may be applied in liquid form. Thereby, the balancing layer may be applied as a coating to the core. The balancing layer may be applied as one or several layers of the thermosetting binder. By using a liquid thermosetting binder, no extra off-line drying of the binder is necessary, for example, spray drying or drying of an impregnated paper.

The method may further comprise drying the thermosetting binder. Preferably, the balancing layer remains essentially in B-stage. The balancing layer may be applied as several layers of a thermosetting binder, wherein each layer preferably is dried before application of a subsequent layer.

The step of applying the thermosetting binder forming the balancing layer may comprise applying, preferably by scattering, the thermosetting binder in powder form. The thermosetting binder may be a dry powder. By applying the thermosetting binder in powder form, the balancing layer may be applied in a single step, preferably as a single layer. The thermosetting binder may be spray dried.

The method may further comprise applying water or steam, on the first surface of the core prior to applying to the thermosetting binder. Alternatively, the method may further comprise applying preferably water, or steam, on the thermosetting binder. The aqueous solution or steam is used to stabilise the balancing layer such that the core with the balancing layer can be handled in the production line, for example, be turned around. The aqueous solution or steam makes the thermosetting binder tacky and thereby the thermosetting binder in powder form sticks together. The aqueous solution may comprise release and wetting agents and catalysts. The aqueous solution may include pigments. The thermosetting binder remains essentially in B-stage.

The moisture content of the balancing layer may be higher than the moisture content of the surface layer as measured prior to pressing. The moisture content may be 6-30%, such as 8-20%, of the total weight of the balancing layer. Water or steam may be applied to the thermosetting binder

The surface layer may comprise a décor paper, preferably a resin impregnated décor paper, more preferably a melamine formaldehyde impregnated décor paper.

The amount of the thermosetting binder in the balancing layer may essentially correspond to the amount of the thermosetting binder in the surface layer.

The amount of the thermosetting binder in the balancing layer may be lower than to the amount of the thermosetting binder in the surface layer. The amount of the thermosetting binder in the balancing layer may for example be about 80% of the amount of the thermosetting binder in the surface layer.

The moisture content of the balancing layer may be higher than the moisture content of the surface layer as measured prior to pressing. The moisture content may be 6-30%, such as 8-20%, of the total weight of the balancing layer prior to curing.

The surface layer may comprise a layer of a thermosetting binder and at least one pigment. The surface layer may in one embodiment consist of, or consist essentially of a thermosetting binder and optional additives.

According to another embodiment, a semi-finished product is provided. The semi-finished product comprises a core having a first surface, and a balancing layer arranged on the first surface of the core, the balancing layer comprising at least 80% by weight of a thermosetting binder, preferably at least 90% of a thermosetting binder.

The semi-finished product is already provided with a balancing layer. A surface layer can in a separate process be applied to the semi-finished product to form a building panel. The semi-finished product may, for example, be stored and transported.

The thermosetting binder may be essentially B-stage. For example, the balancing layer may only be dried without curing, or if the thermosetting binder is in powder form, liquid or steam may be applied in order to get the binder tacky and stick the powder together and attach to the core.

The thermosetting binder may be melamine formaldehyde resin.

According to another embodiment, a method of producing a building panel is provided. The method comprises: providing a core, applying a thermosetting binder in a liquid form on a first surface of the core for forming a

The surface layer may comprise a layer of a thermosetting binder and at least one pigment.

The amount of the thermosetting binder in the balancing layer may essentially correspond to the amount of the thermosetting binder in the surface layer.

The amount of the thermosetting binder in the balancing layer may be lower than the amount of the thermosetting binder in the surface layer.

The moisture content of the balancing layer may be higher than the moisture content of the surface layer.

The moisture content may be 6-30%, such as 8-20%, of the total weight of the balancing layer prior to curing.

EXAMPLES

Example 1: Dry melamine formaldehyde resin

A water solution was sprayed on one surface of a standard HDF board, Sonae 9.7 mm. Then 100 g/m2 melamine formaldehyde powder resin – 773 from BASF - was applied with a scattering device on the wet HDF board.

The HDF board was then turned upside down and a surface layer containing 100 g/m2 melamine formaldehyde resin was applied on the other side of the board.

The HDF board containing a clean dry melamine formaldehyde resin on one side for forming a balancing layer and on the other side a surface layer containing 100 g/m2 melamine, then was put into a press where heat and pressure was applied.

Pressing conditions:

Temperature: 160°C on the upper and under heating plates.

Pressing time: 20 sec

Pressure: 40 bar

During the pressing operation the melamine formaldehyde resins cured and a laminate board was obtained.

In order to investigate the cupping behaviour of this product we placed the above flooring laminate into different climates. After 3 days in 50% RH climate the cupping was + 0.83 mm (convex cupping). After 2 days in 25% RH climate the cupping was – 0.07 mm (slightly concave).