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**Datasheet for the decision
of 23 September 2022**

Case Number: T 1770/21 - 3.4.02

Application Number: 19178923.9

Publication Number: 3564184

IPC: B82Y30/00, B29C70/88,
B29C70/02, B64D45/02

Language of the proceedings: EN

Title of invention:

STRUCTURAL FIBRE-REINFORCED COMPONENT WITH LIGHTNING STRIKE
PROTECTION BY USING CARBON NANO TUBE MATS AND METALLIC LAYERS

Applicant:

Airbus Defence and Space GmbH

Headword:

Relevant legal provisions:

EPC Art. 76, 123(2), 84, 54(1), 56

Keyword:

Divisional application - subject-matter extends beyond content
of earlier application (no) - after amendment
Claims - clarity (yes)
Novelty - (yes)
Inventive step - (yes)

Decisions cited:

G 0004/19

Catchword:



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Case Number: T 1770/21 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 23 September 2022

Appellant: Airbus Defence and Space GmbH
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 12 April 2021
refusing European patent application No.
19178923.9 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman R. Bekkering
Members: A. Hornung
B. Müller

Summary of Facts and Submissions

I. The applicant appealed against the decision of the examining division refusing European patent application No. 19178923.9 on the basis of Article 97(2) EPC because the requirements of Articles 76 and 84 EPC were not fulfilled.

The present patent application is a divisional application of European patent application 16164424.0 (parent application). The examining division was of the view that the subject-matter of claim 1 then on file extended beyond the content of the earlier application as filed and that claims 1 and 7 then on file were not consistent with each other. In response to a summons to oral proceedings before the examining division, the applicant withdrew its request for holding oral proceedings and requested a decision according to the state of the file. The examining division issued a decision by merely referring to their previous communication dated 22 October 2020.

II. In its statement of grounds of appeal, the applicant requested *inter alia* that the decision under appeal be set aside and a patent be granted on the basis of the claims according to a main request, identical to the claim request underlying the appealed decision, or one of the first or second auxiliary requests filed with the statement setting out the grounds of appeal.

III. Following a telephone conversation with the board, the applicant filed a new main request with a letter dated 16 September 2022. It consists of amended claims 1 to 11 replacing previous claims 1 to 11 and amended description

pages 1 to 17 replacing previous description pages 1 to 17.

IV. The present decision refers to the following documents:

D1: US 8,800,911 B2

D2: US 2016/0031569 A1

V. Independent claim 1 according to the main request reads as follows:

"Structural component (1), in particular for an aircraft, spacecraft or rocket (10), comprising:
a ply (2) of fiber reinforced polymer;
a first carbon nano tube mat (3); and
a metallic layer (4), wherein the carbon nano tube mat (3) and the metallic layer (4) are arranged on the ply (2) of fiber reinforced polymer to form a hybrid lightning strike protection layer (5)".

Claim 7 according to the main request reads as follows:

Method for manufacturing a structural component according to any one of claims 1 to 6, comprising:
curing a matrix (8') of a component (1'), the component comprising:
a ply (2') comprising fiber material;
a metallic layer (4);
a first carbon nano tube mat (3),
wherein the first carbon nano tube mat (3) and the metallic layer (4) are arranged on the ply (2'), and
wherein at least the first carbon nano tube mat (3) is impregnated with the non-cured matrix (8'),
such that at least the first carbon nano tube mat (3) and the metallic component (4) are embedded in the cured matrix (8).

Reasons for the Decision

1. Article 76 EPC

The present European patent application does not extend beyond the content of the earlier application as filed (Article 76 EPC).

1.1 The present patent application was filed as a divisional application of the European parent application No. 16164424.0.

Claim 1

1.2 According to the appealed decision, referring to a communication annexed to a summons to oral proceedings before the examining division, point 2.1, the "subject-matter of claim 1 extends beyond the content of the earlier application as filed" for the following reason:

Claim 1 "merely comprises 'a ply of fiber reinforced polymer comprising a matrix', whereas it remains open whether the first carbon nano tube mat and the metallic layer also comprise such a matrix. The examining division could not find a passage in the description disclosing an embodiment with only the fiber reinforced polymer being impregnated" (highlight in the original). In particular, paragraph [0023] of the description of the parent application, which "is seen as the most relevant passage in this respect", "does not support claim 1 as currently on file because it is not unambiguously derivable that the product can have dry plies as included in the scope of claim 1".

- 1.3 By deleting the feature "comprising a matrix" from the feature "ply of fiber reinforced polymer comprising a matrix" of claim 1 of the main request underlying the appealed decision, the applicant overcame the objection raised by the examining division in the appealed decision. Indeed, present claim 1 is identical to claim 1 of the parent application as originally filed.

Claim 7

- 1.4 No objection under Article 76 EPC was raised in the appealed decision against the subject-matter of claim 7. The board does not see any reason to question the compliance of the subject-matter of claim 7 with the requirements of Article 76 EPC either. Indeed, claim 7 on file is based on claims 7, 8 and 11 of the parent application as originally filed.

2. Article 123(2) EPC

Present claims 1 to 11 are identical to claims 1 to 11 as originally filed. The requirement of Article 123(2) EPC is fulfilled.

3. Clarity

Contrary to the opinion expressed by the examining division in the appealed decision, the claims of the present European patent application are clear (Article 84 EPC).

- 3.1 The examining division was of the view that claims 1 and 7 were not consistent with each other, since claim 7, referring to claims 1 to 6, comprised the feature of the first carbon nano tube mat being impregnated with the non-

cured matrix, whereas the first carbon nano tube mat of claim 1 lacked such a non-cured matrix (see the communication annexed to a summons to oral proceedings before the examining division, point 3.1).

3.2 The board cannot follow the reasoning of the examining division. As explained by the applicant in the statement of grounds of appeal, page 3, point 3.1.3, "[t]he method according to independent claim 7 is suitable to manufacture a component with all the features of patent claim 1. That a component manufactured with said method may have additional features beyond those specified in patent claim 1 does not constitute a discrepancy between the subject-matters of said patent claims".

3.3 No further objection of lack of clarity was raised in the appealed decision against the remaining claims 2 to 6 and 8 to 11. The board does not see any reason to question the clarity of these claims either (Article 84 EPC).

4. Novelty and inventive step

The subject-matter of claims 1 to 11 is novel and involves an inventive step in view of the available prior art (Articles 54(1) and 56 EPC).

4.1 No objection of lack of novelty or lack of inventive step was raised in the appealed decision against the subject-matter of the claims underlying the appealed decision. On the contrary, the examining division provided reasons why the subject-matter of claims 1 to 11 seemed to be novel and to involve an inventive step (see the examining division's European search opinion dated 9 October 2019, point 2). Moreover, the parent application was granted on the basis of a claim 1 consisting of the same main features as present claim 1, namely a ply comprising fiber

material on which a metallic layer and a CNT mat are arranged.

4.2 The board does not see any reason to question novelty or inventive step of the subject-matter of claims 1 to 11 either.

4.2.1 D1 is considered to represent the closest prior art. It discloses various embodiments of lightning strike protection material.

One of the embodiments of D1 is made of a "substrate [which] includes a non-woven mat, veil or scrim containing fibers formed of a first plurality of CNTs [carbon nano tubes] (...). Optionally, a second plurality of CNTs may be grown on the substrate" (D1, column 8, lines 3 to 11). However, this embodiment does not comprise a metallic layer.

D1 discloses a further embodiment comprising "a woven or expanded metal screen as the substrate. (...) A plurality of CNTs can be grown on the substrate as described above" (D1, column 9, lines 4 to 9). The methods for growing CNTs on a substrate surface include "functionalizing the surface of the substrate by exposing the surface to an oxidizing gas, and then forming catalysts on the surface of the substrate by immersing the substrate in a catalyst solution. (...) Chemical vapor deposition can then be used to facilitate the growth of the CNTs on the surface of the substrate" (D1, column 4, line 56 to column 5, line 2). Growing a layer of CNTs as described in D1 does not provide a CNT mat as defined in claim 1.

In summary, none of the embodiments of D1 discloses a structural component to form a hybrid lightning strike

protection layer for an aircraft, the structural component comprising a combination of CNT mat and a metallic layer. According to the disclosure of D1, either a CNT mat or a metallic layer is used in combination with grown-on CNTs. Since a CNT mat and a metallic layer are known in the art as being alternative solutions for increasing electrical conductivity of the hybrid lightning strike protection layer, the skilled person has no obvious incentive to use a CNT mat and a metallic layer in combination.

4.2.2 D2 neither discloses a CNT mat nor a hint to use a CNT mat in a lightning protection layer for an aircraft. Indeed, D2, with reference to figure 1, merely discloses the use of a coating layer (140) "provided with electrically conductive elements 142. The electrically conductive elements are, for example, carbon nanotubes (CNT), which are located in a coating layer or are mixed into a coating of the fourth stratum" (D2, [0053]).

4.2.3 Therefore, the subject-matter of claim 1 and of claims 2 to 11, depending on or referring to claim 1, involve an inventive step in view of D1 and D2.

5. Double patenting

The subject-matter of present claim 1 does not define the same subject-matter as claimed in the parent application.

5.1 During examination proceedings, the examining division objected that claim 1 then on file claimed the same subject-matter as claims 1 to 3 of the granted parent application (see examining division's communication dated 31 March 2020, point 2). Even though present claim 1 has been amended with respect to claim 1 then on file by deleting the wording "comprising a matrix" from the feature of claim 1 reading "a ply (2) of fiber reinforced

polymer comprising a matrix", the board examined whether present claim 1 fulfilled the requirement that a patent application should not claim the same subject-matter as a European patent which has been granted to the same applicant (G4/19).

- 5.2 Present claim 1 defines different subject-matter than the subject-matter defined in the granted claims of the parent application for the following reasons:

On the one hand, the ply defined in present claim 1 is a "ply of fiber reinforced polymer", whereas granted claims 1 to 3 of the parent application define merely a "ply comprising fiber material". In other words, in granted claims 1 to 3 of the parent application the composition of the ply comprising fiber materials is left open, in particular, whether it comprises fiber reinforced polymer or not.

On the other hand, present claim 1 leaves open whether the CNT mat is impregnated with a non-cured matrix which becomes a cured matrix after curing, as defined in granted claims 2 and 3 of the parent application, respectively.

6. It follows that claims 1 to 11 of the present main request meet the requirements of the EPC and that a patent can be granted on the basis thereof.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to grant a patent on the basis of the following documents:

- Claims 1 to 11 of the main request as filed with the letter dated 16 September 2022,
- Description pages 1 to 17 as filed with the letter dated 16 September 2022,
- Drawing sheets 1/4 to 4/4 as originally filed.

The Registrar:

The Chairman:



L. Gabor

R. Bekkering

Decision electronically authenticated