Title: A SOLID PHENOLIC CORE AND PREPARATION METHOD THEREOF

Abstract: This invention discloses a three-layer-sandwich solid phenolic core (SPC) comprising first outside layer, middle layer and second outside layer. The middle layer of the SPC is a thick solid plate formed by using several layers of paper material through heat-pressing process; the first and second outside layers of the SPC are thin solid plates formed by using several layers of paper material through heat-pressing process; the three-layer-sandwich SPC is formed by coating adhesive on the outside surfaces of the middle layer (or the inner surfaces of the first and second outside layers) and then by pressing the first and second outside layers onto the outside surfaces of the middle layer. This invention is advantageous in increasing yield, increasing production elasticity, decreasing SPC cost and increasing the quality of the SPC.
A SOLID PHENOLIC CORE AND PREPARATION METHOD THEREOF

TECHNICAL FIELD

[0001] This invention relates to a solid phenolic core and a method for producing the same.

BACKGROUND

[0002] A Solid Phenolic Core (SPC) is an indoor decorative material, which is widely used in the different locations and places such as table-board of family kitchen, table-board of washing room, dining table, desk, door plank, the hung wall in public places, barrier separations for shower/bath room and lavatory, sink, reception counter, locker, lab table-board, ceiling, office cube, door leaf and table-board of tea room, and so on.

[0003] As shown in Fig. 1, a SPC 10 typically comprises a three-layer-sandwich buildup structure: a top layer 14, a middle layer 16 and a bottom layer 12 of the SPC. While the top and bottom surface layers dictate the decorative appearance and provide properties to resist the actions of abrasion and scratch, impact, light, heat, chemical agents, stain and should be easy to clean, the middle layer has the function of loading-bearing ability. Therefore, the middle layer is thicker than the top and bottom layers. In a typical SPC, the thickness of the top and bottom layer is usually about 0.4~1mm, while the thickness of the middle layer is usually about 2~25mm.

[0004] Fig. 2 is a schematic view of an SPC, which is produced by a traditional multi-layer heating-pressing machine 20. As shown in Fig. 2, with a 20-layer heating-pressing machine as example (only partial structure is shown), there is a top plate 22 (top) and a bottom plate 22 (bottom), which can be used to produce twenty sheets of SPC 21 (i) (i=1,2,... ... 20) in one heating-pressing process cycle. Driven by a hydraulic pressure device (not shown in the figure), the bottom plate 22 (bottom) moves in the direction towards the top plate 22 (top) so as to apply pressing force on the working-pieces between the top plate 22 (top) and the bottom plate 22 (bottom). As shown in Fig. 2, the multi-layer heating-pressing machine 20 comprises twenty
openings C (i) (i=1, 2, ..., 20), which are formed by twenty-one heating plates 24 (j) (j=1, 2, ..., 20, 21). Each heating plate includes heating device (not shown in the figure), such as electrical heating wire, high-pressure vapour pipe or high-pressure hot-water pipe. Within each opening C (i) (i=1, 2, ..., or 20), there are two steel plates 25 (i. top) and 25 (i. bottom) disposed above and below respectively, thus forming the opening. As shown in Fig. 2, one piece of SPC 21 (i) is produced between two heating plates 24 (i) and 24 (i+1) by heating-pressing process. Specifically, three-layer materials are disposed sequentially in an opening formed between steel plates 25 (i. top) and 25 (i. bottom): the top layer 28 (i. top) is a stack (3 sheets for example) of melamine resin saturated surface Deco paper and/or top surface Deco paper 28 (i. top), which is in contact with the corresponding steel plate 25 (i. top); the bottom layer 28 (i. bottom) comprises a stack (3 sheets for example) of melamine resin saturated surface Deco paper and/or bottom surface Deco paper 28 (i. bottom), which is in contact with the corresponding steel plate 25 (i. bottom); the middle layer 29 (i) comprises a stack (100 sheets for example) of phenolic resin treated middle Kraft paper 29 (i), which is arranged between the melamine resin saturated surface Deco paper and/or top surface Deco paper 28 (i. top) and melamine resin saturated surface Deco paper and/or bottom surface Deco paper 28 (i. bottom).

[0005] In production process, after melamine resin saturated surface Deco Paper and/or top surface Deco paper 28 (i. top), phenolic resin treated middle Kraft paper 29 (i) and melamine resin saturated surface Deco paper and/or bottom surface Deco paper 28 (i. bottom) are disposed in each of the openings in the heating-pressing machine, the top and bottom heating-plates 24 (i) and 24 (i+1) start applying heat to the three layer materials in the opening. In the meantime, driven by hydraulic force, the bottom plate 22 (bottom) moves in the direction towards the top plate 22 (top) so as to apply pressure to the materials disposed between the top plate 22 (top) and bottom plate 22 (bottom). Under the impact of heating-pressing for a certain period of time, the melamine resin in the top and bottom surface Deco paper 28 (i. top) and 28 (i. bottom) and the phenolic resin in middle Kraft paper 29 (i) begin melting and flowing.
up-and-down through these three layer materials to cause chemical reaction between the melamine resin and phenolic resin within the three layer materials. Such chemical reaction cause the resins and papers being solidified through cross-linking reaction by which the soft papers become stiff unitary laminate mass, thus forming an SPC. During the heating-pressing process, the textures (or patterns) on steel pates 25 (i. top) and 25 (i. bottom) are transferred to the top surface Deco paper 28 (i. top) and the bottom surface Deco paper 28 (i. bottom), thus forming the textures (or patterns) on the top and bottom surfaces of the SPC.

Although the above-described traditional production method can produce a batch of SPCs in one heating-pressing process cycle, it has some shortcomings, due to the structure of heating-pressing machine and the process in the traditional production method, as follows:

Because the top and bottom surfaces have decorative function, the heating-pressing production process has high requirements to the steel plates. Because any deficiencies on the surface of a steel plate will directly cause deficiencies on the top or bottom surface of the produced SPC, the traditional production method has higher requirements to the steel plates, such as planeness and heat conductivity. Moreover, because the heating-pressing production process is a process in which the resin in papers flows up-and-down with high temperature and high pressure and in which cross-linking reaction cause soft surface paper, Deco paper and Kraft paper to solidify to become a stiff unitary laminate mass thus forming an SPC, the traditional production method has strict requirements to the heating-pressing machine in pressure stability and heat-transfer uniformity, thus causing in heating-pressing machine relatively expensive. Typically, it needs one hour to complete one heating-pressing production cycle. Therefore, considering that an SPC has certain thickness requirement, the output of a relatively expensive heating-pressing machine is restricted. In addition, the top or bottom surface of an SPC shall provide properties to resist the actions of abrasion, scratch, heat, chemical agents and stain and should be easy to clean. These properties of the top or bottom surface primarily come from the
melamine resin contained in the surface Deco papers outside of the SPC, while external impact force resistant property of the SPC comes from the phenolic resin treated middle Kraft paper layer. Because the melamine resin treated surface Deco papers disposed outside of an SPC are combined to the phenolic resin treated middle Kraft paper layer through resin movement in heating-pressing production process to cause chemical cross-linking reaction, the traditional production method has strict requirements to heating-pressing production process. When the heat and/or pressure on heating plate and steel plate are not transferred evenly, the reactions in the connection sections between the top surface layer (or bottom surface layer) and the middle layer and in the connection sections among Kraft papers in the middle layer will not be sufficient; thus causing deficiencies such as surface separation, bubbles in middle layer and low property to resist high temperature and boiling water, etc. As a result, the traditional production method has strict requirements to heating-pressing production process, thus increasing costs and decreasing the ratio of qualified products.

[0008] In addition, the traditional production method is not suitable for "build-after-receiving-order" inventory model. Under the traditional production method, after being manufactured, the color, texture (or pattern) and thickness of an SPC are fixed and not changeable. To meet the needs for customers in different color, texture (or pattern) and thickness, the inventory must store varieties of SPCs, thus increasing the costs of the inventory. The traditional production method may be unable to meet time requirement if to make SPCs after receiving orders from customer because the production cycle of the traditional production method is relatively long.

[0009] Furthermore, the traditional production method is not suitable for the current production environment. In the current production process, vendors often use OEM to produce SPCs to reduce the costs. However, many original manufactures do not have high quality and expensive heating-pressing machines due to cost restriction. Also, to produce high quality SPCs, many manufactures invest much time and capital to conduct research on unique heating-pressing production
process and frequently keep the research results as trade secrets. Using the traditional method to make SPCs, to ensure high quality, the manufactures have to reveal their trade secrets as how to make SPCs to OEM manufactures, thus putting the manufactures in disadvantages position.

Moreover, there are some faults may exist in the SPC produced through traditional production method such as thickness deviations and bucklings in different degrees (i.e. without good planeness), which might cause lots of troubles in post-sale installation, even causing such an SPC unable to be installed as required.

SUMMARY OF THE INVENTION

The first object of the present invention is to provide a structure and method for producing SPCs to increase product output and elasticity when heating-pressing machine resource is predetermined.

The second object of the present invention is to provide a structure and method for producing SPCs to improve the quality of SPCs when the production condition of heating-pressing machine is predetermined.

The third object of the present invention is to provide a structure and method for producing SPCs to decrease inventory costs, while ensuring varieties of SPCs’ color series and specifications.

The fourth object of the present invention is to provide a structure and method for producing SPCs to decrease the thickness deviations of SPCs.

The fifth objective of the present invention is to provide a structure and method for producing SPCs to fit current OEM production environment.

To achieve above objects, the present invention provides a SPC, which comprises a first outside layer of the SPC, a middle layer of the SPC and a second outside layer of the SPC. The middle layer of the SPC is formed as a thick solid plate by using several layers of paper material through process of heating and pressing them; the first or second outside layer of the SPC is formed as a thin solid plate by using several layers of paper material through process of heating and pressing; and the SPC is formed by adhesively disposing the first and second outside layers of the SPC onto
both outside surfaces of the middle layer of SPC through pressing the first and second outside layers.

[0017] To achieve above objects, the present invention also provides a method for producing an SPC, which comprises a first outside layer of the SPC, a middle layer of the SPC and a second outside layer of the SPC. The method is characterized in that:

[0018] forming the middle layer of the SPC as a thick solid plate by using several layers of paper material through process of heating and pressing;

[0019] forming the first or second outside layer of the SPC as a thin solid plate by using several layers of paper material through process of heating and pressing them;

[0020] forming the SPC by adhesively disposing the first and second outside layers of the SPC onto both outside surfaces of the middle layer of SPC through pressing the first and second outside layers.

[0021] Compared with existing relevant techniques, the present invention is advantageous in that it increases SPC production outputs, enhances SPC production elasticity, decreases SPC production cost and improves SPC production quality when heating-pressing machine resource and condition is predetermined.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] With reference to the following drawings and description about the embodiments, those skilled in the art can clearly understand the objects, technical solutions, technical features and other aspects of the present invention.

[0023] Fig. 1 shows a typical SPC;

[0024] Fig. 2 is a schematic view of an SPC produced by using multi-layer heating-pressing machine through traditional production method;

[0025] Fig. 3 shows a schematic view of an SPC 30 produced according to the present invention;

[0026] Fig. 4 is a schematic view of producing the middle layers of SPCs by using multi-layer heating-pressing machine 40 according to the present invention;
[0027] Fig. 5 is a schematic view of producing the top and bottom layers (generally referred as “SPC surface layer”) by using multi-layer heating-pressing machine according to the present invention;

[0028] Fig. 6 is an enlarged view of producing a batch of SPC surface layers 51 (i) in one opening C (i) (i=1,2,...,20) within multi-layer heating-pressing machine according to the present invention;

[0029] Fig. 7 is a schematic view of applying glue (or adhesive) onto SPC middle layer 36 according to the present invention;

[0030] Fig. 8 shows a process in which SPC top, middle and bottom layers are sequentially disposed into heating-pressing (or cold press) machine 80 according to the present invention; and

[0031] Fig. 9 is a schematic view of pressing the arranged the SPC top, middle and bottom layers in cold-press machine 90 to form a piece of SPC 91 according to the present invention.

DETAILED DESCRIPTION

[0032] Fig. 3 shows a schematic view of an SPC 30 produced according to present invention. As shown in Fig. 3, the SPC 30 is divided into three pre-fabricated parts before being combined together; where the top layer 32 and bottom layer 34 of the SPC can be formed using melamine resin treated surface paper and/or Deco paper with phenolic resin treated Kraft paper through process of heating and pressing and the middle layer 36 can be formed using phenolic resin treated Kraft paper through process of heating and pressing. After these three parts have been fabricated, glue (or adhesive) is applied to the two outside surfaces of middle layer 36 and/or to the back surfaces of the top layer 32 and bottom layer 34. The top and bottom layers 32 and 34 are then adhesively disposed onto the two outside surfaces of middle layer through cold-press or other methods.

[0033] As shown in Fig. 3, the outside surface 32 (1) of the top layer 32 and the outside surface 34 (1) of the bottom layer 34 are melamine resin treated surface paper and/or Deco paper through process of heating and pressing them, thus having color
and textures (or patterns) and providing properties to resist the actions of chemical agents, heat, light, impact, scratch, abrasion, stain, and being easy to clean. After being sand-ground, the inner surface 32 (2) of the top layer 32 and the inner surface 34 (2) of the bottom layer 34 are coarser, thus being suitable to be used as adhesive surface. To improve planeness and thickness precision, both outside surfaces of the middle layer may be sand-ground before being adhesively combined with the top and bottom layers 32 and 34.

[0034] Fig. 4 is a schematic view of producing SPC middle layers by using multi-layer heating-pressing machine 40 according to the present invention.

[0035] As shown in Fig. 4, using multi-layer heating-pressing machine 40 having 20 layers as an example (only part of the construction is shown), there is a top plate 42 (top) and a bottom plate 42 (bottom), which can be used to treat twenty sheets of SPC 41 (i) (i=1,2, ..., 20). Driven by hydraulic press device (not shown), the bottom plate 42 (bottom) moves in a direction towards the top plate 42 (top) so as to apply pressing force on the work-pieces between the top plate 42 (top) and bottom plate 42 (bottom). As the example shown in Fig. 4, multi-layer heating-pressing machine 40 has twenty (20) openings, which are formed by twenty-one heating plates 44 (j) (j=1, 2, ..., 20, 21). Each heating plate includes heating device (not shown), such as electrical heating wire, high-pressure vapour pipe or high-pressure hot-water pipe. Each opening C (i) (i=1, 2, ..., 20) is formed through two steel plates 45 (i. top) and 45 (i. bottom) disposed above and below respectively. As shown in Fig. 4, one SPC middle layer 41 (i) is formed between two heating plates 44 (i) and 44 (i+1) through process of heating and pressing. More specifically, a stack (100 sheets for example) of phenolic resin treated Kraft papers 49 (i) (i=1, 2, ..., 20) are disposed between steel plates 45 (i. top) and 45 (i. bottom). In the production process, after stacks of phenolic resin treated Kraft papers 49 (i) are arranged in each of the openings of the heating-pressing machine, the top heating plate 44 (i) and bottom heating plate 44 (i+1) start heating the stack of the phenolic resin treated Kraft papers disposed between these two heating plates. In the meantime, driven by
hydraulic force, the bottom plate 42 (bottom) moves in a direction towards the top plate 42 (top) so as to apply pressing force to the materials disposed between the top plate 42 (top) and bottom plate 42 (bottom). Impacted by the process of heating and pressing, the phenolic resin in the Kraft papers begin melting and flowing up-and-down through these Kraft papers to cause cross-linking reaction by means of which the soft Kraft papers become a stiff unitary laminate mass.

[0036] In present invention, the middle layer of SPC is produced separately. Because the process of heating and pressing does not concern forming a Decorative surface that provides the properties to resist the actions of abrasion, scratch, heat, chemical agents, satin, external impact and to be easy to clean, it is lenient to the quality of heating-pressing machine and has lower technical requirements to the process of heating and pressing. Therefore, cheaper heating-pressing machines can be used to produce middle layers of SPC.

[0037] Fig. 5 is a schematic view of producing the top and bottom layers (generally referred as “SPC surface layers”) by using multi-layer heating-pressing machine 40 according to the present invention.

[0038] As shown in Fig. 5, with a 20-layer heating-pressing machine 50 as example (only part of the structure is shown), there are a top plate 52 (top) and a bottom plate 52 (bottom), which can be used to produce twenty batches of SPC surface layers 51 (i) (i=1, 2, ⋯ ⋯ 20) in one heating-pressing cycle. Driven by hydraulic press device (not shown in the figure), the bottom plate 52 (bottom) moves in a direction towards the top plate (top) so as to apply pressing force on the work-piece arranged between the top plate 52 (top) and bottom plate 52 (bottom). In the embodiment as shown in Fig. 5, the multi-layer heating-pressing machine 50 comprises twenty openings, which are formed by twenty-one heating plates 54 (j) (j=1,2,⋯ ⋯ 20, 21). Each heating plate contains heating device (not shown in the figure), such as electrical heating wire, high-pressure vapour pipe or high-pressure hot-water pipe, which is used to apply heat to working materials. As shown in Fig. 5, a batch of SPC surfaces 51 (i) are formed between the two heating steel plates 54 (i)
and 54 (i+1) through process of heating and pressing.

[0039] Fig. 6 is an enlarged view of producing a batch of SPC surface layers 51 (i) in one opening C (i) (i=1,2,⋯,20) of the multi-layer heating-pressing machine according to the present invention.

[0040] As shown in Fig. 6, there are typically eight steel plates 65 (j) (j=1,2,⋯,7,8) in each opening formed by heating plates 54 (i) and 54 (i+1) as shown in Fig. 5, thus forming seven processing layers P (i) (i=1,2,⋯,7). Five layers of materials are sequentially arranged in each processing layer P (i): the first layer is a stack of (one or two sheets for example) melamine resin treated surface paper and/or Deco paper 68 (i.1), which is in contact with the corresponding upper steel plate 65 (i); the second layer is a stack of (three sheets for example) phenolic resin treated Kraft paper 68 (i.2); the third layer is a sheet of separating paper 68 (i.3); the forth layer is another stack of (three sheets for example) phenolic resin treated Kraft paper 68 (i.4); the fifth layer is another stack of (one or two sheets for example) melamine resin treated surface paper and/or Deco paper 68 (i.5), which is in contact with the corresponding lower steel plate 65 (i+1). After process of heating and pressing, the first layer of melamine resin treated surface paper and/or Deco paper 68 (i.1) and the second layer of phenolic resin treated Kraft paper 68 (i.2) form a sheet of SPC surface 69 (i. top); the fourth layer of phenolic resin treated Kraft paper 68 (i.4) and fifth layer of melamine resin treated surface paper and/or Deco paper 68 (i.5) form a sheet of SPC surface 69 (i. bottom); the function of the separating paper 68 (i.3) is to separate the SPC surfaces 69 (i. top) and 69 (i. bottom) from each other after the process of heating and pressing. In this manner, in one heating-pressing cycle of heating-pressing production process, a processing layer P (i) can produce fourteen SPC surface layers.

[0041] In the production process, after the materials are arranged into each of the pressing layers as shown in Fig. 6 within the heating-pressing machine as shown in Fig. 5, the upper steel plate 54 (i) and the lower steel plate 54 (i+1) start applying heat and pressure to the materials disposed between the two steel plates. Under the
impact of heating and pressing for a certain period of time, the melamine resin in the
surface paper and/or Deco paper and the phenolic resin in Kraft paper begin melting
and flowing up-and-down through these papers. In the meantime, the melamine
resin in the surface paper and/or Deco paper and the phenolic resin in Kraft paper
generate chemical reaction, causing soft papers to become a stiff slice plates with
certain stiffness due to resin cross-linking reaction.

[0042] Fig. 7 is a schematic view of applying glue (or adhesive) on SPC middle
layer 36 according to the present invention.

[0043] As shown in Fig. 7, driven by a transferring device (not shown in the
figure), SPC middle layer 36 moves through the gap between the adhesive-coating
rollers 64 and 66 that are rotating relatively. An adhesive sprayer 62 is disposed
above the adhesive-coating roller 64 and sprays glue (or adhesive) to adhesive-coating
rollers 64 from the top position. Therefore, when adhesive-coating rollers 64 rotate,
adhesive will be coated onto the surface of adhesive-coating rollers 64. Disposed
under the adhesive-coating roller 66 is an adhesive slot 68, which contains glue (or
adhesive). A portion of the adhesive-coating rollers 66 is immersed into the
adhesive-coating roller 66. Thus, when adhesive-coating roller 64 rotates, adhesive
69 in adhesive slot 68 will be coated onto the surface of adhesive-coating rollers 66.
Consequently, when the SPC middle layer 36 is moving through the gap between the
adhesive-coating rollers 64 and 66, the adhesive will be coated onto the two outside
surfaces of the SPC middle layer 36.

[0044] Fig. 8 is a schematic view to show the process of sequentially arranging
top, middle and bottom layers into a press (or cold press) machine 90 according to the
present invention.

[0045] As shown in Fig. 8, using transferring device (not shown in the figure),
the SPC bottom layer 34 is disposed on the bottom pressing plate 82, the SPC middle
layer 36 is then disposed over the SPC bottom layer 34, and the SPC top layer 32 is
finally disposed over the SPC middle layer 36.

[0046] Fig. 9 is a schematic view of pressing the arranged the SPC top, middle
and bottom layers in cold-press machine 90 to form a piece of SPC 91 according to
the present invention.

[0047] As shown in Fig. 9, a cold-press machine 90 comprises a bottom
pressing plate 82, a top pressing plate 94, a base 96 and a top-plate-guiding apparatus
98. The bottom pressing plate 82 is horizontally disposed on the base 96, while the
top, middle and bottom layers of the SPC 91 are horizontally disposed on the bottom
pressing plate 82. Driven by a hydraulic press device (not shown in the figure), the
top pressing plate 94 moves toward the bottom pressing plate 82 along the direction
guided by the top-plate-guiding apparatus 98 so as to apply pressing force to the SPC
top, middle and bottom layers. Consequently, the three layers are adhesively
combined together to form a piece of SPC 91.

[0048] It should be noted that if the glue (or adhesive) is first coated onto the
inner surfaces of the top and bottom layer and the top, middle and bottom layers are
then pressed together; this process will generate the same effect.

[0049] The SPC produced according to present invention have the advantages as
follows:

[0050] (1) Because the middle layer and outer layer of SPC are produced
separately, the outputs will be increased even if heating-pressing machine resource is
limited. Because the outer layers of SPC is relatively thinner, they can be specially
produced by using heating-pressing machine with high quality, while middle layers
can be produced by using heating-pressing machine with low quality, or the middle
layers can be produced through OEM manufactures. Moreover because the production
of the middle layers of SPC does not relate to the technical information for producing
the outer layers of SPC, the manufactures of the SPC according to the present
invention do not need to disclose their trade secrets of producing the SPC surface
layers to the original manufacturers.

[0051] (2) From production process point of view, the present invention can
decrease production cost. Because in traditional production method, the formation
of outer surfaces of SPC and their combination with the middle layers of SPC are all
completed in one heating and pressing cycle of heating-pressing production process, it
needs more strict requirements to the production process, which results in the high
production cost is easy to cause various faults and high ratio of unqualified products.
However, in present invention, the middle layer and outer layers are produced
separately, and SPC is then produced through the method of adhesive and cold-press.
Compared with the traditional production method, the present invention requires one
extra production process. However, the production requirements are actually
decreased (or simplified) and the cost is lowered. The present invention improves the
production technique and increases the yield ratio of qualified products.
[0053] (3) The production method of the present invention meets
“build-after-receiving-order” inventory model. According to present invention, an
SPC producer can stock some standard SPC middle layers and SPC outer surface
layers with various color and image pattern (or texture). After receiving orders, the
SPC producer can select SPC outer surface layers with desired color and pattern (or
texture) and middle layers with desired thickness and quality and assemble them
together. When the thickness is not suitable for use, it can be adjusted by
sand-grinding the middle layer of the SPC. As such, the color type, image pattern
(or texture) and the thickness standards of SPC will be dramatically increased.
Consequently, the SPC producer can deliver products with fast speed without
imposing excessive high costs to its inventory thus making its business operation
more competitive. In addition, the outside surface layers of SPC themselves can be
sold as decorative material, thus further decreasing the inventory costs.
[0054] (4) The SPC produced according to the present invention has higher
precision in thickness, which effectively overcomes the problem of SPC thickness
development, because the thickness can be controlled precisely through sand-grinding
before adhesively disposing the outside layers onto the middle layer. In addition, the
planeness of such SPC is good which effectively overcome the inefficiency of
post-sale installation.
[0055] (5) The SPC produced according to the present invention complies with
the quality requirements. Applicant conducted a quality test to some of the SPC produced according to the present invention as follows: the SPC is boiled in boiling water for 4 hours, and is then roasted in an oven of 60°C for 20 hours, and is again boiled in boiling water for 4 hours, and is again roasted in a oven of 60°C for 3 hours. Testing results show that no adhesive connection is separated between the middle layer of and outside layers of the SPC.

[0056] In the above description, the present invention is described with some embodiments, which are used to demonstrate the principle of the present invention. By way of example, the SPC outside surfaces of present invention are formed by using melamine resin treated Deco paper and/or phenolic resin treated Kraft paper through heating-pressing process. Of course the SPC surfaces can also be formed by using other materials (such as melamine resin treated surface paper plus untreated Deco paper (which can be color paper or plain paper), melamine resin treated plain Deco paper, melamine resin treated plain Deco paper plus separating paper, melamine resin treated surface paper plus melamine resin treated Deco paper (which can be color paper or plain paper) and phenolic resin treated Kraft paper through heating and pressing in heating-pressing production process. By way of another example, the present invention uses cold-press method to adhesively combine the outside layers with middle layer to form a piece of SPC. These outside layers with middle layer SPC can also be pressed by other apparatuses and methods, such as high-frequency-presser or short-cycle-single-layer (or multi-layer) heating-pressing machine. To those skilled in the art, these embodiments can be modified without beyond the scope of the principles of the present invention. Thus the scope sought for protection in the present invention is defined by the claims.
CLAIMS

1. A solid phenolic core panel (SPC) comprising a first outside layer of the SPC, a middle layer of the SPC and a second outside layer of the SPC, characterized in that:
   the middle layer of the SPC being formed as a thick solid plate by using several layers of paper material through heating-pressing process;
   the first or second outside layer of the SPC being formed as a thin solid plate by using several layers of paper material through heating-pressing process;
   the SPC being formed by adhesively disposing the first and second outside layers of the SPC onto both outside surfaces of the middle layer of SPC through pressing the first and second outside layers.

2. A SPC according to claim 1 characterized in that:
   the middle layer of the SPC being formed as a thick solid plate from a plurality of stacked resin treated paper layers through heating-pressing process; and
   the first or second outside layer of the SPC being formed as a thin plate from a plurality of stacked resin treated paper layers through heating-pressing process.

3. A SPC according to claim 2 characterized in that:
   the thick solid plate of the middle layer being a stiff solid body; and
   the thin plate of the first or second outside layer having a thickness that is substantially thinner than that of the middle layer.

4. A SPC according to claim 2 characterized in that:
   the middle layer of the SPC being formed by using several layers of phenolic resin treated Kraft paper through high-temperature-high-pressure pressing; and
   the first or second outside layer of the SPC being formed by using at least one layer of melamine resin treated Deco paper and a plurality of layers of phenolic resin treated Kraft paper through high-temperature-high-pressure pressing.

5. A SPC according to claim 4 characterized in that:
   the SPC being formed through coating both outside surfaces of the middle layer with adhesive and/or coating the inner surfaces of the first and second outside layers, and then adhesively disposing the first and second outside layers onto both
outside surfaces of the middle layer of SPC.

6. A SPC according to claim 5 characterized in that:
   the first and/or second outside layer of SPC having decoration designs and
   patterns being formed through heating-pressing process.

7. A SPC according to claim 6 characterized in that:
   the thickness of the middle layer is 10 to 40 times thicker than those of the
   first or second outside layers.

8. A SPC according to claim 7 characterized in that:
   the first and/or second outside layers having the properties of wear resistance,
   scraping resistance, high temperature resistance, chemical substance resistance, and
   stain resistance.

9. A SPC according to claim 8 characterized in that:
   at least one of the two surfaces of middle layer being sanded and then being
   adhesively combined together with the first and second outside layers of SPC.

10. A SPC according to claim 8 characterized in that:
    the inner surface of the first and/or second outside layer being sanded and
    then being adhesively combined together with the middle layer of SPC.

11. A method for producing SPC, the SPC comprises a first outside layer of SPC,
    a middle layer of SPC and a second outside layer of SPC, the method is characterized
    in that:
        forming the middle layer of the SPC as a thick solid plate by using several
        layers of paper material through heating-pressing process;
        forming the first or second outside layer of the SPC as a thin solid plate by
        using several layers of paper material through heating-pressing process;
        forming the SPC by adhesively disposing the first and second outside layers
        of the SPC onto both outside surfaces of the middle layer of SPC through pressing the
        first and second outside layers.

12. A method according to claim 11 characterized in that:
    forming the middle layer of the SPC as a thick solid plate from a plurality of
stacked resin treated paper layers through heating-pressing process; and
forming the first or second outside layer of the SPC as a thin plate from a plurality of stacked resin treated paper layers through heating-pressing process.

13. A method according to claim 12 characterized in that:
forming the thick solid plate of the middle layer as a stiff solid body; and
forming the thin plate of the first or second outside layer having a thickness that is substantially thinner than that of the middle layer.

14. A method according to claim 12 characterized in that:
forming the middle layer of the SPC by using several layers of phenolic resin treated Kraft paper through high-temperature-high-pressure pressing; and
forming the first or second outside layer of the SPC by using at least one layer of melamine resin treated Deco paper and a plurality of layers of phenolic resin treated Kraft paper through high-temperature-high-pressure pressing.

15. A method according to claim 14 characterized in that:
forming the SPC through coating both outside surfaces of the middle layer with adhesive and/or coating the inner surfaces of the first and second outside layers, and then adhesively disposing the first and second outside layers onto both outside surfaces of the middle layer of SPC.

16. A method according to claim 15 characterized in that:
forming the first and/or second outside layer of SPC having decoration designs and patterns through heating-pressing process.

17. A method according to claim 16 characterized in that:
forming the middle layer having a thickness that is 10 to 40 times thicker than those of the first or second outside layers.

18. A method according to claim 17 characterized in that:
forming the first and/or second outside layers having the properties of wear resistance, scraping resistance, high temperature resistance, chemical substance resistance, and stain resistance.

19. A method according to claim 18 characterized in that:
sanding at least one of the two surfaces of middle layer and then adhesively combining together with the first and second outside layers of SPC.

20. A method according to claim 18 characterized in that:

sanding the inner surface of the first and/or second outside layer being and then adhesively combining it with the middle layer of SPC.