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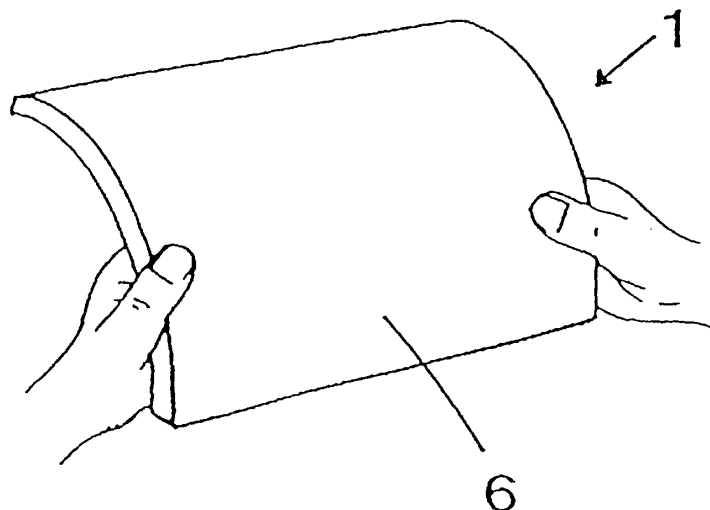
(54) **Method to apply a finishing coat onto the surface of a plastic or composite material**

(57) Method of applying a surface layer to at least one part of the surface of a plastic or composite component. The method comprises the following measures in combination:

a) the surface of the component is degreased and sanded,

b) a layer of a thermosetting adhesive is applied to the degreased and sanded surface,
c) a binder in particulate form is applied to the adhesive layer,
d) the adhesive is allowed to set, the binder particles being fixed to form a base for the surface layer,
e) the surface layer is applied.

Fig 7



Description

[0001] The present invention relates to a method according to the pre-characterising clause of claim 1.

[0002] As an example of the prior art, reference will be made to Swedish patent No. 9701363-5, publication number 511 775.

[0003] Even though a good result is achieved by the method, described therein, of coating the surface of a plastic or composite component with an additional material by thermal spraying, there is a desire, in applications where the layer of additional material is exposed to extreme stresses, to achieve an improved adhesion between the layer and the surface of the plastic or composite component. These may be surfaces that are exposed, for example, to strong air flows, erosion and wear, such as aircraft wings and nose cones for rockets and missiles.

[0004] The object of the present invention is to provide such improved adhesion and this is achieved by the combination of measures specified in the characterising part of claim 1.

[0005] The method according to the invention affords a number of advantages, it being possible to work with a greater number of variations in temperature, particle sizes and material combinations than has hitherto been possible. This makes it easier to select what process parameters are to be used in order to achieve desired characteristics in terms of adhesion and optimum setting.

[0006] The method according to the invention, which may have one or more of the characteristics specified in the subordinate claims, will be explained in more detail with reference to the drawing attached, in which:

Fig. 1 shows the pre-treatment of the surface of a component that is to be coated,

Fig. 2 shows the application of a layer in the form of a thermosetting adhesive to the pretreated surface,

Fig. 3 shows the applied thermosetting adhesive being heated to a temperature close to its gel point,

Fig. 4 shows the application of a binder in particulate form by spraying,

Fig. 5 shows the layer of thermosetting adhesive being heated to its setting temperature in an oven,

Fig. 6 shows the component being coated with additional material by thermal spraying,

Fig. 7 shows the finished component.

[0007] Fig. 1 illustrates the pre-treatment of a part of the surface 2 of a component 1 of a composite material. As a preliminary, the relevant component surface 2 is degreased using acetone, for example. The surface 2 is then lightly sanded using a fine abrasive paper or abrasive nylon 3 in order to remove irregularities and raise the surface somewhat. Finally the surface 2 is degreased and dried again.

[0008] Fig. 2 shows how a layer 4 of a thermosetting adhesive, here in the form of an adhesive film, is applied to the surface 2 pre-treated in accordance with Fig. 1. In applying the adhesive film it is important to ensure that no contaminating substances are allowed to come into contact with the pre-treated surface 2 or the adhesive. Instead of applying the adhesive in the form of a film, as shown in Fig. 2, this can be applied, for example, by spraying or applying it with a brush. A number of different adhesive layers are feasible, for example epoxy adhesive, acrylic adhesive, urethane adhesive or phenolic plastic-based adhesive.

[0009] Fig. 3 shows how the thermosetting adhesive layer 4 is heated up by means of a heat gun 5 to a temperature close to the gel point of the adhesive. This gives the adhesive layer a very good adhesive capacity. It will be obvious that the adhesive layer 4 can be heated in some other way to that illustrated in Fig. 3, for example in an oven or the like.

[0010] Fig. 4, as stated, shows the application by spraying of a binder in particulate form. The particulate form may be powder or short fibre lengths of the material. Alternatively the particles can be applied by scattering on or applying them to the adhesive surface in some other way, so that the particles partially penetrate the latter.

[0011] Fig. 5 shows how, after application of the binder, the component 1 is placed in an oven 7 or the like for heating to the thermosetting temperature of the adhesive layer 4, so that this is made to set, which means that an excellent adhesive bond is obtained between the adhesive layer 4 and the composite material. By heating up the adhesive layer 4 to a temperature close to its gel point before coating, in accordance with Fig. 3, the time taken for this stage of the method can be minimised, since only a certain amount of further heating is required.

[0012] Fig. 6 shows how the pre-treated surface 2 provided with the adhesive layer 4 is coated with a layer 6 of an additional material by thermal spraying, for example flame spraying. This additional material, for example, may be any of the following: a ceramic; metal oxide; metal; metal alloy or plastic. The temperature of the sprayed material can be adjusted through the choice of spraying method. In addition to flame spraying, feasible spraying methods include, for example, arc spraying, plasma spraying or detonation spraying. The application temperature can be varied from approximately 50°C to several hundred degrees Celsius through the use of different spraying methods and additional material. Adhe-

sive is selected having regard to the additional material and application temperature, so that the best possible strength and surface layer quality of the coating 6 can be achieved.

[0013] Fig. 7 shows the finished component 1 after it has been coated with a layer 6 of an additional material and the adhesive layer 4 has been set by the method according to the invention. 5

[0014] It will be obvious to a person skilled in the art that the method according to the invention is not limited to the embodiment described above but may instead lend itself to modifications within the scope of the idea of the invention defined in the patent claims below. Once a first coating layer has been applied and set by the method according to the invention, further layers of different materials, for example, may be applied on top of this by thermal spraying, without the need now to use any adhesive film. 10 15

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Claims

1. Method of applying a surface layer to at least one part of the surface (2) of a plastic or composite component (1), **characterised in that** the method comprises the following measures in combination: 25
 - a) the surface of the component is degreased and sanded (3),
 - b) a layer (4) of a thermosetting adhesive is applied to the degreased and sanded surface, 30
 - c) a binder in particulate form is applied to the adhesive layer (4),
 - d) the adhesive is allowed to set, the binder particles being fixed to form a base for the surface layer, 35
 - e) the surface layer is applied.
2. Method according to Claim 1, **characterised in that** the binder is applied in powder form. 40
3. Method according to Claim 1, **characterised in that** the binder is applied in the form of thin fibres.
4. Method according to any of the preceding Claims, **characterised in that** the binder is a ceramic, metal oxide, metal, metal alloy or plastic. 45
5. Method according to any of the preceding Claims, **characterised in that** the surface layer is applied by thermal spraying or the use of a known chemical method. 50
6. Method according to any of the preceding Claims, **characterised in that** before the surface layer is applied the set adhesive surface with binder particles fixed therein is sanded. 55

Fig 1

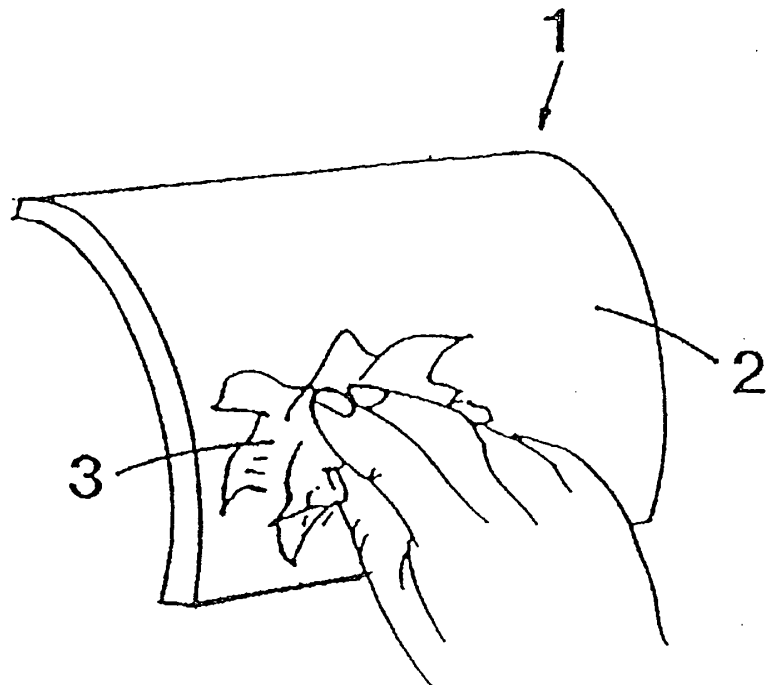


Fig 2

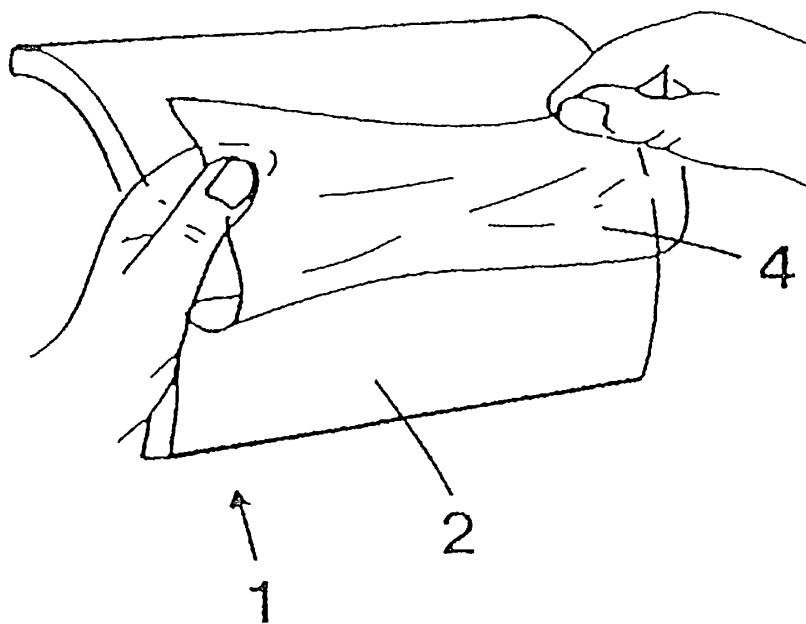


Fig 3

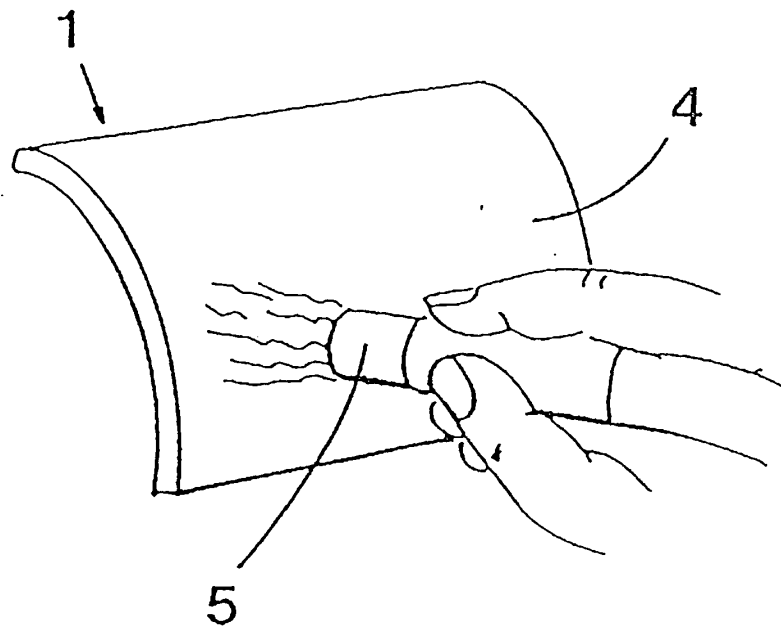


Fig 4

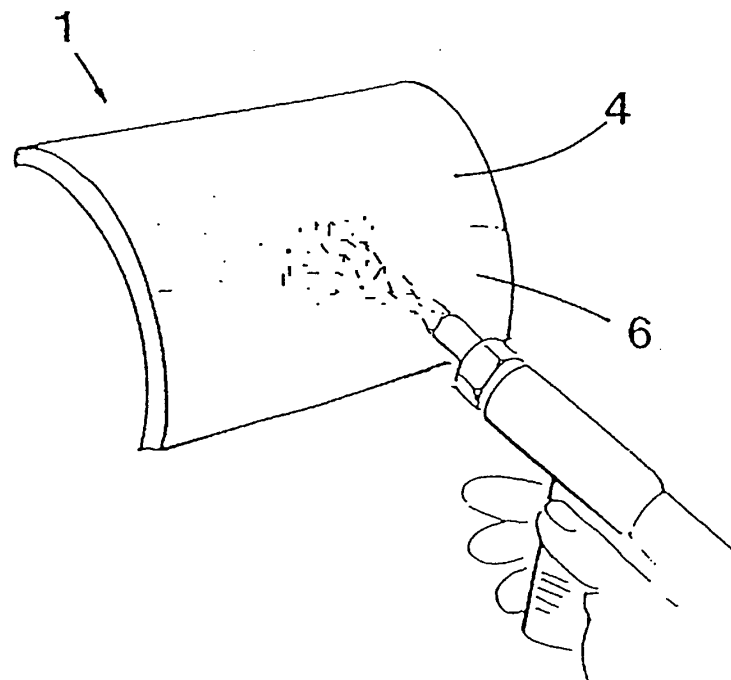


Fig 5

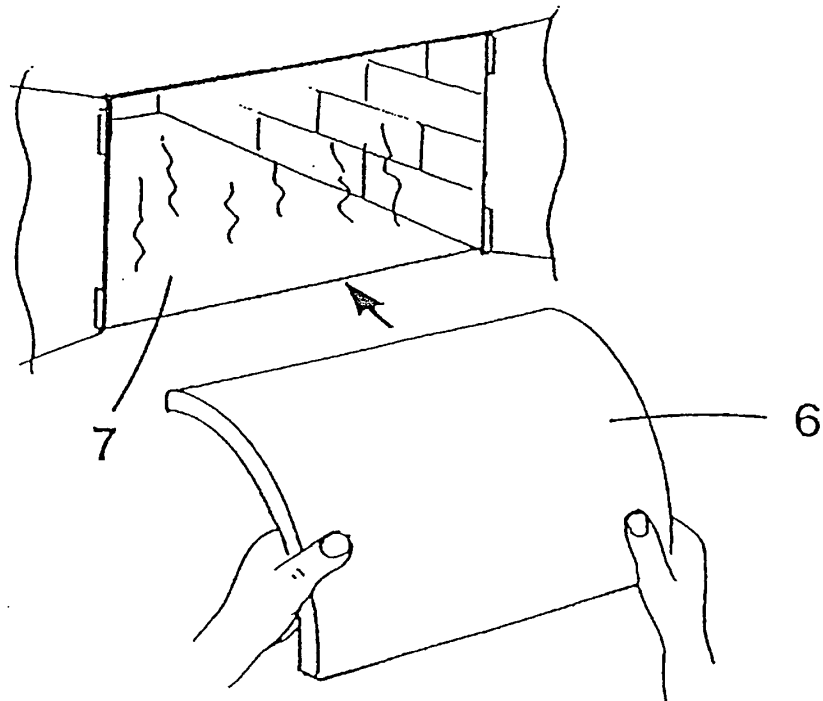


Fig 7

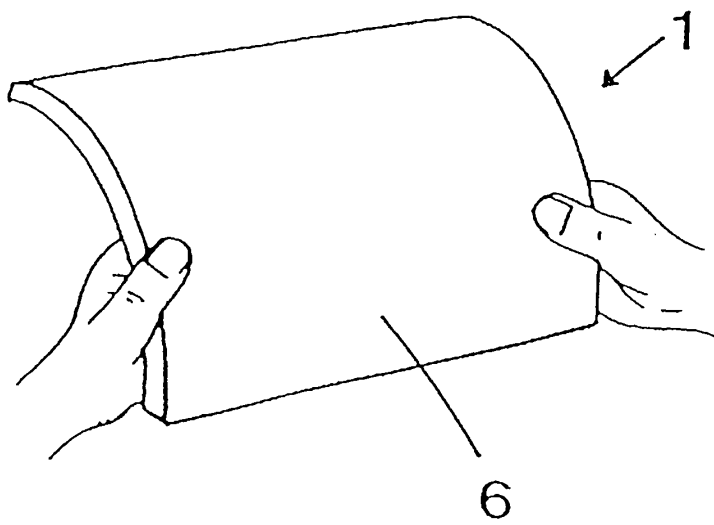


Fig 6

