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Datasheet for the decision of 8 February 2013

Case Number: T 0717/11 - 3.3.09

Application Number: 03705502.7

Publication Number: 1474287

IPC: B32B 3/10, B32B 15/14

Language of the proceedings: EN

Title of invention:
Laminated panel with discontinuous internal layer

Applicant:
Fokker Aerostructures B.V.

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 82, 84, 123(2)

Keyword:
"Main request: amendments not according to Article 123(2) EPC"
"Auxiliary request: fulfils the requirements of the EPC"

Decisions cited:
-

Catchword:
-

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Case Number: T 0717/11 - 3.3.09

D E C I S I O N
of the Technical Board of Appeal 3.3.09
of 8 February 2013

Appellant: (Applicant)
Fokker Aerostructures B.V.
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Representative:
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Decision under appeal:
Decision of the Examining Division of the European Patent Office posted 19 October 2010 refusing European patent application No. 03705502.7 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: W. Sieber
Members: N. Perakis
R. Menapace

Summary of Facts and Submissions

I. European patent application No. 03705502.7, filed in the name of Stork Fokker AESP B.V. (now Fokker Aerostructures B.V.) and published as WO 03/068494, was refused by decision of the examining division issued on 19 October 2010.

II. The decision was based on claim 1 filed by letter dated 27 December 2006 and claims 2 to 11 as published. The examining division considered that the claimed subject-matter lacked novelty and inventive step in view of the disclosure of document

D1: US-A-6 114 050.

III. On 23 December 2010 the applicant (hereinafter: the appellant) lodged an appeal against the decision of the examining division and paid the appeal fee on the same day.

The statement setting out the grounds of appeal was received on 1 February 2011. It contained a new set of claims (claims 1-10) as well as arguments regarding the basis for the amendments and regarding the novelty and inventive step of the claimed subject-matter in view of D1. The appellant also provided arguments in view of document D2 cited in the search report and referred to during the procedure before the examining division:

D2: WO-A-98/53989.

IV. In a official communication dated 21 December 2012 the board expressed its provisional non-binding opinion,

raising objections regarding clarity of the claimed subject-matter and novelty in view of D2.

V. With a letter dated 29 January 2013 the appellant filed a new main and three auxiliary requests (three sets of claims each accompanied by an adapted description and figures) and argued in favour of their patentability. It also filed a new document:

D3: "Fibre Metal Laminates", Vlot *et al.*, Kluwer Academic Publishers, 2001, pages v, vi, 23-37.

Claim 1 of the main request reads as follows:

"1. Laminate, comprising at least two different series (1, 2) of metal layers (3, 4) and sets (5, 10) of fiber-reinforced plastic layers (6, 9), wherein the metal layers (3, 4) of each pair of adjacent metal layers of each series are attached to one another through a set (5, 10) of fiber-reinforced layers (6-9), and a transition (12) between these series (1, 2), wherein the outer layers of each series are metal layers (3) and at the location of the transition (12) at least one of the fiber-reinforced layers (6-9) of a set (5, 10) of fiber-reinforced plastic layers (6-9) is discontinuous and all other layers (3, 6-8) are continuous, and, characterized in that said set (5, 10) of which at least one of the fiber-reinforced layers (6-9) is discontinuous comprises a continuous fiber-reinforced plastic layer (6-8).

VI. Oral proceedings were held before the board on 8 February 2013. During these proceedings the appellant withdrew the previously filed auxiliary requests and

submitted a new auxiliary request (claims 1 and 2, description pages 1-5, drawing sheet 1/1). Claims 1 and 2 read as follows:

"1. Laminate, comprising at least two different series (1,2) of metal layers (3) and fiber-reinforced plastic layers (6,7,9) which are attached to one another, and a transition (12) between these series, wherein the outer layers of each series are metal layers (3) and at the location of the transition (12) at least one of the internal fiber-reinforced plastic layers (9) is discontinuous and all other layers (3,6,7) are continuous, characterized in that there are four metal layers (3), between each of which a set (10) of two plastic layers (6,7) extends in one series, while in another series (2) there are discontinuous plastic layers (9), so as to form sets (5) comprising three plastic layers (6,7,9) in said other series (2)."

"2. Laminate comprising a first series (1) and a second series (2) of metal layers (3,4) and fiber-reinforced plastic layers (6-9) which are attached to one another, and a transition (12) between these series
wherein the first series (1) comprises three metal layers (3) which are continued into the second series (2),
wherein this second series (2) includes a discontinuous metal layer (4), which does not continue into the first series (1),
wherein in the first series (1), two sets (5) each comprising three fiber-reinforced plastic layers (6-8) are accommodated between the three metal layers (3),
wherein the top plastic layer (8) of the top set (5) runs over the top of the discontinuous metal layer (4),

while the other two plastic layers (6,7) of the top set (5) run underneath the discontinuous metal layer (4), wherein a discontinuous fiber-reinforced plastic layer (9) starts at a certain distance from the edge of the discontinuous metal layer (4), in such a manner that the region between the top continuous metal layer (3) and the discontinuous metal layer (4) is substantially filled by a set (10) comprising two plastic layers (8,9),
wherein between the discontinuous metal layer (4) and the continuous metal layer (3) located directly below it there is a set (10) of two-fiber reinforced plastic layers (6,7), both of which are continuous,
wherein the bottom two continuous metal layers (3) in the second series (2) enclose a set (10) of two continuous plastic layers (6,7),
wherein the top plastic layer (9) which, in the first series (1), together with these plastic layers (6,7) form the bottom set (5), is discontinuous and does not carry on into the second series (2),
wherein these layers are attached to one another by means of a bonding agent, some bonding agent being in the transitions defined between the discontinuous layers (4,9)."

VII. Regarding the main request, the appellant argued that the subject-matter of claim 1 fulfilled the requirements of Article 123(2) EPC in view of the application as filed (description and figures). Regarding the auxiliary request, it argued that the claimed subject-matter fulfilled the requirements of the EPC.

VIII. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of claims 1-10 filed as main request on 29 January 2013, or on the basis of the auxiliary request with claims 1 and 2, description pages 1-5, and drawing sheet 1/1, all filed during the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. Amendments under Article 123(2) EPC

2.1 Not withstanding the concerns of the board regarding the basis of the claimed features "at least one of the fiber-reinforced layers (6-9) of a set (5,10) of fiber-reinforced plastic layer" and "and all the other layers (3, 6-8) are continuous" in the application as filed, the fundamental problem under Article 123(2) EPC concerns the feature of the characterising part of claim 1, namely "said set (5,10) of which at least one of the fiber-reinforced layers (6-9) is discontinuous comprises a continuous fiber-reinforced plastic layer (6-8)".

2.2 The appellant did not dispute that there was no explicit disclosure of this feature in the application as filed. The appellant argued that the skilled person would derive this feature from various passages of the application as filed.

2.2.1 Thus, it referred to the description, page 1, lines 24-31, which discloses that the laminates Glare®3 and Glare®4, with respectively two and three plastic layers per set of fibre-reinforced plastic layers, belong to the state of the art. According to the appellant, the skilled reader would directly and unambiguously derive from this passage that the claimed laminates comprise multilayered sets of fibre-reinforced plastic layers.

2.2.2 The appellant also referred to page 2, lines 13-14, which discloses that "at least one of the sets of fiber-reinforced plastic layers may include a discontinuous plastic layer" and argued that it was obvious to the skilled person that if one of the plastic layers of the multilayer plastic set was discontinuous, the remaining layers of the set would necessarily be continuous.

2.2.3 Lastly, the appellant referred to the figures. Since most of the figures, namely figures 1-3, 6 and 7, disclosed laminates having the feature of the characterising part of claim 1, they provided the required basis in the original disclosure. Thus the claimed subject-matter complied with Article 123(2) EPC.

2.3 However, the board is not convinced by the arguments of the appellant.

2.3.1 Firstly, regarding the disclosure on page 1, lines 24-31, the board considers that it relates to the state of the art and would not necessarily be understood by the skilled reader as directly and unambiguously applying to the definition of the claimed invention.

2.3.2 Secondly, regarding the disclosure on page 2, lines 13-14, this disclosure relates to the last sentence of a paragraph (lines 9-14) which reads as follows:

"The laminate according to the invention can be designed in numerous different ways. **For example**, there may be in each case one set of at least two fiber-reinforced plastic layers between two adjacent metal layers, in which case the set is split at the end of a discontinuous metal layer, in such a manner that its plastic layers are located on either side of the discontinuous metal layer. **Furthermore**, at least one of the sets of fiber-reinforced plastic layers may include a discontinuous plastic layer".[emphasis added]

The second sentence of this paragraph starting with "For example" describes a specific embodiment with a split end. However, the immediately following sentence relied upon by the appellant still relates to this specific embodiment as can be inferred from the word "Furthermore". Thus, the last sentence cannot be taken out of its original context and generalised as argued by the appellant.

2.3.3 Lastly, the feature of the characterising part of claim 1 is also not directly and unambiguously derivable from the figures. On the one hand, there are figures which do not disclose this feature, namely figures 4 and 5, so that the skilled person would not derive from the figures that this feature generally applies to the claimed invention. On the other hand, the figures showing the relevant feature concern specific laminates which are much more specific than the laminate described in claim 1. Therefore the

extraction of the claimed feature from the specific figures corresponds to an intermediate generalisation which is contrary to the requirements of Article 123(2) EPC.

2.4 Under these circumstances the subject-matter of claim 1 of the main request does not meet the requirements of Article 123(2) EPC with the consequence that this request is not allowable.

Auxiliary request

3. Amendments under Article 123(2) EPC

The subject-matter of claim 1 is based on the combination of the subject-matter of claims 1, 8 and 9 as filed and consequently meets the requirements of Article 123(2) EPC.

The subject-matter of claim 2 corresponds to the disclosure of page 3, lines 4-25. Therefore it also meets the requirements of Article 123(2) EPC.

4. Clarity under Article 84 EPC

The board is satisfied that the subject-matter of both claims is clear and supported by the description. It therefore meets the requirements of Article 84 EPC.

5. Unity under Article 82 EPC

The subject-matter of both claims 1 and 2 is linked so as to form a single general inventive concept. Both claims relate to laminates wherein at the location of

the transition at least one of the fibre-reinforced plastic layers of a set of such plastic layers is discontinuous and all other plastic layers of this set are continuous.

This corresponds to the "special technical feature" required by Rule 44 EPC, i.e. the feature which defines the contribution which each of these laminates makes over the prior art. The board is therefore satisfied that the auxiliary request fulfils the requirements of Article 82 EPC.

6. Novelty

6.1 None of the cited documents discloses the laminates of claims 1 and 2.

6.2 D1 (figure 5; column 13, lines 7-24) discloses a laminate which provides some kind of transition in the edge region of the laminate. D1 uses metal foils interleaved between every pair of adjacent fibre-reinforced plastic layers in order to achieve a proper force transfer from the bolt which traverses the metal foils and the fibre-reinforced plastic layers. D1 does not disclose, directly or indirectly, discontinued fibre-reinforced layers as set out in claims 1 and 2 of the auxiliary request.

6.3 The laminates of claims 1 and 2 are novel also over D2. Figure 3 and the corresponding part of the description (page 4, lines 2-13) merely show a ply-drop-off, whereas claims 1 and 2 require that the set of plastic layers containing a discontinuous plastic layer necessarily comprises a continuous plastic layer.

6.4 Finally the subject-matter of claims 1 and 2 is novel over D3, in particular figure 2.5 on page 29. This figure discloses a laminate called "interlaminar doubler" with two different series of metal layers and fibre-reinforced plastic layers and a transition between them, which is thus similar to the laminate structures of claims 1 and 2 of the auxiliary request. However, laminate structures as required in claims 1 and 2 are disclosed neither in the text of D3 nor in figure 2.5 itself:

- paragraph 2.2.2 merely makes reference to Glare laminates as used in the "Self-Forming Technique";
- table 2.1 discloses an overview of different types of laminates; and
- figure 2.5 (interlaminar doubler) shows that the middle fibre-reinforced layer of the series on the left is completely discontinued, as is clear from the "adhesive" filling at the location of the transition between the series, while the top and bottom plastic layers are continuous from one series to the other.

Therefore no disclosure, direct or indirect, can be found in D3 of sets of plastic layers containing a discontinuous plastic layer and a continuous plastic layer as required by claims 1 and 2 of the auxiliary request.

7. Inventive step

7.1 The closest state of the art

7.1.1 The board concurs with the appellant that D3 represents the closest state of the art. The laminate structure disclosed in figure 2.5 (interlaminar doubler) of D3, which involves two different series of metal and plastic layers with a transition between them and with a discontinuous internal plastic layer and a discontinuous internal metal layer, is closer to the laminate structures of claims 1 and 2 (see figures 1 and 2 of the patent application) than the laminate structure of figure 3 of D2, which discloses a laminate with a ply-drop-off.

7.1.2 The laminates of claims 1 and 2 differ from those of D3 in that they require the presence of a discontinuous plastic layer and a continuous plastic layer in at least one set of plastic layers.

7.2 The technical problem

7.2.1 The present application (page 1, lines 18-33) discloses that its aim is the provision of a laminate with a smooth transition between different series of metal and plastic layers in order to avoid stress concentrations and undesirable aerodynamic effects already observed in the prior art which uses seams or splices in order to join such series (panels).

7.2.2 The application acknowledges that various types of laminate are commonly employed in different zones of an aircraft fuselage part or wing part, depending on the

load levels (page 1, lines 26-28). In practice, each zone is composed of a panel which comprises a single type of laminate, in such a way that several of these panels have to be assembled so as to obtain the fuselage part or wing part. Such assembly however has the disadvantage that a splice or doubler is present between the assembled panels. This has disadvantages in terms of aerodynamics, strength and stiffness (page 1, lines 24-25).

7.2.3 During the oral proceedings the appellant explained that the technical problem in view of D3 was to provide laminates with a structure which allowed an improved transition between series of different composition. This improvement was reflected in the mechanical properties (tensile strength, shear strength) which were smoothly changed from one series to another and provided a qualitative difference over the laminates of D3. This smooth change was made possible by using at least one set of plastic layers with a discontinuous plastic layer which modified the thickness of the laminate at the region of the transition and with continuous plastic layers extending to the other series of the laminate where they had an impact on its mechanical properties due to the presence of embedded fibers in these continuous plastic layers.

7.2.4 The influence of the embedded fibres on the mechanical properties of a plastic layer is illustrated in D3, table 2.1, which discloses that, by modifying the orientation of the fibre properties such as fatigue, strength, impact resistance can be monitored. The board is therefore convinced that the skilled person would not have any doubt in view of his technical background

knowledge that the technical problem as defined by the appellant is solved by the features as defined in claims 1 and 2.

7.3 The question of obviousness

7.3.1 The skilled person starting from the laminate of D3, figure 2.5, and looking for a laminate with an improved, smooth transition between two different series of metal layers and fibre-reinforced plastic layers would not find any hint in the state of the art (unless using hindsight) towards the claimed laminates which require that, at the region of the transition, sets of fibre-reinforced plastic layers be present between adjacent metal layers, wherein at least one of the fibre-reinforced plastic layers of a set is discontinuous and all other plastic layers of this set are continuous.

7.3.2 D3 does not give any hint towards the solution of the technical problem since it seeks essentially to avoid delamination (page 28, middle paragraph) and uses an additional metal sheet to achieve it.

7.3.3 D2 is also not relevant since it discloses a gradual change in thickness (page 4, lines 12-13) using a ply-drop-off.

7.3.4 D1 (figure 5; column 13, lines 7-19) aims to provide a proper force transfer from the bolt which transverses the metal foils and the fibre-reinforced layers. This is achieved by adding a titanium foil corresponding to a discontinuous metal layer according to the claimed subject-matter. As all plastic layers of D1 are

continuous, this document is not relevant for the solution of the technical problem.

7.4 Thus the laminates of claims 1 and 2 are not obvious from the cited prior art.

8. On the basis of the above considerations the board comes to the conclusion that the claims of the auxiliary request fulfil the requirements of the EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the examining division with the order to grant a patent on the basis of the following documents, all filed during the oral proceedings of 8 February 2013:

- claims 1 and 2 (auxiliary request)
- description pages 1-5
- drawings sheet 1/1.

The Registrar: The Chairman:

M. Cañueto Carbajo W. Sieber