THERMOPLASTIC COVERED COMPOSITE BOARD

FIELD OF THE INVENTION

The invention relates to a composite board. The invention is particularly suitable for use as a shuttering board and it is in this context that the invention will be described.

BACKGROUND TO THE INVENTION

The following discussion of the background to the invention is intended to facilitate an understanding of the present invention. However, it should be appreciated that the discussion is not an acknowledgment or admission that any of the material referred to was published, known or part of the common general knowledge in any jurisdiction as at the priority date of the application.

Outdoor constructions require material that are suited to withstand the effects of the weather such as rain and other environmental factors. Such material must also be durable in situations where the outdoor construction is anticipated to be a permanent construction.

Some of the current materials used in outdoor construction as not environmentally friendly. Alternative materials break easily.

Shuttering boards are commonly used at construction sites to maintain poured concrete in a desired shape. It is particularly used in maintaining poured concrete that, when set, forms a vertical pylon or the like. This process of maintaining the poured concrete in predefined shapes is also known as formwork.

There are essentially three types of shuttering boards that can be used:

Plywood shuttering boards. Such shuttering boards are cheap. But subject to degradation with each use. As a result, plywood shuttering boards are often re-used somewhere between 8 to 10 times before they need to be changed. Changing such shuttering boards consumes additional labour and material costs. Furthermore, the

used plywood shuttering boards must be disposed of in some manner, often by incineration, which creates further environmental problems.

Steel shuttering boards. Being made of a more durable material, steel shuttering boards may be re-used up to 100 times before needing to be changed. However, this durability is also a disadvantage as such shuttering boards are difficult to handle and shape at the construction site.

Plastic shuttering boards. Plastic shuttering boards have been introduced to the market with limited success. The main reasons for this lack of success has been their low strength to weight ratio. While some attempts to improve the strength to weight ratio of plastic shuttering boards have been technically successful, it has been done at such a high production cost that the commercial viability of such boards has been significantly compromised.

It is therefore an object of the present invention to produce a composite board which overcomes, or at least ameliorates in part, one or more of the aforementioned problems.

SUMMARY OF THE INVENTION

Throughout this document, unless otherwise indicated to the contrary, the terms "comprising", "consisting of", and the like, are to be construed as non-exhaustive, or in other words, as meaning "including, but not limited to".

In accordance with a first aspect of the invention there is a composite board comprising three layers of material, the first layer of material consisting of one material from a first hard plastic material set, the middle layer consisting of a wood material, a third layer of material consisting of one material from a first hard plastic material set, where the layers are bonded in a sequential fashion; a fourth layer of material consisting of one material from the hard plastic material set bonded to one edge of the board; and a fifth layer of material consisting of one material from the hard plastic material set bonded to a second edge of the board.

The first layer of material and the third layer of material are thermally bonded or jointed to the fourth layer of material and the fifth layer of material to form thermoplastic edge sealed joints.

Ideally, the material used in the first layer is also used in the third layer. This allows ease of manufacturing as the number of materials needed for manufacturing to be significantly reduced.

The first hard plastic material set, preferably, includes polyethylene; polypropylene; polyvinyl chlorate; acrylonitrile-butadiene-styrene.

The third layer preferably includes plywood, medium density fibreboard, particle board or plank.

It is preferred that the composite board has a thickness between 6 and 50mm with the ideal thickness of the composite board being between 10 and 18mm. Boards in the range 10 to 18mm provide the best overall performance and are relatively easy to manufacture compared to boards of other sizes.

The proportions between the differing layers may vary, but ideally the size of the first and third layers do not exceed 3mm in thickness. It is also preferred that the thickness of the second layer, as a proportion of the total thickness of the composite board, remains at substantially 80%.

Thermal bonding may be used to sequentially bind each layer to its next layer. It is further preferred that any such bond be waterproof.

In accordance with a second aspect of the present invention there is a method of producing a composite board comprising the steps of:

bonding a first layer made of a material from a hard plastic material set to a second layer made of a wood material;

bonding the second layer to a third layer made of a material from a hard plastic material set;

bonding a fourth layer of material consisting of one material from a hard plastic material set bonded to one edge of the board;

bonding a fifth layer of material consisting of one material from a hard plastic material set bonded to a second edge of the board; and

laminating the bonded board.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a plan view of a composite board according to the present invention.

PREFERRED EMBODIMENTS OF THE INVENTION

In accordance with a first embodiment of the invention there is a composite board 10 of 18mm thickness (T). The composite board 10 comprises three layers of various material compositions. The first layer 12 and the third layer 14 are made of polyethylene to a thickness of 1.5mm. The second layer 16 consists of a wood material such as plywood. In this embodiment, the polyethylene of the middle layer 16 is solid state polyethylene. The second layer has a thickness of 14.4mm. The composite board 10 further comprises a fourth layer 18 and a fifth layer 20 made of polyethylene to a thickness of 1.5mm each. The length and width of the composite board are 2440mm and 1220mm respectively.

Each layer is thermally bonded to the layer below by adhesives to provide additional strength to the composite board 10 and to make the resulting composite board 10 waterproof. The adhesives are applied evenly on each layer. In this manner, first layer 12 is thermally bonded by adhesive to second layer 16, which is in turn thermally bonded by adhesive to third layer 14 and so on. The fourth layer 18 is thermally bonded by adhesive to an edge of the composite board 10 and the fifth layer 20 is in turn thermally bonded by adhesive to the other edge of the composite board 10. The first layer 12 and the third layer 14 are thermally bonded or jointed to the fourth layer 18 and the fifth layer 20 to form thermoplastic edge sealed joints 22,

24 that prevent water or moisture from penetrating into the middle layer, thereby enhancing the lifespan of the composite board. The whole composite board is then applied under heavy loads for a certain duration until the adhesives are set. The whole composite board is then laminated using conventional laminating techniques.

The applicant has found that the re-use cycle of composite boards made in accordance with the invention, and used as shuttering boards, ranges from 200 to 500 uses. Furthermore, such composite shuttering boards are completely recyclable.

The inherent strength of the composite boards also makes them suitable for other uses such as non-load bearing walls, scaffolding boards, floor decking, roofing shelters and truck cabins.

It should be appreciated by the person skilled in the art that the above invention is not limited to the embodiment described. In particular, the following modifications and improvements may be made without departing from the scope of the present invention:

- The polyethylene material used in the first and third layers may be replaced with other hard plastic materials such as polyvinyl chloride, polypropylene or ABS.
- The wood material used in the second layer may be replaced with medium density fibreboard, particle board or plank.
- The polyethylene material used in the fourth layer 18 and the fifth layer 20 may be replaced with other hard plastic materials such as polyvinyl chloride, polypropylene or acrylonitrile-butadiene-styrene (ABS).
- The material used in the second layer may be of virgin or recycled origin. In this manner, new composite boards may be made by recycling the material used in older composite boards.
- The thickness of the composite board may vary from the 18mm described above. While the preferred thickness range identified by the applicant is

from 6mm to 50mm thickness, boards of other sizes may just as easily be created.

- The thickness of the first and third layers should be limited to a maximum of 3mm for any composite board less than or equal to 50mm in thickness (total).
- The thickness of the second layer, as a proportion of the total thickness of the composite board, should be roughly 80%.
- The first layer 12 and the third layer 14 may have a flat, smooth surface or a textured surface so as to improve friction on the surface of the board for anti-skid purposes.
- The length and width of the composite board may vary from the 2440mm and 1220mm described above. While the preferred length and width range identified by the applicant is from 50mm to 6000mm and 50 mm to 2000mm respectively, boards of other sizes may just as easily be created.

It should be further appreciated by the person skilled in the art that the features described above, where not mutually exclusive, can be combined to form yet further embodiments of the invention.

Claims:

1. A composite board comprising:

   a first layer of material consisting of one material from a hard plastic material set;

   a second layer consisting of a wood material;

   a third layer of material consisting of one material from the hard plastic material set;

   where the layers are bonded in a sequential fashion;

   a fourth layer of material consisting of one material from the hard plastic material set bonded to one edge of the board; and

   a fifth layer of material consisting of one material from the hard plastic material set bonded to a second edge of the board.

2. A composite board according to claim 1, where the first layer of material and the third layer of material are thermally bonded or jointed to the fourth layer of material and the fifth layer of material to form thermoplastic edge sealed joints.

3. A composite board according to claim 1 or 2, where the hard plastic material set comprises the materials: polyethylene; polypropylene; polyvinyl chlorate; acrylonitrile-butadiene-styrene.

4. A composite board according to any preceding claim, where the second layer of material is plywood, medium density fibreboard, particle board or plank.

5. A composite board according to any preceding claim where the total thickness of the composite board is between 6 and 50mm.

6. A composite board according to claim 5, where the total thickness of the composite board is between 10 and 18mm.

7. A composite board according to claim 5 or claim 6, where the thickness of the first and fifth layers does not exceed 3 mm.

8. A composite board according to any preceding claim, where the thickness of the second layer represents substantially 80% of the total thickness of the composite board.

9. A composite board according to any preceding claim where each layer is thermally bonded to the next layer in sequence.

10. A composite board according to claim 9, where the bonding agent used is waterproof.

11. A composite board according to any preceding claim, where the material used in the first layer is the same as the material used in the third layer.

12. A method of producing a composite board comprising the steps of:

bonding a first layer made of a material from a hard plastic material set to a second layer made of a wood material;

bonding the second layer to a third layer made of a material from a hard plastic material set;

bonding a fourth layer of material consisting of one material from a hard plastic material set bonded to one edge of the board;

bonding a fifth layer of material consisting of one material from a hard plastic material set bonded to a second edge of the board; and

laminating the bonded board.

13. A composite board substantially as described herein with reference to the drawings.