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(54) METHOD FOR PREPARING A FLOOR

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(57) **ABSTRACT**

Disclosed is a method for preparing a floor comprising the steps of preparing one or more floor structures comprising an upper surface arranged in parallel to a lower surface; and one or more channels disposed vertically between the upper and lower surfaces and longitudinally extending along the upper and lower surfaces, each of the one or more channels having a top and a bottom; preparing a foundation; attaching a sill plate to the foundation; placing one or more floor structures on top of the rimboard and attaching the floor structure to the sill plate and foundation.

METHOD FOR PREPARING A FLOOR

BACKGROUND OF THE INVENTION

[0001] A structural, load-bearing floor system is constructed by laying a floor deck across a number of underlying, supporting joists or beam members. The deck may be made of a variety of different materials, however generally the deck will be constructed of wood, such as wood panels set to lie across foundation walls or beam members, so as to replace the use of subfloor panels set upon underlying wood joists.

[0002] In designing a floor structure system, a number of factors are important, notably that the combination of the wood panels and underlying joists create a strong, stiff floor. The floor should also have other important features, for example, it should be relatively easy to install as well as be capable of accommodating building services such as HVAC, plumbing, as well as fiber optics and other communication cables. Yet another important factor that has been insufficiently addressed in past floor structures is that the floor structure should be compatible with potential floor coverings to be used over it.

[0003] Constructing a floor or floor system is a long, multi-step, and time consuming part of any constructions process, be it for commercial or residential purposes. The first stage of the process involves preparing a foundation and then a series of structural layers are installed atop the foundation. These layers include (in order) a still plate, rimboard, optional intermediate supports, I-joists attached to the rimboard, and then a floor decking is installed upon the I joists, rimboard and intermediate supports.

[0004] It is particularly desirable to develop an alternative method for floor construction such as a floor structure that is integrated as a single piece unit that can be lifted by a crane or boom truck and installed in place. By preparing the floor in this manner, it needs only to be installed (rather than assembled) once it is delivered on site. Accordingly, because the floor does not have to be assembled on site, it can be manufactured in a plant, which allows greater realization of economies of scale, more rigorous quality control, and means that production of the floor structure is not interrupted by inhospitable weather. Accordingly, there is a need in the art for a floor structure that is integrated into a single unit capable of being prefabricated and mass produced.

[0005] Several prefabricated floor structures have been proposed in the past. For example, U.S. Pat. No. 6,244,008 discloses a pre-assembled floor composed of layers of steel, insulation and cement. While this floor is capable of being pre-assembled it has a number of drawbacks, notably a lack of workability, difficulty of use and a general incompatibility between its cement surface and floor coverings to be installed on this surface.

[0006] Another structural panel is proposed in U.S. Published Patent Application No. 2002/0059757. This published patent application discloses a modified stress-skin panel (a type of prefabricated structural panel). These panels include spaces for components such as heater ducts. However, these panels are not really applicable for forming floors, they are actually meant to form wall panels and in most cases would be inapplicable for forming floor structures.

[0007] Accordingly there remains in the art a need for a floor structure that is capable of being pre-fabricated or preassembled, is compatible with desired floor coverings, and relative to comparable structures is easy to set in place and install.

BRIEF SUMMARY OF THE INVENTION

[0008] The present invention includes a method for preparing a floor comprising the steps of preparing one or more floor structures comprising an upper surface arranged in parallel to a lower surface; and one or more channels disposed vertically between the upper and lower surfaces and longitudinally extending along the upper and lower surfaces, each of the one or more channels having a top and a bottom; preparing a foundation; attaching a sill plate to the foundation; placing one or more floor structures on top of the rimboard and attaching the floor structure to the sill plate and foundation.

DETAILED DESCRIPTION OF THE INVENTION

[0009] All parts, percentages and ratios used herein are expressed by weight unless otherwise specified. All documents cited herein are incorporated by reference.

[0010] As used herein, "wood" is intended to mean a cellular structure, having cell walls composed of cellulose and hemicellulose fibers bonded together by lignin polymer.

[0011] By "laminated", it is meant material composed of layers and bonded together using resin binders.

[0012] By "wood composite material" or "wood composite component" it is meant a composite material that comprises wood and one or more other additives, such as adhesives or waxes. Non-limiting examples of wood composite materials include oriented strand board ("OSB"), laminated veneer lumber (LVL), oriented strand lumber (OSL), structural composite lumber ("SCL"), waferboard, particle board, chipboard, medium-density fiberboard, plywood, and boards that are a composite of strands and ply veneers. As used herein, "flakes", "strands", and "wafers" are considered equivalent to one another and are used interchangeably. A non-exclusive description of wood composite materials may be found in the Supplement Volume to the Kirk-Othmer Encyclopedia of Chemical Technology, pp 765-810, 6th Edition, which is hereby incorporated by reference.

[0013] In most construction a floor is typically built upon a conventional foundation (for the first story), which supports a floor comprised of a series of parallel, spaced apart floor I joists, with a wood decking fastened upon them. As mentioned above, this can be a particularly laborious and time-intensive process, as the sill plate, termite shields are first installed upon the foundation, then the rimboard is set out along the edges of the foundation, and attached to the sill plate; furthermore, intermediate supports may need to be installed to provide additional buttressing or support. Only at this stage can the floor structure itself be constructed. This is done first by setting out in parallel a series of I-joists, which span the length of the floor. This must be done with great care to ensure that the joists are cut and placed so that they fit flush between the rimboard around the perimeter of the floor, and possibly any intermediate supports between; if they are not fit exactly flush with relationship to each other the result can be a floor that is not level, which will almost

certainly be unacceptable to the end user and thus require reinstallation. In placing the I-joists it may be necessary to use blocking such as "crush blocks". These crush blocks are installed where the joists transfer load to the foundation and the intermediate support. The crush blocks prevent the webstock of the I-joists from bowing or splitting the bottom flange portion of the I-joist. It is necessary to cut the blocks to fit the space between the upper and lower flange that are attached to the webstock; this is a difficult and time consuming process requiring many small pieces to be cut and installed.

[0014] And additional steps are also necessary even after the installation of the I-joists. "Bridging" of the I joists, which is both time consuming and difficult, is necessary for example in order for the joists to remain parallel to each other under load. Finally, the floor itself is completed by laying a series of panels across the I-joists and attaching them together using one or more of the following: nails, screws, or adhesive.

[0015] As can be seen this process of constructing a floor is fraught with difficulties. At several stages of construction, a builder must use the utmost care and attentiveness, and if he or she fails to do so a mistake in floor construction could cause the builder to have to cure such a mistake by repairing or replacing the defective floor or section. This utmost care itself entails a cost, however, as it both increases the cost and time of building.

[0016] These problems of on-site floor construction have been largely remedied by floor construction described in the present invention, where the floor is not built on site, but instead is built in floor structure segments elsewhere (such as in a manufacturing plant or similar facility) and transported to the construction site where it is lifted into place and installed by use of a crane during construction of a building. The structural components of the floor system are combined in the unit, such that no additional floor joists are required to hold up the structure. This floor structure has yet additional advantages as well because it is capable of accommodating the infrastructure to hold a variety of building services such as HVAC ducts, plumbing pipes, and conduits for fiber optic cables as well as other types of communication cables.

[0017] In addition to the aforementioned benefits, the floor system of the present invention also result in a flatter floor deck because the floor sections of the present invention are larger than typical building panel sizes and these floor sections can be leveled on-site using shims or leveling screws built into the floor sections if the foundation is not sufficiently flat. These leveling means can be mechanically, pneumatically, hydraulically or electrically actuated. Further, as mentioned above by building the floor structure in a single unit in a manufacturing plant allows for greater realization of economies of scale, and better quality.

[0018] The configuration of the floor structure is illustrated in FIG. 1. The floor structure **2** comprises an upper surface **5** arranged in parallel to a lower surface **8**. One or more channels **14** are disposed vertically between the upper surface **5** and lower surface **8** and these channels extend longitudinally along the length of the upper surface **5** and lower surface **8** as shown in FIG. 1. Each of the one or more channels have a top **17** (attached to the upper surface **5**) and a bottom **20** (attached to the lower surface **8**).

[0019] The upper surface **5** and lower surface **8** of the present invention will typically be constructed of one or more wood composite floor panels. For example, the entire top surface may be composed of one piece of OSB that is 20 feet long by 4 feet wide. The bottom panel would also be one piece of the same length and width as the top surface. Alternatively panels of other dimensions may be used. The wood composite is preferably OSB material, but known wood composite materials as mentioned above may be used also. For reasons that are discussed in greater detail below, there is a sufficient amount of reinforcement in the lower surface due to the arrangement and reinforcing effects of the channels, that the wood composite boards which form the lower surface **8** can be made thinner than the wood composite boards which form the upper surface **5**. The wood composite boards which form the lower surface **5** have a thickness of about ⅜ inch to about ⅞ inch, preferably about ½ inch to about 23/32 inch, while the wood composite boards which form the upper surface **8** have a thickness of between ½ inch to about 1 inch, preferably about 19/32 inch to about 23/32 inch.

[0020] The present floor structure also includes one or more channels **14**, which are meant to accommodate a variety of different building services such as HVAC equipment, telecommunication cables and wiring, plumbing and other important building services. In one embodiment, the channels have stiffeners **29** spot welded to the end of each channel, with holes formed in the stiffeners **29** to allow the passage of the cables, wiring, and plumbing along the length. The channels may have formed openings in the sides to accommodate the passage of cables, wiring, and plumbing along the floor's width.

[0021] When assembled together, the width of the floor structure is from about 12 inches to about 180 inches, preferably from about 36 inches to about 144 inches, while the length of the floor structure is about 48 inches to about 500 inches, preferably from about 96 inches to about 480 inches.

[0022] The channels **14** illustrated in the present drawing are shown with sloped walls forming a U cross section, however, the shape of each of the channels can vary according to the specific design necessary for implementation of the floor structure. So in addition to the channels having a U cross section, the channels may also be formed in a rectangular cross section or a V cross section, or some other suitable shape. FIG. 1 shows one embodiment of the present invention with channels **14** made from curved, bent galvanized steel, 10 gage to 20 gage, preferably 12 gage to 18 gage. The channels may optionally be fitted with stiffeners along their length to reinforce the channels. The stiffeners may be made from stamped galvanized steel 10 gage to 20 gage, preferably 12 gage to 18 gage and shaped to fit snugly inside the area of the channel at 2 foot to 8 foot intervals (preferably 4 foot intervals) and at the supporting ends. As mentioned above, these channels, and the spaces between the channels, are useful for accommodating HVAC ducts, plumbing pipes, and fiber optic cables as well as other types of communication cables.

[0023] Additionally, interlocking cams **35** may optionally be placed along the longitudinal edges of the floor structure in order to provide a better mechanical grip between adjacent and adjoining floor structure units and assist in pulling

adjacent panels together. An additional optional feature shown in FIG. 1 is a blocking member **11**, which is disposed vertically between the upper surface **5** and lower surface **8**, and permanently affixed thereto. The blocking member may be a piece of solid wood lumber, a manufactured I-joist, a wood composite material or some other suitable material.

[**0024**] A particular advantage of the present invention is that the disclosed floor structure allows for the disentanglement of the building services, which have relatively shorts life spans (e.g., 10 years) from the floor and building itself, which should have a much longer life span (e.g., over 100 years). Utilizing the presently disclosed floor structure allows for the building services to be easily upgraded in the future when necessary or when more sophisticated equipment becomes available.

[**0025**] Yet another advantage of this arrangement as found in the present invention is that it also increases the strength performance of the floor structure because the larger footprint of the channel on the lower wood composite board **5** acts to reinforce the floor structure in the area where the high tension forces make the floor structure more likely to fail (i.e., the lower wood panels that form the lower surface of the floor structure) than at other areas of the floor structure.

[**0026**] As mentioned above, the channels **17** must be securely attached to the upper and lower wood **5**, **8** composite boards, with nails, screws, adhesive glue, or other permanent fasteners as described above. The channels **17** may additionally have extending tabs **23** (See FIG. 2*a*) to facilitate attachment of the channels to the upper surface **5**. Fasteners may be selected from readily available nails and fasteners such as the Primeguard Plus™ exterior screws available from PrimeSource Building Products, Inc., Carrollton, Tex.

[**0027**] In addition, an adhesive may also be used to ensure that the channels are sufficiently fastened to the upper and lower composite boards so that the channels can bring strength reinforcing properties as described above. This adhesive is typically applied in beads of a typical width of ¼ inch, but wider or thinner depending on the specific individual needs. The adhesive resin used to from the bead in the present invention may be selected from a variety of different polymer materials such as epoxies, phenolic, resorcinol, acrylic, polyurethane, phenolic-resorcinol-formaldehyde resin, and polymeric methylenediisocyanate ("pMDI"). The selection will largely depend on the cost and performance targets specified. Some examples of specific resin systems that are suitable for use in the present invention include ISOSET® UX-100 Adhesive, available from Ashland Specialty Chemical Company, Columbus, Ohio. ISOSET is a two-part resin system, based on a 100-percent solids polyurethane adhesive, blended with conventional ISOSET adhesive. This system offers faster strength and faster complete cure times, while providing excellent strength performance. Particularly preferred is PL® Premium subfloor adhesive available from PL Sealants and Adhesives, Mentor, Ohio.

[**0028**] Additional options or features can be added to the wood board as well. For example, tongue and groove surfaces (not illustrated in figures) can be added to the edges of the floor structure to ensure good, tight fits with adjacent floor structure pieces. Similarly, interlocking cams (not illustrated in figures) can be formed on the longitudinal edges to pull the panels tight during assembly. Also four machined holes (not illustrated in present FIG. 1), two holes at each panel end, may be added to the lower panel as a means of easily attaching cables for lifting and lowering the panel into place with a crane.

[**0029**] When the floor structures are fully assembled so that the U-shaped channels are disposed between the upper and lower levels (thereby interconnecting the panels) and the channels are disposed in the space between the upper and lower levels, then the overall thickness of the floor structure will be about 8 inches to about 24 inches, preferably about 10 inches to about 14 inches.

[**0030**] The floor structure outlined above is installed as a floor during building construction as follows.

[**0031**] First, preparatory steps are taken, such as the construction of a foundation which may be installed from prefabricated concrete slabs or the concrete can be poured on site using a concrete form, and the form then removed after the concrete sets. The foundation may also be constructed from hollow block masonry (e.g., concrete blocks), which are stacked and cemented together into walls of appropriate height.

[**0032**] Next, a sill plate is attached ("anchored") to the foundation. The sill plate is the horizontal wood member that is anchored to the foundation to provide a nailing surface for floor or walls built above. Typically this is done by placing bolts in the foundation when the foundation is constructed and then securing the sill firmly to the foundation with the bolts, or by using foundation straps set into the foundation wall. For the inventive floor system, the foundation straps would need to be positioned at the same frequency as the bolts used to connect the sill plate to the foundation. The sill plate is typically pressure-treated lumber, which has excellent rot and insect resistance. In the pressure treating process, the lumber is treated with chemicals such as copper boron azole, alkaline copper quaternary or Sodium Borates-treated lumber. Advance Guard® brand borate pressure treated wood available from Osmose Inc., Buffalo, N.Y. is an example of a suitable pressure treated lumber product.

[**0033**] A termite shield may optionally be installed between the foundation and the sill plate. Metal termite shields are physical barriers to termites, which prevent the termites from building invisible tunnels into the wood structure of the house. Although the metal termite shields do not fully block a termite incursion, they help identify a termite presence by forcing the termites to build tunnels around the shields—these tunnels are then easily seen. Metal termite shields also help prevent dampness from wicking to adjoining wood members, which can result in rot, which itself makes the material more attractive to termites and other pests. Metal shields are used in conjunction with the concrete or solid masonry walls described above, and are fabricated of sheet metal, which is unrolled and attached over the foundation walls. The edges are then bent at a 45° angle. Metal shields must be very tightly constructed, and all joints and gaps must be completely sealed because such gaps could allow an entry point for termites. Joints and gaps may be sealed by soldering, or filled with a tar-like bituminous compound.

[**0034**] Next any necessary intermediate supports (as discussed above) are installed. Typically, these supports will be

installed at about the midpoint of the distance that is being spanned by the floor structure. So for a floor structure which runs 40 feet between opposite foundation walls, the intermediate support will be positioned at about 20 feet from the foundation walls. As mentioned above, it is important that the top of the intermediate support is flush with the top of the sill plate attached to the foundation. The intermediate support may be selected from materials such as parallel strand lumber (PSL), glulam beams, or laminated veneer lumber (LVL), and comprise several joined pieces of lumber, i.e. 2-3 pieces of 2=12 nailed together and set to span a 60' opening, Suitable LVL material is sold as Microlam™, while suitable PSL is sold as Parallam™, each of these may be purchased from Trus joist, Boise, Id.

[0035] Then, a crane is used to set sections of the inventive floor panels described above in place on the foundation and any optional intermediate support structures. The dimensions of the floor structure are set forth above. The floor section is attached to the foundation using the previously installed foundation straps according to the manufacturer's instructions. Typically, nails or screws are used for this attachment.

[0036] The adjacent floor structure sections are then joined together using a lateral joining means. The most preferred lateral joining means are the interlocking cams described above. These camlocks are accessible from the upper or lower surface of the floor, and are used by turning them into locking position with a tool that inserts into the cam and then twisting the cam in a manner very similar to turning a screw with a screwdriver. By turning the camlocks, the floor panels are pulled together and locked to form a continuous floor deck. Other lateral joining means could also be used. Adhesive, such as PL Premium is spread over mating surfaces of floor sections prior to turning the camlocks into the locked position.

[0037] Splines may optionally be used to join the floor sections. If used, one floor section would have the spline preinstalled and the edge of the adjoining floor section would be open. When the floor sections are joined, the spline slides into the open edge of the mating floor section, almost like large tongue and groove joint. In the case of the splines, glue and nails or screws would be used to join the floor sections. Splines are then attached. Suitable spline materials include 2 inch lumber or the flange materials used in the special I-joists described above. The spline would be fit and attached to one floor section then the adjacent floor section slid into place and itself attached to the spline. The spline may be attached using commonly accepted fastening means, nails, screws, adhesives. A 2× lumber or custom I-joist, both sized to fit between the upper and lower panels on the floor section, could be used as splines.

[0038] If necessary, appropriate connections are made for building services such as electrical, HVAC, plumbing that were installed between the channels or in the channels of the floor structure.

[0039] The floor structure will now be described in more detail with respect to the following, specific, non-limiting examples.

[0040] A method of preparing a floor is conducted according to the present invention as follows. This is an example for the assembly of a 40 foot×60 foot floor deck using a wood-steel composite floor structure described in greater detail below.

[0041] First, the footer and foundation wall is built. A 16 inch to 24 inch wide trench is dug for the footer. The footer trench is set so that the foundation wall will sit in the middle of the footer, and the trench is filled with concrete and allowed to set. Although, the actual depth and width of the trench is determined by local codes, the trench is dug deep enough to hit solid ground (not loam) and to be below the frost line to prevent "frost heave". A form for the poured concrete foundation wall is then set on top of the footer. The wall height will be determined by code requirements for distance of wood materials above grade. For this example, the wall is a minimum of 31.5 inches above grade. The foundation wall is 8 feet wide and 40 feet, 1 inch×60 feet, 1 inch as measured from the outside of the foundation walls. At the time concrete is poured into the form, foundation straps are placed. The number and placement will depend on code, but for illustration, one will be placed at each corner, with one every five feet along the foundation wall. In this case, the foundation straps are from USP Connectors, Livermore, Calif., and are installed according to the manufacturer's instructions. The form is filled with concrete and allowed to set. (Foundation connectors could be used instead of straps, but instead attaching the foundation straps to the rimboard, the floor sections would be attached by toe-nailing the rimboard to the sill plate.)

[0042] Next, a termite shield is applied. The termite shield is fashioned from galvanized sheet metal and is set on top of the foundation wall such that water is shed from the structure, but so the insects cannot climb past the shield. It is bonded to the foundation using PL Premium construction adhesive.

[0043] Next, a sill plate is anchored to the foundation. The sill plate is 2×8 Advance Guard® Brand Borate Pressure Treated Wood from Osmose lumber. It is placed on top of the foundation wall to form a rectangle that is 40 foot×60 foot as measured on the outside edge of the sill plate. The sill plate is attached to the foundation using the manufacturing nailing schedule for the foundation straps selected.

[0044] Then the intermediate support piers and beam are installed. Piers of poured concrete are formed as described for the foundation wall. There are two piers just inside the foundation wall that will support each end of the beam, with piers every eight feet on center. The 20 inch high×18 inch×18 inch piers rest on footers dug below grade (in view of the same consideration for foundation wall footer mentioned above). The intermediate support beam is formed from doubled 2×12 lumber (SYP, Grade No 2 or better) held together with three nails every 16 inches. The intermediate beam rests on top of another piece of sill plate material (2×8 Advance Guard® Brand Borate Pressure Treated Wood) approximately 6 inches long. The sill plate and intermediate beam are attached the pier with a foundation strap. The top of the intermediate support beam and the top of the sill plate on the foundation wall should be at the same height. A crane is then used to set 8 feet×40 feet sections of the floor structure described below in place on the foundation and support structures. The crane lifts the floor panel and sets it into position with help from the installation crew. The adjacent floor sections are joined together using camlocks. The perimeter of the floor panel has blocking, which is similar to 1⅛" thick OSB set on edge and spanning the gap between the upper and lower surface of the floor panel. The camlocks are set every 4 feet along the adjoining edges of

the floor panels. PL Premium construction adhesive is spread along any mating edges prior to pulling and joining the floor panels together using the camlocks.

[0045] The floor structures mentioned above as forming the floor were prepared as follows. The floor structures were four feet wide, 40 feet long, and 9.5 inches thick. The upper and lower composite wood boards were 23/32" and ½" AdvanTech boards, respectively. Between the upper and lower composite wood boards were arranged three channels, cross sectional illustrations and dimensions of these channels are shown in FIG. 2. The channels themselves were 20 feet long, and stiffeners at each end and along the channels at a longitudinal spacing of one stiffener for every four feet.

[0046] Screws were inserted every 8-inches as indicated by in FIG. 2 to fasten the metals channels to the upper and lower composite wood boards. The screws used were Primeguard Plus™ exterior screws. As can be seen the metal channel in FIG. 2*b* is in the shape of an isosceles trapezoid, with the top of the channel **14** having a length of seven inches, the height of the trapezoidal channel **14** being 8 inches, the non-parallel sides of the trapezoidal channel form a 78° angle with the base **45** of the trapezoidal channel. The extending tabs **23** are approximately 1.5 inches long.

[0047] Shown in FIG. 2*b* is a stiffener **29** to be placed inside the channel **14**, with a hole **45** (as described above) placed in the exact center of the stiffener **29**.

[0048] Additionally, to further secure the channels to the composite wood boards a ¼ inch bead of PL premium adhesive was used on each of the tabs shown in FIG. 2, and additional three ¼ inch beads were applied to the bottom of the channel contacting the lower wood board as shown in FIGS. 1 and 2. All of these beads ran the entire length of the floor structure.

[0049] It will be appreciated by those skilled in the art that changes could be made to the embodiments described above without departing from the broad inventive concept thereof. It is understood, therefore, that this invention is not limited to the particular embodiments disclosed, but it is intended to cover modifications within the spirit and scope of the present invention as defined by the appended claims.

We claim:

1. A method for preparing a floor comprising the steps of:

(A) preparing one or more floor structures comprising:

a. an upper surface arranged in parallel to a lower surface; and

b. one or more channels disposed vertically between the upper and lower surfaces and longitudinally extending along the upper and lower surfaces, each of the one or more channels having a top and a bottom.

(B) preparing a foundation;

(C) attaching a sill plate to the foundation;

(D) attaching a rimboard to the sill plate;

(E) placing one or more floor structures on top of the rimboard and attaching the floor structure to the rimboard; and

(F) attaching splines to the floor structure.

2. A method for preparing a floor according to claim 1, further comprising the step of: (B') installing a termite shield between the sill plate and the foundation.

3. A method of preparing a floor according to claim 1, further comprising the step of installing one more intermediate supports, whereby the floor structure is placed atop the intermediate support.

4. A method of preparing a floor according to claim 1, wherein the floor structure further comprises lateral joining means, and whereby the lateral joining means are used to mechanically join one or more floor structures that are adjacent to each other.

5. The method of preparing a floor according to claim 1, wherein the one or more channels are composed of metal.

6. The method of preparing a floor according to claim 5, wherein the metal is selected from the group comprising aluminum and steel.

7. The method of preparing a floor according to claim 1, further comprising an adhesive applied between the top of the one or more channels and the upper surface and the bottom of the one or more channels and the lower surface.

8. The method of preparing a floor according to claim 1, wherein the upper surface and the lower surface are oriented strand board panels.

9. The method of preparing a floor according to claim 1, further comprising a blocking member, the blocking member disposed vertically between the upper surface and the lower surface and permanently affixed thereto, wherein the blocking member is selected from the group comprising, lumber, I-joists, or wood composite material.

10. The method of preparing a floor according to claim 4, wherein the lateral joining means are interlocking cams.

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