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Datasheet for the decision of 24 July 2019

Case Number: T 1041/16 - 3.2.01

Application Number: 06836474.4

Publication Number: 1968850

IPC: B64C1/00, B29C70/44

Language of the proceedings: EN

Title of invention:
SINGLE PIECE FUSELAGE BARREL

Patent Proprietor:
The Boeing Company

Opponents:
1. Airbus Operations SAS/2. Airbus Operations Limited/
3. Airbus Operations GmbH/4. Airbus Operations S.L./

Headword:

Relevant legal provisions:
EPC Art. 83, 84, 123(2), 123(3), 56

This datasheet is not part of the Decision.
It can be changed at any time and without notice.

Keyword:
Sufficiency of disclosure - (yes)
Clarity of amendment to granted claim - (yes)
Amendments - added subject-matter (no) - extension of scope of protection (no)
Inventive step - (yes)

Decisions cited:
T 0271/84, T 0917/94

Catchword:

This datasheet is not part of the Decision.
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Case Number: T 1041/16 - 3.2.01

D E C I S I O N
of Technical Board of Appeal 3.2.01
of 24 July 2019

Appellants: (Opponents)	1. Airbus Operations SAS/ 2. Airbus Operations Limited/ 3. Airbus Operations GmbH/ 4. Airbus Operations S.L./ 316, Route de Bayonne/New Filton House/ Kreetslag 10/Avenida de John Lennon S/N 31060 Toulouse/Bristol/Hamburg/Getafe (FR)
Representative:	Santarelli 49, avenue des Champs-Elysées 75008 Paris (FR)
Respondent: (Patent Proprietor)	The Boeing Company 100 North Riverside Plaza Chicago, IL 60606-1596 (US)
Representative:	Witte, Weller & Partner Patentanwälte mbB Postfach 10 54 62 70047 Stuttgart (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 2 March 2016 concerning maintenance of the European Patent No. 1968850 in amended form.**

Composition of the Board:

Chairman	G. Pricolo
Members:	W. Marx
	O. Loizou

Summary of Facts and Submissions

I. The opponents (1 to 4) lodged an appeal against the decision of the opposition division maintaining European patent No. 1 968 850 in amended form.

II. In its decision the opposition division held that the amended claims filed on 26 August 2015 according to the auxiliary request 2 complied with the requirements of Article 123(2) EPC, Article 123(3) EPC and Articles 83 and 84 EPC. Moreover, it found that the subject-matter of independent claims 1 and 9 involved an inventive step in view, *inter alia*, of the following prior art:

E1: EP 1 134 069 A1;
E2: "ADVANCED TOW PLACEMENT OF COMPOSITE FUSELAGE STRUCTURE" (R. L. Anderson, C. G. Grant), Ninth DoD/NASA/FAA Conference on Fibrous Composites in Structural Design, 4-7 November, 1991, Lake Tahoe, Nevada;
E3: "Review of Damage Tolerance for Composite Sandwich Airframe Structures", DOT/FAA/AR-99/49, Federal Aviation Administration, August 1999;
E4: US 2004/0070108 A1.

III. Oral proceedings before the board took place on 24 July 2019.

The appellants (opponents) requested that the decision under appeal be set aside and the patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed.

IV. Independent claims 1 and 9 as maintained in amended form by the opposition division read as follows

(amendments with respect to granted claims are marked by strike-through for deletions and underlining for additions):

"1. An aircraft stringerless fuselage structure comprising:
an impact compliant outer skin (16) comprising an outer skin surface (22), an inner stringerless skin surface (24), and a variable skin thickness (26) for accommodating strength requirements of differing bird impact zones and structural zones, said impact compliant outer skin (16) comprising a plurality of resin impregnated skin fibers (20); and
a plurality of circumferentially orientated hat frames (28), wherein the hat frames (28) are arranged as stiffeners (18) which are circumferentially orientated relative to a fuselage barrel section (10), each of said circumferentially orientated frames (28) integrated into said inner stringerless skin structure (24), wherein the circumferential orientation of the hat frames (28) includes hat frames arranged perpendicularly to the axis of the aircraft fuselage or in circumferential orientations which are angled relative to the axis wherein intersecting stiffeners are angled relative to the axis,
characterized in that stiffener fibers (30) include ±60 degree lay-up and are not ~~aligned with, or~~ at 0 degrees and not at 90 degrees to, skin fibers (20) of the outer skin (16)."

"9. A method of forming an aircraft fuselage structure void of stringers comprising:
utilizing a fuselage lay-up tool (52) comprising an upper tool surface (58), a plurality of

circumferentially oriented stiffener grooves (56) formed into said upper tool surface (58);
laying-up a plurality of resin impregnated stiffener fibers (30) within said plurality of stiffener grooves (56) to form a plurality of stiffeners (18) wherein the stiffeners (18) are circumferentially orientated;
laying-up a plurality of resin impregnated skin fibers (20) onto said upper tool surface (58) and over said plurality of resin impregnated stiffener fibers (30) to form an impact compliant outer skin (16), said impact compliant outer skin (16) comprising an outer skin surface (22), an inner stringerless skin surface (24), and a variable skin thickness (26) for accommodating the requirements of impact zones and structural zones, said plurality of resin impregnated stiffener fibers (30) laid-up such that they are not ~~aligned with, or~~ at 0 degrees and not at 90 degrees to, said plurality of resin impregnated skin fibers (20);
curing said plurality of resin impregnated skin fibers (20) to said plurality of resin impregnated stiffener fibers (30) such that said plurality of stiffeners (18) become integrated into said inner stringerless skin surface (24), wherein the circumferential orientation of the stiffeners (28) relative to fuselage barrel section (10) includes stiffeners arranged perpendicularly to the axis of the aircraft fuselage or in circumferential orientations which are angled relative to the axis wherein intersecting stiffeners are angled relative to the axis, whereby said stiffener fibers (30) include ±60 degree lay-up."

Reasons for the Decision

1. The appeal of the opponents is admissible.

2. Amendments

2.1 Independent claims 1 and 9 of the auxiliary request 2 filed on 26 August 2015 and as maintained by the opposition division have been amended by replacing the term "*are not aligned with, or at 90 degrees to*" (used in granted claims 1 and 9) by the term "*are not at 0 degrees and not at 90 degrees to*".

The board concurs with the contested decision that the claims 1 and 9 as amended comply with the provisions of Articles 83, 84, 123(2) and (3) EPC, as set out in the following.

2.2 Article 84 EPC:

2.2.1 The appellants argued that, in view of deletion of the term "aligned" in amended claims 1 and 9, it was not clear what was represented by the values "0 degrees" and "90 degrees". For example, the values might refer to angular coordinates in a two- or three-dimensional system, or to a physical quantity other than angles. If the term "aligned with" were not needed, as found by the opposition division, this term would not have been used on page 5, lines 1-2, of the application as filed when drafting it (this passage being the only basis for the feature in question). The opposition division's reasoning was based on prior knowledge of the term "aligned with".

2.2.2 The board cannot follow the appellants' view, but finds that the opposition division's finding was correct in

that, when fibers are concerned (as explicitly recited in claims 1 and 9), which are slim and line-like entities, the angles indicated in the claims are only to be measured between the longitudinal axis of these fibers. The board notes that the appellants, when objecting to the amendments under Article 123(2) EPC (see further below), even acknowledged that the term "to" made clear that relative angles were meant.

Therefore, the board concludes that deletion of the term "aligned with" in claims 1 and 9 does not render the subject-matter of claims 1 and 9 unclear and that Article 84 EPC is complied with.

2.3 Article 83 EPC:

2.3.1 According to the appellants, the support for the amendment was the same as for the claims as granted, so the modified expression showed the same problem of insufficiency of the description as the support provided by the description (expression "*are not aligned (0 or 90 degrees) with*"). The contested patent was silent on how to put into practice stiffener fibres which were "not aligned (0 or 90 degrees) with" the skin fibres. These terms or features referred to a non-conventional concept of alignment ("at 90 degrees") which did not belong to the common general knowledge of the person skilled in the art. As regards the passages in the patent specification referred to in the contested decision (column 3, lines 49-52; column 4, lines 23-25), the appellants argued that the skin fibers and the stiffener fibers were described within their own reference system using angular coordinates. The subsequent expression "*the stiffener fibers 30 are not aligned (0 or 90 degrees) with the skin fibers 20*" did not allow to know whether relative angles between

individual fibers or angular coordinates were meant. Therefore, this expression was not sufficiently clear and complete for it to be carried out by a person skilled in the art, which also applied to the characterising portion of amended claims 1 and 9.

2.3.2 The board sees no reason to depart from the finding of the opposition division that the particular exclusion of an allegedly non-conventional definition of alignment (namely: alignment at an angle of 90 degrees between stiffener and skin fibers) merely relates to a simple, relative angle between fibers of two components which as such would not provide the skilled person with any difficulties.
Moreover, the board cannot see that the passages in the patent specification referred to by the appellants in this respect can lead to a different conclusion. Admittedly, the description first specifies the structural characteristics of the skin fibers (see column 3, lines 49-52: "*use of 0/45/90 degree laminate mixture at 20/80/0 percentage ratios*") and of the stiffener fibers (column 4, lines 23-25: "*stiffener fibers 30 are layed up as +/-60 degree laminates*") within their own reference system, i.e. the laminate structure, as known to the skilled person. However, it cannot be concluded therefrom that the following sentence which establishes in addition a relationship between stiffener and skin fibers (lines 25-26: "*In addition, the stiffener fibers 30 are not aligned (0 or 90 degrees) with the skin fibers 20*") gives rise to doubts as to what kind of angles it refers to. The skilled person reading the term "aligned with" will understand that a relationship between the orientation of two elongated objects is established, so it is clear to him that a relative angle is meant by the values of 0 or 90 degrees recited in the description.

Notwithstanding the fact that the term "aligned" is not used any more in claims 1 and 9 as amended (which specify the claimed invention), the board can therefore see no reason - even in view of the fact that this term is still present in the description - why the invention should be insufficiently disclosed.

2.4 Article 123(2) EPC - feature "*stiffener fibers (30) include ±60 degree lay up*":

2.4.1 The appellants objected to this feature being extracted but taken in isolation from claims 6 and 19 and from page 4, line 32 to page 5, line 1 of the application as filed. Allegedly, these passages described the specific property of the laminate of stiffener fibers for all stiffener fibers (as also construed by the opposition division in paragraph 4.2.4 of the contested decision), and not only for certain stiffener fibers as expressed (in the absence of an article preceding the term "stiffener fibers") in claims 1 and 9. As no other concrete example was described, the generalisation resulted in subject-matter extending beyond the content of the application as filed. In particular, the application as filed only disclosed one single embodiment describing the skin (page 4, lines 13-16) and stiffeners (page 5, lines 9-14, 18, 19, 23 and 24).

2.4.2 However, the board cannot find any indication in the passages cited by the appellant supporting that the amendment resulted in an unallowable generalisation.

All additional features mentioned in original claim 6 or 19 in conjunction with a "*+/- 60 degree layup*" of frames or a plurality of stiffeners (i.e. the 0/45/90 degree layup of the skin at 20/80/0 percent ratios; at

least one cap element, or the plurality of stiffeners comprising hat frames including at least one cap element) are mentioned independently and under a preferable context in the description as originally filed, as already found by the opposition division. The passage on page 4, lines 13-16, states that in one specific embodiment it is contemplated "*that the use of 0/45/90 degree laminate mixture at 20/80/0 percentage ratios provides the preferably structural characteristics for the skin 16*", i.e. describes only a preferable embodiment for the skin lay-up. According to page 4, lines 23-25, "*the stiffener elements 28 may include, but are not limited to, hat frames*", so the hat frames (which form part of the preamble of claim 1, but do not appear in claim 9) are characterised as merely optional features. The same applies to the characterisation of stiffener fibers as being of low modulus (page 4, line 27: "*stiffener fibers 30 (preferably low-modulus fibers)*"). These fibers are mentioned in the context of the +/- 60 degree laminates thereafter (see page 4, line 32 to page 5, line 1: "*In one embodiment, the low modulus stiffener fibers 30 are preferably layed up as +/- 60 degree laminates*"), i.e. a +/- 60 degree lay-up is again a preferable option, which in the board's view does not necessarily has to apply to all stiffener fibers. The passages cited by the appellant on page 5 of the application as filed then relate to a specific embodiment of the hat frame assembly (see page 5, line 9: "*In one embodiment of the hat frame assembly 28...*"), which optionally might include one or more cap elements (as expressed on page 5, lines 18-24: "*The hat frame assembly 28 can further include one or more cap elements ...*").

In view of this teaching in the description as originally filed, the board cannot find anything wrong

in the finding of the opposition division that the additional feature according to which "*stiffener fibers include +/- 60 degree lay up*" is not taken out of a defined context, such as a single embodiment as argued by the appellants, so it can be extracted independently without violating Article 123(2) EPC.

2.5 Article 123(2) EPC - feature "*not at 0 degrees and not at 90 degrees to*":

2.5.1 The appellants also objected to the deletion of the term "aligned with" and the use of the term "to" in this amended passage as compared to granted claims 1 and 9, arguing as follows:

On the one hand, if the author of the patent had considered the verb "align" superfluous, he would not have used it but would have used the amended expression in the first place. According to the jurisprudence of the Boards of Appeal, deletion of a feature from an independent claim was only permissible if there was a direct an unambiguous basis in the application as originally filed. Claim interpretation should not add anything new to the claimed subject-matter. In the present case, according to the board's preliminary opinion, the originally disclosed expression "*aligned (0 or 90 degrees)*" was a specific definition of what according to the patent was meant by "aligned". However, this expression described two alternatives ("not aligned at 0 degree", "not aligned at 90 degrees"), and the term "aligned" (which meant "in a line") was missing in claim 1. By removing an ambiguity the claimed subject-matter had changed. Interpretation of claim 2 which still contained the term "aligned" was also an issue.

On the other hand, the term "*to*" implied relative angles between the stiffener fibers and the skin fibers, whereas the expression "*the stiffener fibers 30 are not aligned (0 or 90 degrees) with the skin fibers 20*" (following the characterisation of stiffener fibers that were "*layed up as +/- 60 degree laminates*") left open whether relative angles or angular coordinates where meant, thereby allegedly adding an element which was not contained in the application as filed.

2.5.2 As acknowledged by the appellants, the expression as originally disclosed comprised two alternatives ("not aligned at 0 degree" and "not aligned at 90 degrees").

- In the first alternative, the term "aligned with" (which conventionally means "being in a line with", i.e. a relative angle of 0 degrees between two parts) is redundant to a relative angle of 0 degrees between stiffener and skin fibers and can be deleted in accordance with Article 123(2) EPC without changing the subject-matter claimed (see e.g. T 917/94 in this respect).
- The second alternative ("at 90 degrees") relates to a non-conventional concept of alignment, as put forward by the appellants when objecting to insufficiency of disclosure, i.e. it provides a special meaning to the term "aligned". The board cannot see that a deletion of the term "aligned" in this context, which renders the claimed subject-matter unmistakably clear, should result in an extension of the subject-matter beyond the application as filed.

The opposition division found that the wording of claims 1 and 9 as granted ("*not aligned with, or at 90 degrees to*") was somewhat ambiguous and added new subject-matter. However, having resolved the issue of ambiguity does not necessarily result in a change of

the claimed subject-matter violating Article 123(2) EPC, as argued by the appellants. In the present case, in view of the non-conventional definition or special meaning ascribed to the term "aligned with" in the application as filed, comprising relative angles of 0 and 90 degrees as explained further above, the board finds that claims 1 and 9 as amended comply with the provisions of Article 123(2) EPC. Claim 2 might still contain the term "aligned". However, interpretation of this claim which remained identical to claim 2 as granted is a matter of clarity, which cannot be objected to in opposition appeal proceedings.

The term "*to*" used to define relative angles between stiffener and skin fibers in claims 1 and 9 does not add new information as compared to the original disclosure, since the originally disclosed wording "*aligned with*" also describes a relative angle between fibers of two components (see 2.3.2 above). Therefore, the board cannot see a violation of Article 123(2) EPC in this respect either.

2.6 Article 123(3) EPC:

2.6.1 The appellants argued that, in the absence of a reference to the alignment, a limitation included in granted claims 1 and 9 had been deleted and the scope of protection had allegedly been enlarged.

2.6.2 Granted claims 1, 9 specify stiffener fibers which are "*not aligned with, or at 90 degrees to, skin fibers*". The board already finds that on a true reading of these claims the amendment made to claims 1 and 9 ("*not at 0 degrees and not at 90 degrees*") expresses exactly the same as the granted version of the claims. The board agrees with the respondent that the word "not" modifies

both "aligned with" and "at 90 degrees", which is further supported by the definition to be found in the description ("*... are not aligned (0 or 90 degrees) with ...*"). In this respect, it is also referred to the case law of the Boards of Appeal (see e.g. T 271/84, OJ EPO 1987, 405, point 2), according to which an amendment to a claim to clarify an inconsistency does not contravene Article 123(2) or Article 123(3) EPC if the amended claim has the same meaning as the unamended claim, on its true construction in the context of the specification.

However, even from a rather formalistic point of view, assuming that the word "or" in granted claims 1 and 9 separates two embodiments (see contested decision, point 2.2.5) and the wording "not..., or" in granted claims 1 and 9 is not directed to a double exclusion (as would be expressed by "neither ... nor"), the board does not see a problem under Article 123(3) EPC. Such interpretation would mean that the subject-matter as defined in the granted claims comprises a first embodiment characterised by stiffener fibers not aligned with skin fibers, and a second embodiment having stiffener fibers at 90 degrees to the skin fibers. The scope of protection defined by the first embodiment depends on the exclusion provided by the term "not aligned with", which conventionally would mean "*not at 0 degree to*", but according to a non-conventional interpretation (in view of the definition given in the description of the patent specification) means "*not at 0 degrees and not at 90 degrees*". Combining the first embodiment in its conventional interpretation (which does not exclude angles of 90 degrees) with the second embodiment (which includes angles of 90 degrees) would not change the scope of protection, i.e. the second embodiment could be deleted

without violating Article 123(3) EPC. As regards the interpretation adopted by the board in view of the non-conventional definition in the patent specification for the first embodiment (excluding angles of 0 and 90 degrees), the combination with the second embodiment results in an increase of the scope of protection conferred by the granted patent, so deletion of the second embodiment in amended claims 1 and 9 narrows down the scope of protection and cannot violate Article 123(3) EPC.

3. Inventive step (Article 56 EPC)

3.1 The subject-matter of claims 1 and 9 involves an inventive step (Article 56 EPC), irrespective of whether E1 or E4 is taken as the closest prior art.

3.2 The appellants argued that the features of the preamble of claim 1 were known from E1, including a stringerless fuselage structure. As this was contested by the respondent, the appellants also referred to E4 as alternative prior art showing the preamble of claim 1. The interpretation of the characterising features of claim 1 in the contested decision (see point 4.2.4: implying all stiffener fibers and any skin fiber; +/-60 degree lay-up applied with respect to main or major longitudinal extent of the stiffener) were allegedly not justified, as it ascribed limitations to claim 1 and the corresponding parts in claim 9 which did not form part of the claims and had no support in the description. The formulation of the technical problem consisting in improving the resistance to bird strikes was banal (in view of E2, Figure 2; E3, sentence bridging pages 7 and 8). The numerical values as specified e.g. in the characterising portion of claim 1 were only mentioned in the description (page 4,

line 32 ff; paragraph [0012] of patent specification) by way of example (not as preferable values), i.e. the exclusion of angles 0° and 90° amounted to a selection without any effect. Since paragraph [0012] of the contested patent was silent on any surprising effect, selecting these arbitrary values was simply a matter of choice for the skilled person.

Moreover, the numerical values as claimed were known from documents E2 and E3:

- E2 referred to "Hercules", a specialist in making fibers, and addressed the issues the contested patent was concerned with, namely (see Figure 2) impact energy, a concave surface and variable skin thickness. Table 1 in E2 listed fuselage components such as flat and curved stiffened panels. An example of a flat stiffened panel was shown in Figure 4 in E2, which also recited the term "stringer (ply layup)" and showed references axes at 0° (longitudinal) and 90° (in width direction). Curving the flat panel around the 0° or the 90° axis was easy and without difficulty to make to produce parts of the fuselage (such as a kneel, listed in Table 1). When curving the panel around the 90° axis, circumferential stiffeners as in the contested patent were provided, and the orientation of fibers (defined in Figure 4 with respect to the 0° axis, as known by the skilled person) had to be corrected by 90° (+/-60 corresponded to +/-30 degrees). Since the stringer ply layup did not show a +/-60 degrees ply, the +/-60 degrees fibers of the skin ply were not aligned with the stiffener fibers. Claim 1 did not require all stiffener fibers to be excluded from the orientation with respect to the skin fibers as claimed.

- E3 also addressed the issue of impact (page 8) and showed (Table 1) traditional skin layups (such as a 0/45/90 degree laminate mixture as mentioned in paragraph [0011] of the contested patent; see also claim 6) and, different therefrom, non-traditional layups (30/90/-30/0) of soft stiffener (values of 90 and 0 were not claimed). Non-traditional layups were also known from E2 for skin and stiffener fibers (see Figure 4: fiber angle +/-15).

As E2 and E3 referred to the same effect as stated in the contested patent, the skilled person would combine E1 with E2 and/or E3 and arrive at the subject-matter of claims 1 and 9.

3.3 Irrespective of whether E1 discloses a stringerless fuselage structure, it is undisputed that starting from E1 (or E4) as the closest prior art the characterising features of claim 1 and the corresponding features of method claim 9 are not disclosed in E1 (or E4). The claimed subject-matter therefore differs from E1 (or E4) at least in that

- stiffener fibers include +/-60 degree lay-up and
- are not at 0 degrees and not at 90 degrees to skin fibers of the outer skin

3.3.1 The patent specification discloses (paragraph [0012]) that non-traditional lay-up angles of stiffener fibers achieve the desired conformity during impact while retaining sufficient structural support. Moreover, a +/-60 degree lay-up excluding relative angles of 0 and 90 degrees between the stiffener fibers and the skin fibers are explicitly referred to as preferable embodiments. Since impact conformity in the context of the patent specification relates to bird impacts (see paragraphs [0006] and [0010]), the objective technical problem to be solved may be considered as improving the

resistance to bird strikes. The fact that a similar problem might be known in the prior art and therefore was "banal", as argued by the appellants, is not in itself a reason for not accepting such formulation of the problem or to deny already the presence of an inventive step. It might only give a hint that the skilled person would contemplate taking into account such prior art, but the real test for judging inventive step is whether the skilled person would arrive at the claimed solution.

3.3.2 The board cannot agree with the appellants' view that the numerical values as specified in claims 1 and 9 are mentioned in the description by way of example only and are selected without any effect. As noted by the respondent, paragraph [0011] of the contested patent recites that the use of non-traditional fiber angles in laminates is contemplated in the invention to achieve the desired strength/conformity properties, i.e. the angles are chosen to increase the impact resistance. Moreover, paragraph [0012] of the patent explicitly refers to stiffener fibers "*layed up as +/- 60 degree laminates*" that are "*not aligned (0 or 90 degrees) with the skin fibers*" as preferable values in the context of the above mentioned problem. Thus, the board cannot see that these values have been selected arbitrarily without any effect, as alleged by the appellants, hence the attack on inventive step in this respect fails.

3.3.3 E2 shows in Figure 4 a flat stiffened panel having a skin ply layup including angles of +/-60 degrees, however the stringer ply layup comprising stiffener fibers is different and does not show these angles. For this reason alone, the board cannot see how the skilled person would arrive at the subject-matter of claims 1

and 9 (i.e. stiffener fibers including +/- 60 degree lay-up) when taking into account the teaching of E2. Moreover, the board has doubts that the composite structure of the flat stiffened panel of Figure 4 in E2 is identically used in the curved test panels listed (but not further specified) in Table 1 in E2. Figure 4 explicitly refers to a stringer ply layup ("stringer" specifies a part orientated along the longitudinal axis of the fuselage), so the board cannot see that E2 provides any motivation to curve the flat panel around the 90° axis and take this axis as new reference axis. E2 therefore lacks a clear indication that the composite structure of Figure 4 would also be applied for a fuselage structure comprising a plurality of circumferentially orientated hat frames arranged as stiffeners, as specified in the preamble of claim 1.

3.3.4 E3 relates to stiffened skin/laminate structures and discloses in Table 1 various layups for skin and stiffener. E3 might show a specific layup for soft stiffeners including fibers at +/-30 degree, which seems to be used in composite configuration side panels as represented in Figures 9 and 10. Figure 10 in E3 relates to a stringerless fuselage structure comprising circumferentially orientated, cobonded J frames, which comes close to the structure specified in the preamble of claim 1 (which only requires hat frames instead). Even assuming that a +/-30 degree stiffener layup listed in Table 1 is used for the circumferentially oriented J frames in Figure 10, the board cannot see how a +/-60 degree stiffener layup should be suggested by E3. The board agrees with the contested decision that the angle definition in laminate layup applies with respect to the mean or major longitudinal extent of the stiffener. As argued by the respondent, there is no motivation to rotate the reference axis by 90° in E3

(as argued by the appellants with respect to E2) so that a fiber orientation at 30° to the reference axis would become 60°.

3.3.5 In summary, the board was not convinced by the arguments of the appellants that the skilled person would be prompted by the teaching of E2 or E3 to arrive at stiffener fibers including a +/-60 degree lay-up as claimed. For this reason alone, the existence of an inventive step has to be acknowledged.

In view of the foregoing, it can be left open whether the exclusion of relative angles of 0 and 90 degrees between stiffener fibers and skin fibers relates to all stiffener fibers, as found by the opposition division, which was contested by the appellants.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

A. Vottner G. Pricolo

Decision electronically authenticated