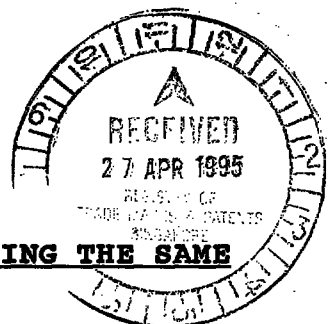




A TIMBER PRODUCT AND METHOD OF MANUFACTURING THE SAME

The present invention relates to a timber product and a method of manufacturing the same.

The present invention provides a method of manufacturing a timber product comprising mixing pulp and/or fibrous material with a binder composed of at least one of gypsum and cement and moulding the resulting mixture under pressure so as to impregnate the pulp and/or fibrous material with the binder.

The present invention also provides a timber product comprising pulp and/or fibrous material and a binder composed of at least one of gypsum and cement.

The timber product preferably has a density of at least 600 kg/m³, and not more than 1500 kg/m³.

Preferably, the pulp and/or fibrous material is selected from coconut husks, palm tree stems (with oil removed), reeds, straw, hay, cotton, linen, cloth, paper, cardboard and wood shavings.

Preferably, the ratio by weight of binder to pulp and/or fibrous material is from at least 0.3:1 to not more than 3:1. The lower ratios can be used to produce moulded products of light density which can be easily worked with woodworking tools such as chisels, planers, saws or the like. If too little binder is used, the product would when exposed to water, either swell or lose its workability, and surfaces, corners or edges of the product would easily disintegrate when impacted or subjected to rough handling. The use of a binder in an amount greater than the ratio of 3:1 would result in denser material with increased hardness and structural strength. However, owing to the abrasive nature of the binder this would necessitate the use of harder tools or more frequent tool sharpening.

In order to reduce the overall density of the product, the gypsum content in the binder can be increased at the expense of the cement content, cement being denser than gypsum.

The timber product of the present invention can be manufactured by a wet or a dry process. The wet process comprises providing a wet mixture of pulp and/or fibrous material and binder, and then compressing that mixture under pressure of from 2000 to 4000 psi. The dry process comprises mixing pulp and/or fibrous material with dry binder, compressing that mixture, and curing the binder by heating the compressed mixture in a steam atmosphere at a temperature of preferably from 130 to 180°C. The wet process has the advantage of lower initial investment, but provides slower production than can be achieved by the dry process. The rate of production using the wet process can however be increased by using metal moulds which can be removed from the press. Such removable moulds maintain boards under pressure when removed from the press, thereby allowing the press to be used to press further boards. The mould can be left to cure naturally at ambient temperature or can be heated to decrease the curing time (initial setting). The temperature must, however, be carefully regulated so as to prevent blistering. Typically, the boards are kiln dried to the required moisture content. The dry process has the disadvantage that the initial investment required is higher than for the wet process and can only produce a limited range of products as the process is not as flexible.

Compression of the mixture of pulp and/or fibrous material and binder is a very important factor as it determines the properties, particularly strength, of the finished product. Pulp and/or fibrous material requires a significant amount of water to make it "workable", that is, permit it to be able to be stirred and mixed with binder. However, in order to render the pulp and/or fibrous material workable too much water is introduced into the mixture for the binder to set. Pressure is thus required to compress the mixture and to drive off excess water. This is achieved by using a mould having holes or gaps through which the water can drain. On compressing the mixture, the water content in the mixture is decreased and the binder concentration in relation to the volume of the pulp and/or

fibrous material is increased. Consequentially, the volume of the mixture is reduced, and the resulting product is one of pulp and/or fibrous material impregnated with a cement/gypsum binder. The product is cured under pressure and when removed from the press a residual pressure remains which increases the compression and structural strength of the product. This resulting product does not swell when exposed to water.

Boards manufactured using this method have excellent woodworking properties, for example, in sawing, shaving, planing, nailing, carving and in retaining screws.

If the timber products of the present invention, for example long planks or architrave, are required to exhibit some flexibility, such as to enable fixing to curved counter top bandings or other circular applications, flexibility can be increased by incorporating resinous materials such as urea formaldehyde, polyvinyl acetone, ethylene-vinyl acetate (EVA) or latex.

In addition, when boards are required having an increased fire-resistance, the addition of non-combustible materials such as ceramic fibre, rock wool, mineral wool, chalk, ash, pearlite, vermiculite, lime, clay or other non-volatile inorganic substances can be made.

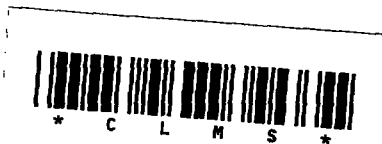
Timber products in accordance with the present invention can typically be used with the following applications. It is ideal for use in areas where hard wood is normally used. It is also ideal for door applications as it does not require the addition of facing boards (such as plywood and hardboard) timber lippings, stiles or nails. This is because the core is easily worked to accommodate hinges, locks, etc. in the same manner as soft or hard wood doors. The timber products of the present invention are also suitable for kitchen table tops, toilet partitions, garden furniture, fencing, hoardings and other outdoor applications where exposed to high moisture. Furthermore, because of its high degree of stability and soundness, the timber products of the present invention can be easily laminated or veneered to give decorative finishes.

In addition, the individual pulp or fibrous pieces used to fabricate the timber product can be dyed with water fast colours to give a textured finished product having homogenous texture. Such textured material is suitable for furniture and other decorative applications. Moreover, when preservative treatment is required, the timber products of the present invention can be impregnated with preservatives by first soaking and drying the individual pulp or fibrous pieces before producing the board. This ensures that the whole core is treated, instead of only the surface (for example a few millimetres) as in traditional wood preservative treatments.



CLAIMS

1. A method of manufacturing a timber product comprising mixing pulp and/or fibrous material with a binder composed of at least one of gypsum and cement and moulding the resulting mixture under pressure so as to impregnate the pulp and/or fibrous material with the binder.
2. A method as defined in claim 1, wherein the binder is mixed with the pulp and/or fibrous material in a ratio by weight of at least 0.3:1.
3. A method as defined in claim 1 or claim 2, wherein the binder is mixed with the pulp and/or fibrous material in a ratio by weight of not more than 3:1.
4. A method as defined in any one of claims 1 to 3, wherein the pulp and/or fibrous material is selected from coconut husks, palm tree stems (with oil removed), reeds, straw, hay, cotton, linen, cloth, paper, cardboard and wood shavings.
5. A method as defined in any of claims 1 to 4, wherein the pulp and/or fibrous material and binder are mixed with a water-based liquid to provide a wet mixture.
6. A method as defined in claim 5, wherein the wet mixture is moulded under a pressure of from 2000 to 4000 psi.
7. A method as defined in claim 5 or claim 6, further comprising the step of heating the moulded mixture.
8. A mixture as defined in claim 7, wherein the heating step is performed at a temperature of from 130 to 180°C.
9. A method as defined in claim 7 or claim 8, wherein the



heating step is performed in an autoclave.

10. A method as defined in any one of claims 1 to 4, wherein the pulp and/or fibrous material is mixed dry with the binder, compressed and then cured in a steam atmosphere.

11. A method as defined in claim 10, wherein the steam is at a temperature of from 130 to 180°C.

12. A method as defined in any one of claims 1 to 11, wherein the pulp and/or fibrous material and binder are further mixed with a resinous material.

13. A method as defined in claim 12, wherein the resinous material is selected from urea formaldehyde, polyvinyl acetone, ethylene-vinyl acetate or latex.

14. A method as defined in any one of claims 1 to 13, wherein the pulp and/or fibrous material and binder are further mixed with a fire-resistant material.

15. A method as defined in claim 14, wherein the fire-resistant material is selected from ceramic fibre, rock wool, chalk, lime, mineral wool, clay, ash, pearlite and vermiculite.

16. A timber product comprising pulp and/or fibrous material and a binder composed of at least one of gypsum and cement.

17. A timber product as defined in claim 16, wherein the ratio by weight of binder to pulp and/or fibrous material is at least 0.3:1.

18. A timber product as defined in claim 16 or claim 17, wherein the ratio by weight of binder to pulp and/or fibrous material is not more than 3:1.



19. A timber product as defined in any one of claims 16 to 18, further comprising a resinous material.
20. A timber product as defined in claim 19, wherein the resinous material is selected from urea formaldehyde, polyvinyl acetone, ethylene-vinyl acetate or latex.
21. A timber product as defined in any one of claims 16 to 20, further comprising a fire-resistant material.
22. A timber product as defined in claim 21, wherein the fire-resistant material is selected from ceramic fibre, rock wool, chalk, lime, mineral wool, clay, ash, perlite and vermiculite.
23. A timber product as defined in any one of claims 16 to 22, wherein the pulp and/or fibrous material is selected from coconut husks, palm tree stems (with oil removed), reeds, straw, hay, cotton, linen, cloth, paper, cardboard and wood shavings.
24. A timber product as defined in any one of claims 16 to 23 where the product has a density of at least 600kg/m³.
25. A timber product as defined in any one of claims 16 to 24 where the product has a density of not more than 1500kg/m³.