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**D E C I S I O N**  
**of 25 September 2003**

**Case Number:** T 0874/00 - 3.3.3

**Application Number:** 95909131.5

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**Language of the proceedings:** EN

**Title of invention:**  
SHEET MATERIAL

**Applicant:**  
Van der Wijngaart, Adriaan Johannes Hubertus

**Opponent:**  
-

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 56, 123(2)

**Keyword:**  
"Inventive step (no) - obvious combination"

**Decisions cited:**  
-

**Catchword:**  
-



Case Number: T 0874/00 - 3.3.3

**D E C I S I O N**  
**of the Technical Board of Appeal 3.3.3**  
**of 25 September 2003**

**Appellant:** Van der Wijngaart, Adriaan Johannes Hubertus  
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**Representative:** Prins, Adrianus Willem  
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**Decision under appeal:** Decision of the Examining Division of the  
European Patent Office of 16 March 2000, posted  
5 April 2000 refusing European application  
No. 95909131.5 pursuant to Article 97(1) EPC.

**Composition of the Board:**

**Chairman:** R. Young  
**Members:** P. Kitzmantel  
E. Dufrasne

## Summary of Facts and Submissions

- I. This appeal, which was filed on 14 June 2000, lies against the decision of the Examining Division dated 16 March 2000 and issued in writing on 5 April 2000, refusing European patent application No. 95 909 131.5 filed on 23 February 1995 as PCT/NL95/00071 in the name of Van der Wijngaart, Adrianus, Hubertus, Johannes and published under No. WO 95/23179 (EP-A-0 796 290). The appeal fee was paid together with the Notice of Appeal and the Statement of Grounds of Appeal was filed on 14 August 2000.
- II. The decision under appeal was based on Claims 1 to 20 of a main request (filed with the submission dated 16 February 2000) and on Claim 1 of an auxiliary request (filed at the oral proceedings on 16 March 2000; wording identical to that of Claim 1 of the main request). Claim 1 of the main request read:

"1. Sandwich material comprising a core material and two fibre containing layers bonded to the core material, said fibres being anchored in the fibre containing layer and partly projecting therefrom, and said fibre containing layers being bonded to the core layer by means of a bonding agent, and wherein finishing layers are present on the said two plastic fibre containing layers."

The Examining Division refused the application for lack of inventive step over D6 (DE-A-2 156 481) in combination with D5 (US-A-5 037 690) and D4 (US-A-4 135 019) because the distinguishing feature over D6, i.e. the provision of outer thermoplastic plastic layers

(finishing layers) to the sandwich construction according to D6, was not shown to solve the technical problem underlying the alleged invention which was an improvement of the bond strength between the individual layers forming the sandwich or sheet material. A contribution of the finishing layers to the solution of this problem was not apparent, since the bonding was actually obtained by the resin impregnated fibre material provided between the finishing layer and the core material and not by the finishing layer itself. The use for that purpose of resin impregnated fibre material was, however, known from the citations.

III. Together with the Statement of Grounds the Appellant submitted Claims 1 to 17 of an auxiliary request. With its submission dated 6 March 2003, and in reaction to the Rapporteur's communication of 26 August 2002, the Appellant replaced its previous requests by Claims 1 to 32 of its present sole request.

Independent Claims 1, 16, 31 and 32 of this request read:

"1. A method for obtaining a sheet material comprising a substrate coated with at least one layer of plastic, said method comprising subsequently the following steps:

a) providing a layer of plastic, a substrate, and fibres;

b) anchoring the fibres to a surface of a substrate side of the layer of plastic and/or anchoring the fibres to the substrate if a plastic is used as substrate, wherein the fibres partly project from

substrate side of the layer of plastic and/or the substrate; and

c) bonding the substrate side of the layer of plastic to the substrate by means of a bonding agent."

"16. A sheet material based on a core material as substrate and two surface layers of plastic, said core material comprising a honeycomb material having two top layers, wherein said layers of plastic are bonded to the top layers of the core material by the use of fibres that are anchored in the top layer or in the layer of plastic and are partly projecting there from between said top layers and layers of plastic, said bonding being effected by a bonding agent."

"31. Use of a sheet material according to anyone of the claims 16-30 for constructing silos for solids or liquids, housings for air-ventilation/air-conditioning systems, gas washers and cooling towers and the like."

"32. Use of a sheet material according to anyone of the claims 16-31 for the manufacture of construction material for constructing silos for solids or liquids, housings for air-ventilation/air-conditioning systems, gas washers and cooling towers and the like."

IV. In its written submissions the Appellant presented the following arguments:

(a) The subject-matter of Claim 1 was novel over

(i) D1, because this document disclosed a composite sheet of a polymer matrix comprising fibres partly projecting

outwardly from the surface of the sheet but did not disclose the separate provision of a plastic layer, a substrate and fibres;

- (ii) D2, because this document disclosed the coating of a thermoplastic material comprising embedded and freely protruding fibres with a thermosetting material but, similarly to D1, did not disclose the separate provision of a plastic layer, a substrate and fibres;
- (iii) D3, because this document disclosed the bonding of certain materials to glass fibre reinforced plastic panels whose surface had been flame treated in order to expose glass fibre strands; again D3 did not disclose the separate provision of a plastic layer, a substrate and fibres;
- (iv) D4, because this document disclosed a combination of layers comprising a preprint single cloth layer which was pressurized according to the vacuum bag technique or the press cure method, techniques which prevented the formation of fibres which project from the layer surface;
- (v) D5, because this document described a plastic sheet material made from natural-fibre reinforced polyurethane but did not disclose that the fibres partly project from the substrate; and

- (vi) D6, because this document disclosed a table top material comprising a sheet sandwiched between two fibre-plastic composite sheets by pressurizing this assembly in a mould, a method which would not allow for outwardly projecting fibres.
- (b) The subject-matter of Claim 1 was also inventive.
- (i) D1, the closest prior art, was restricted to the use of heat-resistant fibres because there the fibres must withstand the heat which makes them project outwardly by release of the tension exerted on them by the solid polymer matrix wherein they are embedded. The problem of the invention, to which no solution was suggested in D1, was the provision of a method which was not restricted with regard to the choice of the fibre material.
  - (ii) D2 comprised no suggestion to solve the existing technical problem because this document used glass and asbestos material which was not sensitive to the reheating of the mould exemplified in this document.
  - (iii) D3 was not a relevant state of the art because it was entirely related to the bonding of glass fibres and did not suggest the anchoring of the fibres to an existing surface.

- (iv) D4 was of no help for the solution of the existing technical problem, i.e. the avoiding of fibre damage, because there the fibres were exposed to high pressure and heat.
  - (v) D5 was concerned with coherent natural-fibre material and not with producing a bond between a layer and a substrate and was not therefore relevant prior art.
  - (vi) Also D6 could not suggest the inventive solution of anchoring fibres to a surface and failed to disclose a material having fibres protruding from its surface.
- (c) Furthermore the sheet material comprising a honeycomb core material according to Claim 16 was also novel and inventive.
- (i) Closest prior art in this respect was D5. The subject-matter of Claim 16 was distinguished therefrom by the two top layers of the honeycomb material and by the bonding of (outer) plastic layers to these top layers by fibre material anchored to the top layer which partly projects therefrom. Due to this construction with top layers the fibres were able to efficiently make contact with the honeycomb material.



(ii) The provision of top layers on the honeycomb-core was not suggested in D4 which required an open core structure to allow for at least partly filling the structure with micro balloons.

(iii) Nor was this construction foreshadowed in D5 where an excellent bond between the core layer and the outer sheets was formed by the penetration of the polyurethane into the honeycomb structure which would be prevented by top layers.

V. In its Annex to the summons, dated 19 May 2003, to attend oral proceedings the Rapporteur made the following comments:

"Comments of the Rapporteur

1. **Obviousness**

1.1 Irrespective of the wording of the claims the allegedly "inventive" idea of the present application resides

(i) in the use of fibres which are attached to the surface of a plastic layer/substrate by pressing them into the softened surface of said substrate/layer (page 2, lines 26 to 30; page 4, lines 8 to 19) and

(ii) by bonding another material to the fibre-carrying area by means of an interposed bonding agent.

In the absence of other information in the application it is limited to this enabling disclosure.

1.2 By these measures an improved substrate-layer adhesion shall be achieved ( technical problem).

1.3 The afore-mentioned aspect (i) is known from D2 (GB-A-1 034 738). This document describes the partial embedding of fibres in the surface of a vinyl plastisol in such a way that after complete gelation fibre ends protrude from the surface which provide an improved bonding of the vinyl material to a thermosetting material coated thereon (page 1, lines 23 to 27; page 1, line 75 to page 2, line 30).

1.4 The afore-mentioned aspect (ii) is known from D3 (US-A-3 431 157) which teaches that a firm bond between a cured glass fibre reinforced plastic panel and another material can be achieved by burning away the surface of the plastic panel portion to be joined thereby exposing glass fibres, applying a layer of adhesive to the exposed glass fibres and pressing said other material on top of said adhesive layer (Claim 1).

1.5 It is open to doubt whether the combination of these two aspects (and thus the subject-matter of present Claim 1) requires an inventive step.

1.6 While the Appellant correctly stated that the only fibre materials disclosed in D2 and D3 was glass (D2 and D3) and asbestos (D2), such fibres are neither excluded from the scope of present Claim 1, nor is the method of D2 applicable only to these fibres.

1.7 The subject-matter of Claim 16 comprises the additional feature that the substrate is a honeycomb material having two top layers.

1.8 No particular advantage is apparent from the use as substrate of a topped honeycomb material (known as part of composite laminates from D4 (US-A-4 135 019: Claim 1), D5 (US-A- 5 037 690: Claim 3) and D6 (DE-A-2 156 481: page 3, second parameter)) as compared with other adherable substrates.

1.9 The fact that Claim 16 - in contrast to D4 and D5 - foresees the presence of top layers in spite of their negative influence on the mechanical bonding capacity of the honeycomb material by closing up its open cell surface, cannot contribute an inventive step unless this feature leads to an unexpected solution of a technical problem.

## 2. **Article 123(2) EPC**

There appears to be no basis in the original description for the following features:

### 2.1 Claim 1:

The feature "layer of plastic"; it should rather read "layer of thermoplastic plastic" (see e.g. the introductory sentence of the description).

### 2.2 Claim 16:

The feature that the fibres are anchored in the top layer.

2.3 Claim 17:

The feature that the fibres are selected from the group (of synthetic fibres, natural fibres, metal fibres) and combinations thereof.

2.4 Claim 24:

The feature that the sheet material is provided with a decorative layer in or under the finishing layer.

2.5 Claim 27:

The feature "top layer of the resin".

2.6 Claim 28:

The feature that the finishing layer has a brickwork or roof tile structure.

2.7 Claim 29:

The feature that the sheet material has "incorporated therein" water resistant gypsum board (according to the description (especially page 3, lines 20 to 24) it is the substrate which may be a gypsum board).

2.8 Claim 32:

The feature (which distinguishes this claim from Claim 32 [should read "Claim 31"]) "for the manufacture of construction material"; it anyway appears that this claim is redundant.

**3. Other deficiencies**

3.1 Claim 1, penultimate line: it should read "from the substrate side of the layer ...".

3.2 Claim 5:

This Claim should be dependent on Claims 2 to 4 only.

3.3 Claim 7:

This claim is unclear, since the statement "the fibres comprise a fibres layer" is linguistically obscure and also lacks support.

3.4 Claim 17:

The repetition of the term "synthetic fibres" (lines 5 to 6) should be avoided.

3.5 Claim 27:

The statement "resulting in a strong, scratch-resistant and decorative top" is superfluous.

3.6 Claim 31:

The words "and the like" are unclear and should be deleted.

4. Any comments and/or amended claims shall be submitted one month prior to the oral proceedings, at the latest."

VI. With its letter dated 25 August 2003 the Appellant informed the Board that it would not attend the oral proceedings to which it had been summoned. No comments have been received from the Appellant by the Board with regard to the above-quoted communication of the Rapporteur.

VII. At the oral proceedings held on 25 September 2003 in the Appellant's absence the appeal was dismissed.

VIII. The Appellant requested that the decision under appeal be set aside and a patent be granted on the basis of Claims 1 to 32 filed with the submission dated 6 March 2003.

### **Reasons for the Decision**

1. The appeal is admissible.

2. *Amendments (Article 123(2) EPC)*

For the reasons listed in the Annex to the summons to attend oral proceedings (cf. section V supra, paragraph 2) the set of operative claims contravenes the requirements of this article.

3. *Novelty*

Although the independent Claims 1 and 16 belong to different categories (method/product) the subject-matter of both claims comprises the features that fibres which are anchored in the surface of the substrate or plastic layer partly project (protrude) therefrom and are thus engaging with the bonding agent interposed between the substrate and the plastic layer(s).

Conclusions concerning the issue of novelty which are based on differences with regard to these features are thus equally valid for both claims.

The same applies *a fortiori* to the further independent Claims 31 and 32 which relate to uses of the sheet material according to Claim 16.

3.1 Document D1

Claim 1 of this document relates to a method for adhering a coating material to a densified random-fiber composite sheet comprising the steps of applying heat to a surface of the sheet to form an activated surface in which the fibers of the sheet project outwardly from a plane defined by that surface, and applying a coating material to said activated surface whereby said coating material physically interacts with said projecting fibers to adhere thereto.

Differently from the method according to present Claim 1 which requires that loose fibres are anchored to a surface of the material (substrate), the composite sheet of D1 comprises a mixture of a heat fusible resin and reinforcing fibers distributed therein.

3.2 Document D2

Claim 1 of this document relates to a method of mechanically bonding together thermoplastic and thermosetting materials which comprises the steps of (a) introducing fibrous material into a thermoplastic moulding during the stage of its production so that a part only of the fibre becomes embedded in or adherent to the moulding and a part is protruding free from the same, and (b) coating the exposed fibrous material with the selected thermosetting material so that the latter bonds to the fibres.

The subject-matter of present Claim 1 is *inter alia* different from this disclosure by the use of a bonding agent between the fibre containing bonding surface of the moulding and the coating layer.

### 3.3 Document D3

Claim 1 of this document relates to a method for bonding a cured glass fibre reinforced plastic panel to other materials comprising the steps of burning away the surface layer of plastic from the surface of the plastic panel to be joined, said burning step exposing glass fibres which adhere well to the adhesives, applying a layer of an adhesive to the exposed glass fibres, pressing said other material on top of said adhesive layer, and curing said adhesive layer.

Present Claim 1 is distinguished from this disclosure by the separate step of anchoring the fibres on the surface of the substrate.

### 3.4 Document D4

Claim 1 of this document relates to a composite structure comprising:

- a. a bismaleimide resin impregnated cloth;
- b. a cellular honeycomb core structure selected from the group of polyamide paper and bismaleimide-glass fabric wherein said cells contain carbon microballoons;
- and
- c. a bismaleimide adhesive bonding said impregnated cloth to said core structure.



Differently from the method according to present Claim 1 the method of preparation of these composites does not provide fibres which protrude from the substrate's surface.

As opposed to the structures of present Claim 16 the honeycomb material containing core of this document does not comprise top layers to which the outer layers of plastic are bonded.

### 3.5 Document D5

Claim 1 of this document relates to a sandwich panel comprising a core layer firmly bonded on opposite sides to thermoset polyurethane resin sheet material reinforced with cohesive natural-fibre material, said panel being obtained by combining two of said impregnated sheets with the core layer and thermosetting the resulting laminate. According to Claim 3 the core may be a honeycomb structure.

As compared to present Claim 1 the laminates of D5 do not comprise sheet material with protruding fibres.

### 3.6 Document D6

Claim 1 of this document relates to a table-top consisting of a sandwich structure comprising two fibre-reinforced plastic surface layers and a filler panel, comprising fibre board (Claim 2) and honeycomb structures (page 3, second paragraph).

Again these laminates do not comprise sheets having protruding fibres.

3.7 The subject-matter of the independent claims is thus novel over the cited prior art.

4. *Problem and solution*

The problem underlying the claimed invention is the provision of a sheet material having "a sufficient bond between various materials" (cf. page 2, lines 17 to 18).

The solution to this problem offered by the claimed invention essentially comprises two aspects:

(i) the provision of fibres protruding from the surface of one of the materials constituting the sheet material, and

(ii) the bonding of this fibre-carrying surface to another material by means of an interposed bonding agent (cf. Claim 1; section V supra, paragraph 1 of the Rapporteur's comments).

The Board is satisfied that this technical solution effectively solves the afore-mentioned problem.

5. *Obviousness*

5.1 As set out in paragraphs 1.3 and 1.4 of the Rapporteur's comments (section V supra) document D2 discloses aspect (i) and document D3 discloses aspect (ii) of the afore-mentioned technical solution. Both

these documents are equally relevant and either of them is an appropriate starting point for the solution of the existing technical problem.

- 5.2 In the Board's judgment, it is obvious to the skilled person confronted with the problem of providing a good bond between various materials to combine the teachings of D2 and D3, i.e. to use a bonding agent (as according to D3) between a substrate from whose surface protrude partly embedded fibres (as according to D2) and a layer to be attached to the fibre-carrying surface (as according to D3).

With respect to the solution of the existing technical problem by the combination of these aspects the manner of providing the fibre-carrying surface - by partial embedding of fibres (as according to D2) or by partial exposure (by burning away of the matrix) of already embedded fibres (as according to D3), is of no relevance.

- 5.3 Therefore the subject-matter of Claim 1 does not involve an inventive step.
- 5.4 The same conclusion applies to the subject-matter of independent Claim 16 because the nature of the substrate - there a topped honeycomb material - plays no role for the solution of the existing technical problem. The use for laminates of honeycomb materials as such can also not contribute an inventive step because laminates comprising honeycomb materials are well-known in the art (cf. paragraph 1.7 to 1.9 of the comments of the Rapporteur, section V supra).

6. In the circumstances, the subject-matter of Claims 31 and 32 must also be considered as obvious because the specified uses are conventional and do not therefore contribute an inventive step.

## **Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:

E. Görgmaier

R. Young