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(54) **A method for manufacturing marble-like products with combined cross section of synthetic resin and cement or gypsum based layers.**

(57) A method for manufacturing a marble-like product with composite cross section of two or more monolithically applied layers in which the first main layer is based on synthetic resin binders like epoxy resin while the backing layers is composed of a hydraulic binder type like cement, gypsum or anhydrite.

The product layers are applied wet on wet directly after each other. Intermediate layers of sprinkled sand or crushed stone may be used to increase bond between the two layers specially if the second layer is to be applied for any reason after the setting time of the first layer. The moulds used for production can be made of metal, plastic, rubber or combinations thereof, in which the product is stored at ambient room temperature or elevated temperatures until the product cures before demoulding.

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A method for manufacturing marble-like products with combined cross section of synthetic resin and cement or gypsum based layers

Background of the invention:

Considering the known cast marble-like tiles and products we find that they all use the same type of binder, i.e. either synthetic resin or cement based type, all over the product cross section. This makes the products based on synthetic resin binder very costly in addition to many other technical disadvantages, as for example, its limited dimensional stability especially at higher temperature differences.

The present invention is a new method to manufacture marble-like products whose cross section is composed of two different layers regarding the type of binder used in each. One layer uses synthetic resin based binder type while the other layer uses hydraulic type binder like cement, gypsum or anhydrite.

Advantages of the present invention can be summarized as follows:

1. Reduced cost of the materials used compared as the costly synthetic resin is used in relatively smaller part of the whole cross section.
2. Better chemical, physical and mechanical properties can be achieved more economically.

3. As the back layer of the tiles are cement or gypsum based, the fixing mortar on walls or floors can be also low cost cement or gypsum mortars or adhesives.

4. The facing layer being synthetic resin based which can be formulated to be highly chemical resistant layer enables production of special chemical resistant tiles at low cost because of the low cost of the back layers.

Method of manufacturing:

The resin compound (e.g. epoxy) mixed with selected fillers or without any fillers shall be sprayed or cast in moulds at the required thickness of the facing layer. The kinds of resin, the fillers, the mixing ratios and the thickness of this layer ranging from fraction of millimeters to some centimeters are determined according to the required properties of the end product. The moulds can be of different types; metallic, wooden or plastic, while some moulds need to be pretreated with suitable release agents. This first layer can be compacted or vibrated after its application. The second layer which can be based on cement, gypsum, anhydrite or any other hydraulic binder shall be cast on the

first layer within the setting time of the first resin based layer, i.e. wet on wet process. The kind of binder, the filler, its mixture as well as its thickness are determined according to required end product. After casting this layer it can be compacted or vibrated.

After the curing time which depends on the ambient temperature or the hot curing if necessary the final product is demoulded ready to use. Additional preparations before usage like cutting, sawing or assembling may be made.

After applying the first layer, an intermediate layer of sand, aggregates, crushed stones or any other material with a suitable size or grading can be sprinkled to increase the bond between the main layers if required. The use of this intermediate layer may be necessary if casting of the second main layer can be for any reason only done after the setting time of the first resin layer.

Several examples of the invention are shown in the drawings. The drawings show in

Fig. 1 a mould,

Fig. 2 a first step of the method according to the invention,

Fig. 3 a second step of the method according to the invention, resulting in a first example of the invention as shown in Fig. 3,

Fig. 4 a second example of the invention,

Fig. 5 a third example of the invention,

Fig. 6 an end product according to the invention.

The drawings show the following elements:

A mould 2,
a synthetic resin 4,
a cement mortar layer 6,
anchorage stones 8.

Claims

1. A method for manufacturing a marble-like product with composite cross section of two monolithically applied layers; one layer based on synthetic resin binders and a backing layer based on a hydraulic binder, the method which comprises:

a) Spraying or casting a layer of a selected synthetic resin like epoxy resin non modified or modified with selected fillers and additives and applied in one or more steps using the same or different resins, composition and method of application in each step, wherein said layer whether

applied in one or more steps have thicknesses ranging from fraction of millimeter into some centimeters;

b) Casting the second main layer which is based on cement, gypsum, anhydrite or any other hydraulic binder mixed with or without fillers, additives and reinforcements, wherein said layer whose thickness can be part of or some centimeters is applied on the first layer before the resin layer sets or hardens i.e. wet on wet process;

c) Optionally sprinkling an intermediate layer of sand or stones or any other suitable material on the first (resin) layer before applying the second layer to increase bond between the 2 main layers specially if the second main layer can only be applied for any reason after the setting time of the first main layer, and

d) Applying said layers after each other inside moulds made of metal, plastic, rubber, wood or combination thereof which is stored either at ambient room temperature or elevated temperature to fasten curing until the product layers cure to strength enough for demoulding and it can be stored thereafter to cure to strength enough for handling and usage.

2. The method according to claim 1 characterized in that the resin based layer is composed of any resin type or types selected to suit the required product properties.

3. The method according to claim 1 characterized in that the resin layer is composed of pure resin without filler or with selected fillers or additives according to the required properties.

4. The method according to claim 1 characterized in that the resin, fillers and additives used in the facing layer can be selected to achieve certain chemical resistance to produce special chemical resistant tiles.

5. The method according to claim 1 characterized in that the back layer is composed of any hydraulic binder like cement, gypsum or anhydrite and mixed with water and with or without other fillers, additives or reinforcements at selected proportions to give the required properties.

6. The method according to claim 1 characterized in that an intermediate layer of aggregates, crushed stones, metals and similars can be sprinkled after applying the first layer within its setting time to increase the bond between the two main layers especially when the back layer can only be applied for any reason after the setting time of the first layer.

7. The method according to claim 1 characterized in that the new product is composed of two layers or more, one main layer based on synthetic resin binders and back layer of cheaper materials

that results in a considerable decrease in the cost of the final product while many mechanical and physical properties can be improved.

8. The method according to claim 1 characterized in that the new product is produced using moulds made of different materials like metals, wood or plastic which are to be treated or do not need treatments with release agents according to the properties of the materials used and the end product.

9. The method according to claim 1 characterized in that the moulds used can be designed to the size and shape of the required end product or at different sizes or shapes while additional preparations like sawing or assembling are used.

10. A marble like product manufactured according to any one of the claims 1 to 9, with composite cross section of two monolithically applied layers; one layer based on synthetic resin binders and a backing layer based on a hydraulic binder; the product comprising:

a) The sprayed or casted one layer of a selected synthetic resins like epoxy resin non modified with selected fillers and additives and applied in one or more steps using the same or different resins composition and method of application in each step, wherein said layer whether applied in one or more steps have thickness ranging from fraction of millimeter into some centimeters;

b) The casted second main layer which is based on cement, gypsum, anhydrite or any other hydraulic binder mixed with or without fillers, additives and reinforcements, wherein said layer whose thickness can be part of or some centimeters is applied on the first layer before the resin layer sets or hardens i.e. wet on wet process;

c) Optionally sprinkled an intermediate layer of sand or stones or any other suitable material on the first (resin) layer before applied the second layer to increase bond between the 2 main layers specially if the second main layer can only be applied for any reason after the setting time of the first main layer; and

d) which layers were applied after each other inside moulds made of metal, plastic, rubber, wood or combination thereof which is stored either at ambient room temperature or elevated temperature to fasten curing until the product layers cure to strength enough for demoulding and it can be stored thereafter to cure to strength enough for handling and usage.

Fig. 1



Fig. 2

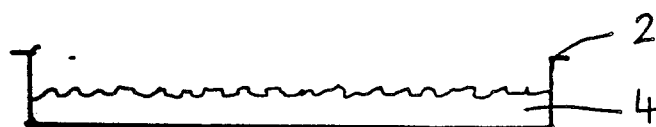


Fig. 3

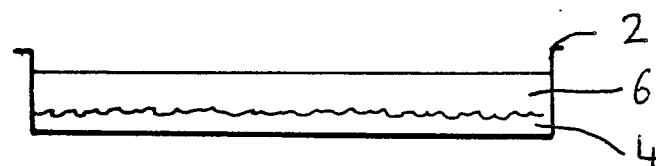


Fig. 4

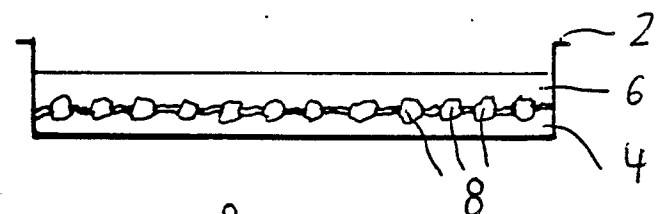


Fig. 5

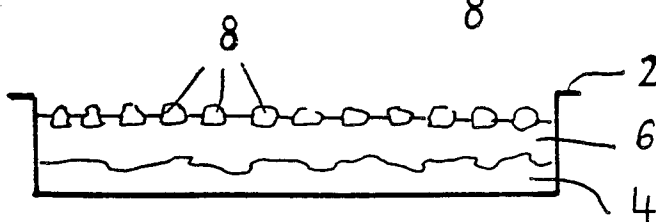


Fig. 6

