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**Datasheet for the decision  
of 3 April 2019**

**Case Number:** T 0828/15 - 3.2.05

**Application Number:** 06769909.0

**Publication Number:** 1899146

**IPC:** B29C70/34

**Language of the proceedings:** EN

**Title of invention:**

Method of manufacturing curved composite structural elements

**Patent Proprietor:**

The Boeing Company

**Opponent:**

Premium AEROTEC GmbH

**Relevant legal provisions:**

EPC Art. 123(2)

**Keyword:**

Amendments - added subject-matter (yes)



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Case Number: T 0828/15 - 3.2.05

**D E C I S I O N**  
**of Technical Board of Appeal 3.2.05**  
**of 3 April 2019**

**Appellant:** Premium AEROTEC GmbH  
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**Decision under appeal:** **Interlocutory decision of the Opposition  
Division of the European Patent Office posted on  
9 February 2015 concerning maintenance of the  
European Patent No. 1899146 in amended form.**

**Composition of the Board:**

**Chairman** M. Poock  
**Members:** S. Bridge  
D. Rogers

## **Summary of Facts and Submissions**

- I. The appeal was lodged against the interlocutory decision of the opposition division that the European patent No. 1 899 146 as amended according to the main request meets the requirements of the EPC.
- II. The opposition was filed against the patent as a whole based on article 100(a) EPC 1973 (lack of novelty, article 54 EPC 1973, and lack of inventive step, article 56 EPC 1973) and article 100(c) EPC (added subject-matter extends beyond the content of the application as filed, article 123(2) EPC).
- III. Oral proceedings were held before the board of appeal on 3 April 2019.
- IV. The requests of the appellant (opponent) were to set aside the decision under appeal and to revoke the patent.
- V. The requests of the respondent (patent proprietor) were, as a main request, to dismiss the appeal, or alternatively to set aside the decision under appeal and to maintain the patent upon the basis of one of the first to fifth auxiliary requests, all filed under cover of a letter dated 28 February 2019.
- VI. Claim 1 of the main request reads as follows:

"A method of manufacturing a composite curved structural element (102), comprising the steps of:  
laying up (906) a curved composite web ply (310) including a composite material on a manufacturing tool (200), the manufacturing tool including a curved

surface (202) in the shape of a planar arc, wherein the composite material has a plurality of fibers; and

curing the web ply, the method being characterised in that:

the fibers are provided in the form of pre-impregnated, contiguously adjoined strips (304) of a composite material that are collimated and placed on the curved surface in a planar arc,

wherein all of the fibers of the composite material have a general unidirectional fiber orientation, the fiber orientation of the web ply being substantially aligned with a longitudinal centerline of the curved surface."

VII. Claim 1 according to the first auxiliary request differs from claim 1 of the main request in that the following additional feature is introduced before *"wherein all of the fibers ..."*:

*"the strips of composite material comprising slit tape"*.

VIII. Claim 1 according to the second auxiliary request differs from claim 1 of the main request in that the following text is introduced after *"on a manufacturing tool (200)"*:

*"using a fiber placement machine"*,

and the following passage is introduced before *"wherein all of the fibers ..."*:

*"by the fiber placement machine, the strips comprising prepreg tow, wherein the fiber placement machine dispenses multiple tows to a movable payoff head that collimates the tows and applies the tows to the curved surface (202) of the manufacturing tool (200) using one or more compaction rollers that compress the tows against the curved surface (202) of the manufacturing tool (200)"*.

IX. Claim 1 according to the third auxiliary request differs from claim 1 of the main request in that the following additional feature is introduced at the end of the claim:

*"the method further comprising the step of laying up (908) a cap ply (402, 404) including a composite tape on a cap surface (204, 206) of the manufacturing tool (200) that intersects the curved surface (202) forming a corner between the cap surface (204, 206) and the curved surface (202), wherein the composite tape comprises a plurality of tape fibers including a general tape fiber orientation, and the tape fiber orientation is substantially aligned with a longitudinal centreline of the cap surface, and a splice (406, 408) is formed along the corner where the cap ply (402, 404) meets the web ply (310)".*

X. Claim 1 according to the fourth auxiliary request differs from claim 1 of the main request in that it includes the amendments of both the first and third auxiliary requests.

XI. Claim 1 according to the fifth auxiliary request differs from claim 1 of the main request in that it includes the amendments of both the second and third auxiliary requests.

XII. The arguments of the appellant in the written and oral proceedings can be summarised as follows:

The term "all of the fibres ..." of claim 1 adds subject-matter which was not originally disclosed, because there is no discussion of *all fibres* anywhere in the application as filed.

The passage page 2, lines 14 to 20 relates to the subject-matter of originally filed claim 1 and not to that of originally filed claim 6, the latter being the basis for present claim 1 (main request). The subject-matter of claim 6 as filed is disclosed in the next passage (page 2, lines 21 to 27) and relates to "*another aspect of the present invention*" (page 2, line 21) so that the text relating to the subject-matter of claim 1 as filed cannot be used as basis for amending the subject-matter of claim 6 as filed. Figure 9 confirms that these are different steps: step 902 for fibre placement (originally filed claim 1) and step 906 for the web ply (originally file claim 6, now claim 1 of the main request).

In particular, the passage page 2, lines 17 to 19 does not exclude the composite material from including other pluralities of fibres each having a different general fibre orientation, such as, for example, diagonal plies of figure 5 or cross plies of figure 6.

Therefore, claim 1 adds subject-matter which was not originally disclosed.

XIII. The arguments of the respondent in the written and oral proceedings can be summarised as follows:

In claim 1, the "*composite material*" is that of the web ply, or in other words, the ply or layer. The contested feature of claim 1 (main request) specifies that all of the fibres of the composite material (laid up as the web ply) have a unidirectional fibre orientation. Here the limitation of "*all of the fibres*" continues to apply to the web ply. This is further emphasised by the next feature of claim 1, where reference is again made

to the web ply. The use of the word "all" in the statement "*all of the fibres of the composite material have a general unidirectional fibre orientation*" emphasises that all of the fibres are required to be aligned in the same direction. However, it does not add to the meaning because the use of the term "*unidirectional*" would be meaningless if only applied to some of the fibres in the composite. The skilled person would expect that a unidirectional requirement would, in practice, mean there would be some finite distribution of orientations of the fibres and not a precise alignment for every single fibre. Hence, the term "*unidirectional*" does not rule out small variations in fibre orientation and the fibres could be said to have a general alignment or general orientation. Therefore, the skilled person would understand the terms "*unidirectional*" and "*general fibre orientation*" to have the same meaning.

The two embodiments (respectively page 2, lines 14 to 20 and page 2, lines 21 to 29) are not mutually exclusive, because the term "*ply*" is only a general term for a layer.

The second part of the sentence page 2, lines 17 to 19 refers to "*each of the strips*" of the plurality of fibres having a general fibre orientation: This thus provides a basis for "*all fibres*".

The second part of the sentence page 2, lines 21 to 29 refers to "*the fibre orientation of the web lay*" of the plurality of fibres including a general fibre orientation: This again provides a basis for "*all fibres*".

Therefore, claim 1 does not add subject-matter which was not originally disclosed.

## Reasons for the Decision

1. *Objection of added subject-matter - article 100(c) EPC*
- 1.1 In claim 1 of the main request the amendment according to which "all of the fibers of the composite material have a general unidirectional fiber orientation, ..." (underlining added by the board) was contentious between the parties.
- 1.2 The board could not find a basis for this amendment in the application documents as filed.
  - 1.2.1 Claim 6 as filed only required that "*the composite material comprises a plurality of fibers including a general fiber orientation, ...*" and thus does not provide a basis for the feature that "all of the fibers of the composite material have a general unidirectional fiber orientation, ..." (underlining added by the board).
  - 1.2.2 The summary of the invention as filed discloses that the composite material can include/comprise a plurality of fibers having/including a general fiber orientation (page 2, lines 17 to 19 - relating to the process of placing of strips to form a ply - and page 2, lines 24 to 27 - relating to a curved composite web ply). The sentence page 2, lines 17 to 19 continues: "*and the fiber orientation of each of the strips can be substantially aligned along the full length of the planar arc*". The sentence page 2, lines 24 to 27 continues: "*and the fiber orientation of the web lay can be substantially aligned with a longitudinal centerline of the curved surface*".



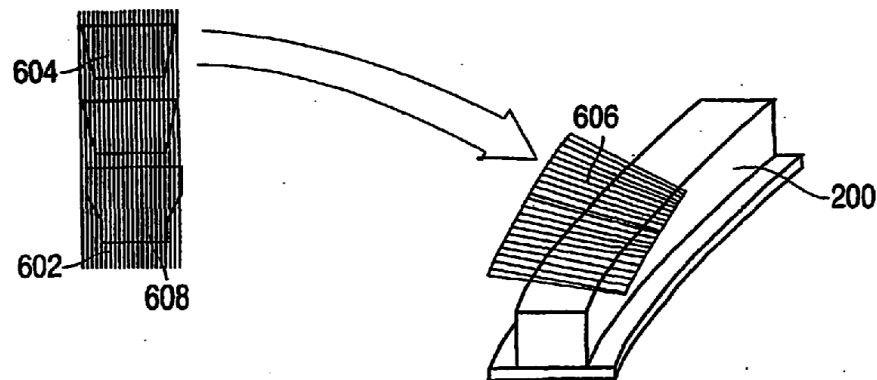
The respondent referred to the final parts of these sentences as providing a basis for the expression "*all of the fibres*" as though they were making an independent general statement on their own. However, the final parts of these sentences cannot be separated from the first part which already limited the domain of discourse to "*a plurality of fibers*". Thus the reference to "*each of the strips*" (page 2, lines 17 to 19) or to "*the web lay*" (page 2, lines 24 to 27) remains within the bounds of "*plurality of fibers*" as set out above and thus does not provide a basis for the feature that "all *of the fibers of the composite material have a general unidirectional fiber orientation, ...*".

In particular, the board considers that the statement the composite material can include/comprise a plurality of fibres having/including a general fibre orientation does not exclude the composite material from including further pluralities of fibres each having different general fibre orientations. "*A plurality of fibres having a general fibre orientation*" is thus not the same as the requirement from claim 1 that "all *of the fibres of the composite material have a general unidirectional fibre orientation*". The stricter requirement of claim 1 that all of the fibres of the composite material must have "*a general unidirectional fiber orientation, the fiber orientation of the web ply being substantially aligned with a longitudinal center-line of the curved surface*" thus constitutes added subject-matter, contrary to the requirements of article 123(2) EPC.

- 1.2.3 Contrary to the respondent's further argument, the board does not consider the term "*unidirectional*" to be

meaningless when only applied to a subset of fibres in a ply: as was also argued by the appellant, there may be several subsets of fibres, each subset comprising a plurality of fibres, the fibres in each subset being unidirectional in a different direction to that of the other subsets. Such a ply would not be such that "all of the fibres of the composite material have a general unidirectional fibre orientation, ...". The application as filed illustrates itself in figure 6 such a possibility in terms of laying up a cross ply made from trapezoidal cut outs 604 from a unidirectional tape 602 (left hand side of figure 6) for which the fibres cannot all share a general fibre orientation after being laid up as shown in the right hand side of figure 6, because of the trapezoidal shape of the adjoining cut outs 606 (application as filed, figure 6, page 11, lines 7 to 15).

**FIG. 6**



1.3 In consequence, the subject-matter of claim 1 of the main request does not meet the requirements of article 123(2) EPC.

1.4 First to fifth auxiliary requests

1.4.1 Each respective claim 1 of the first to fifth auxiliary requests comprises the contested feature:

*"wherein all of the fibers of the composite material have a general unidirectional fiber orientation, the fiber orientation of the web ply being substantially aligned with a longitudinal centerline of the curved surface".*

- 1.4.2 In consequence, the reasoning set out above in the context of the claim 1 according to the main request carries over to each respective claim 1 of the first to fifth auxiliary requests.
- 1.4.3 The respective subject-matter of claim 1 of the first to fifth auxiliary requests does not meet the requirements of article 123(2) EPC.

**Order**

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

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:



N. Schneider

M. Poock

Decision electronically authenticated