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**Datasheet for the decision  
of 28 July 2010**

**Case Number:** T 0782/08 - 3.2.06

**Application Number:** 97939730.4

**Publication Number:** 0865525

**IPC:** D04B 21/14

**Language of the proceedings:** EN

**Title of invention:**

Improved warp/knit reinforced structural fabric

**Patentee:**

McDONNELL DOUGLAS CORPORATION, et al

**Opponent:**

AIRBUS et al.

**Headword:**

-

**Relevant legal provisions:**

RPBA Art. 13(1)

**Relevant legal provisions (EPC 1973):**

EPC Art. 56, 84

**Keyword:**

"Main request - inventive step (no) - feature in claim lacking technical significance"

"First to fourth auxiliary requests - clarity - (no)"

**Decisions cited:**

G 0007/93

**Catchword:**

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Case Number: T 0782/08 - 3.2.06

**D E C I S I O N**  
of the Technical Board of Appeal 3.2.06  
of 28 July 2010

**Appellant:** AIRBUS et al.  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 19 February 2008  
rejecting the opposition filed against European  
patent No. 0865525 pursuant to Article 102(2)  
EPC.

**Composition of the Board:**

**Chairman:** P. Alting van Geusau  
**Members:** M. Harrison  
W. Sekretaruk

## Summary of Facts and Submissions

- I. The appellant (opponent) filed an appeal against the decision of the opposition division rejecting the opposition against European patent No. 0 865 525, and requested revocation thereof.
- II. In support of its arguments, the appellant relied on the following documents:
- D1: EP-A2-0 361 796  
D2: US-A-4 872 323  
D3: Matériaux composites, introduction à l'usage des ingénieurs et techniciens, Teknea, 1989, pages 31 to 53.
- III. The respondent (proprietor) requested dismissal of the appeal.
- IV. Subsequent to issuing a summons to oral proceedings, the Board issued a communication indicating its provisional opinion. This stated *inter alia* that the subject matter of claim 1 appeared novel over the cited prior art and that in respect of inventive step the objective problem to be solved was a matter which might be discussed at oral proceedings. It was also stated that the subject matter of independent claim 9 appeared to lack novelty over both D1 and D2 and that the subject matter of claim 10 appeared to lack inventive step when starting from D2 and combining this with the teaching of D3.
- V. In its submission dated 25 June 2010, the respondent filed five auxiliary requests.

VI. During the oral proceedings held on 28 July 2010 before the Board, the appellant confirmed its request for revocation of the patent. It also withdrew all objections concerning alleged lack of novelty.

The respondent's main request was that the appeal be dismissed. Its previous auxiliary requests were replaced by first to fourth auxiliary requests filed during the oral proceedings.

VII. Claim 1 of the main request (patent as granted) reads as follows:

"A process for making a multi-ply structural fabric sheet (40) which is non-woven and non-crimped and capable of being used in structural applications and wherein the multiple plies of the sheet are stacked in facewise engagement; each ply essentially comprises fibres running only in a single direction; at least one of the plies has its fibres running at 0° to the length of the sheet and at least some of the other plies have their fibres running at respectively different angles to the length of the sheet; and the multiplicity of plies are secured together by warp knitting a thread through the plies in the sheet; and wherein the process comprises separately forming each of said other plies on a belt having pins at its two side edges by wrapping the fibres of each such ply about these pins to hold the fibres of such ply in parallel arrangement at the desired angle to the length of the belt, characterised in that: each 0° ply is prepared off the belt to fix the fibres of the ply so that the fibres are stabilised and remain in their desired 0° orientation in parallel arrangement with one another and the prepared and

stabilised 0° ply is subsequently applied to the belt with the fibres of the 0° ply running along the length of the belt and with the 0° ply being located in the sheet other than on the upper surface thereof."

VIII. Claim 1 of the first auxiliary request, the only independent claim thereof, is the same as claim 1 of the main request with the exception that, in the characterizing part of the claim, between the wording "each 0° ply is prepared off the belt" and "to fix the fibres of the ply so that...", the following is inserted:

"by contacting each 0° ply at selected locations with a slight amount of curable resin,".

IX. Claim 1 of the second auxiliary request is the same as claim 1 of the first auxiliary request, with the exception that the inserted wording of the first auxiliary request is amended as follows:

"by contacting each 0° ply at selected locations with a slight amount of curable resin only sufficient to merely hold the individual fibers and plies in a parallel array,".

Additionally, the wording "in the sheet other than on the upper surface thereof" was replaced by the following wording:

"intermediate an upper ply and a lower ply of said sheet."

X. Claim 1 of the third auxiliary request is the same as claim 1 of the second auxiliary request, amendments having been made only to the dependent claims thereof.

XI. Claim 1 of the fourth auxiliary request is the same as claim 1 of the second and third auxiliary requests, with the exception that the inserted wording of the second auxiliary request is further amended to read:

"by contacting each 0° ply at selected locations with a slight amount of curable resin only sufficient to merely hold the individual fibers and plies in a parallel array, the amount being between 2% to 6% by weight of fiber,".

XII. The arguments of the appellant may be summarised as follows:

Only inventive step was contested. In regard to claim 1 of the main request, all features of the preamble were known from D2. The last feature (referred to herein as "feature h2") of the claim defined "the 0° ply being located in the sheet other than on the upper surface thereof.". This feature was however devoid of technical relevance to the process, as evident from the patent e.g. in paragraph [0031]. Merely excluding the presence of a 0° ply on the upper surface in this process claim provided no technical effect. Feature h2 was thus an arbitrary feature and not relevant for the consideration of inventive step. The objective problem to be solved when starting from the process of D2 (which process already provided a certain amount of stabilisation of fibres in the 0° layers in the sheet due their positioning between adjacent layers) was to

further improve the stabilisation of the fibres, in particular due to the fact that forces arose on the fibres when arriving at the needle bed of the knitting station which might disturb the alignment. D3 (see section 2.4.2) dealt with parallel fibres of quasi-unidirectional woven layers and emphasised one main purpose of the thin and weaker perpendicular threads in such layers which was to ensure parallelism of the main fibres. The fibres did not need to be impregnated with resin, even though this was a further possibility taught by D3. A skilled person starting from D2 and faced with the aforementioned problem would therefore adopt the teaching of D3 and replace the stationary threads in each of the three layers of D2 (see threads 49, 50, 51 in e.g. Fig. 17) with a quasi-unidirectional woven layer to thereby arrive at the subject matter of claim 1. The threads 51, forming a 0° layer on the upper surface in D2, would be omitted without affecting the process in any way.

In regard to the first to fourth auxiliary requests, the expressions "slight amount" and "selected locations" were not clear. Also, the terminology "selected locations" related, according to the description, to both the fibres and the connection of plies, but the insertion was made in the claim in relation to "off-the-belt" preparation relating to single plies. The additional wording "merely hold" in the second to fourth auxiliary requests was also not clear, contrary to Article 84 EPC 1973. The amount of 2% to 6% added by way of the fourth auxiliary request, did not overcome the clarity problems.

XIII. The arguments of the respondent may be summarised as follows:

D3 should not be admitted into proceedings. Although the opposition division used its discretion and allowed D3 into proceedings, this matter had to be re-examined since D3 was of no relevance *prima facie*. In particular, it should have been filed much earlier since the subject of the opposition proceedings had not changed when it was introduced.

Concerning the main request, when starting from D2, the problem to be solved was to improve the stability of the 0° parallel arrangement of fibres in a ply to be knitted. D3 gave no hint towards this, but was merely a general reference on composite materials, unrelated to warp knitting machines. Only an *ex post facto* approach would lead a skilled person to consider D3 at all, let alone consider the use of the quasi-unidirectional layers instead of the stationary threads in D2. Further, the feature h2, according to which the 0° ply should be located in the sheet other than on the upper surface thereof, was not devoid of technical significance. In particular, this feature allowed the 0° plies to be used anywhere in the product rather than the top and this could imply advantages for the product characteristics. Also, feature h2 was relevant to the number of 0° fibres applied when making the sheet since the strength of sheet was determined mainly by the number of fibres in the plies and only a certain number of plies could be used.

The first to fourth auxiliary requests were late-filed, but the argument that feature h2 could be regarded as



arbitrary had been made as a new line of attack under inventive step for the first time during the oral proceedings by the appellant and the respondent needed an opportunity to respond to this.

The terminology "slight amount of curable resin" in all auxiliary requests was clear to a skilled person. The purpose was simply to hold together the fibres in a ply just enough so that a stable 0° orientation resulted. This was clear from the disclosure in paragraphs [0062] and [0063] of the patent. The expression "selected locations" did not require a selection process, but merely implied a connection at some points between the adjacent fibres, rather than along their entire length. Paragraph [0062] meant only a fixation between the fibres of a ply and not between the plies; the use of the word "plies" merely concerned all the plies in the sheet which had such 0° fibres.

Where the added wording was inserted in the claim did not give rise to a lack of clarity because the off-the-belt application of resin, which is what that part of the claim was concerned with, was merely to hold the fibres in a stable relationship and was not a ply interface matter. An interpretation of the claim or paragraph [0062] in such a way that the amount of resin had to be sufficient also to hold the plies together was a misinterpretation of the description and the claim.

In the second and third auxiliary requests, the "slight amount" terminology was further limited by indicating that it was also an amount "only sufficient to merely hold the individual fibers and plies in a parallel

array". This terminology "merely hold" was clear for a skilled person and did not need to be defined more precisely, because the fibre type and dimensions, as well as the resin type, could be varied greatly by a skilled person to arrive at a ply where the fibres were merely held together. A skilled person knew when something was "merely held" together.

In the fourth auxiliary request, the specific amount of resin used per weight of fibre was included. Together with the previous definitions, the claim clearly defined for a skilled person how much should be used when fixing the fibres in the plies.

## **Reasons for the Decision**

### 1. *Main Request - Inventive Step*

1.1 The respondent objected to the introduction of D3 on the basis that it was not *prima facie* relevant and should therefore not have been admitted into opposition proceedings by the opposition division due to its late filing, particularly since the subject of the opposition proceedings had not changed.

1.1.1 The Board however notes that in the decision under appeal, the opposition division gives a reasoned statement as to why it exercised its discretion as it did, not least referring to particular pages of D3 which it found to be relevant. The respondent's argument that it does not consider D3 to be *prima facie* relevant is thus beside the point, since no error in the use of its discretion can be seen to have been made

by the opposition division, and since the respondent made no arguments as to why the limits of the discretion afforded to the opposition division had not been observed, the Board finds that its discretion was used correctly (see also G 7/93 item 2.6).

Further, as is evident from the following, D3 is indeed highly relevant to the question of inventive step.

1.2 Both parties agreed that, when starting from D2 as the closest prior art, the features of the characterizing portion of claim 1 were the only novel features. The Board finds no reason to disagree with this, the preamble features being disclosed in e.g. Figs. 2, 17 and 19 and the description col. 3, lines 26 to 45, col. 4, lines 1 to 11, col. 5, line 64 to col. 6, line 46 to col. 7, line 28, and col. 10, line 23 to col. 11, line 15.

1.3 D2 also discloses (see in particular Figures 17 and 19 and the description in column 7, lines 17 to 28 and col. 10, lines 45) that layers of longitudinally running fibres (i.e. fibres running at 0° to the length of the sheet) termed stationary threads 15 are added to the other plies, both between plies and on top of the set of plies, and whereby the stationary threads are also in a parallel relationship and held between other plies in said parallel relationship. Starting from D2, the problem to be solved by the subject matter of claim 1 is to further ensure the stability of such 0° fibres, e.g. in situations where forces tending to disturb the parallel relationship occur, such as when the plies approach the knitting station.

- 1.4 Faced with this problem, a skilled person would find D3, because not only is this concerned with fibre composites in which fibre-constituted plies are used, but section 2.4.2 concerns quasi-unidirectional weaves which are plies in which the threads (fibres) essentially run in one direction, whereby weaker, thinner weft threads are added to ensure only the holding together of the assembly in particular with regard to keeping the warp fibres parallel ("destiné à assurer uniquement la tenue de l'ensemble - parallélisme des fils en particulier - ...").
- 1.5 Since D3 teaches the use of such weaves, generally in fibre composites, and specifically notes the maintenance of the parallel orientation of the fibres in a ply, the skilled person attempting to solve the objective problem would combine this teaching with that of D2 and replace the stationary thread (15) plies in D2 with the pre-prepared quasi-unidirectional weaves of D3, without using inventive skill.
- 1.6 Nevertheless, when combining the teaching of D3 with D2, the skilled person is however presented with a solution in which the top ply in D2 would also be replaced by a pre-stabilised ply from D3, whereas according to the last feature of claim 1 (referred to by the parties as "feature h2") each 0° ply is "located in the sheet other than on the upper surface thereof".
- 1.7 The Board however finds, in accordance with the arguments put forward by the appellant, that this feature h2 is devoid of any technical significance in the process of claim 1 and is thus a feature of claim 1 which must be ignored when considering inventive step.

1.7.1 The description in the patent gives no information as to how the exclusion of a 0° ply on the top in the process of claim 1 should have any technical effect. On the contrary, paragraph [0031] merely states that claim 1 does not specifically limit the 0° ply to a position on the upper surface.

It is also to be noted that no portions of the patent were cited by the respondent in regard to the existence of a technical effect of feature h2.

1.7.2 The respondent instead argued that in the resulting multi-ply product, the positioning of a 0° ply on the upper surface of the sheet may have various effects on the product performance when in use. However, this does not imply any technical effect for the process of claim 1, even if the product is affected as alleged.

Anyway, the presence of a 0° ply on the lower surface of the sheet during manufacture is within the scope of claim 1, whereby the product produced by a process using a 0° upper ply would be the same as a product which was produced instead with a 0° lower ply, merely by turning the product upside down.

1.7.3 The respondent also argued that this feature allowed the process to be carried out with full freedom as to where the 0° ply or plies were placed. However, the mere "possibility" of being able to place the 0° ply or plies at different locations does not limit the claim in any way compared to the disclosure of D2 and this matter is not anyway, in the Board's view, concerned with feature h2, which merely limits rather than

expands the possibilities of where to place a 0° ply. Whilst other prior art cited in the patent disclosed that the 0° ply was necessarily uppermost in the process, this is not the case with D2.

1.7.4 A still further argument of the respondent was that the number of 0° fibres in the product was of prime importance and that only a certain number of 0° plies could be included in the sheet, dependent on the total ply number, whereby the positioning of the plies did have technical importance. In as far as this argument can be understood, this however only implies that the product itself may have a certain advantage, but is devoid of any technical effect when considering the process as defined in claim 1.

1.7.5 Thus, no argument was made by the respondent, and no information can be found by the Board itself, which demonstrates that feature h2 is of any technical significance to the subject matter of claim 1. Thus, feature h2, whilst not taught by the combination of D2 with D3, does not alter the Board's conclusion on inventive step as feature h2 can only be regarded as an arbitrary feature. Thus, a skilled person can choose to include it or not without the exercise of inventive skill when producing a sheet according to D2 with the layers known from D3.

1.8 The respondent also argued that D3 would not be considered by a skilled person involved with a warp knitting process of claim 1 and of D2, because D3 was merely a general text and had no relation to warp knitting. However the Board finds this argument unconvincing, since whilst D3 makes no reference to

warp knitting, it is concerned with fibre composites and strengthening layers therefor. Moreover, a skilled person in the art of warp knitting, being aware of the problem to be solved, is aware of general ply structures and is further taught by D3 specifically the purpose of the stabilisation threads in quasi-unidirectional layers in section 2.4.2 as having the specific property desired, i.e. maintaining parallelism.

- 1.9 The subject matter of claim 1 therefore lacks an inventive step and the requirement of Article 56 EPC 1973 is not fulfilled.

The main request is consequently not allowable.

2. *Admittance of auxiliary requests into proceedings*

Although all auxiliary requests were filed during the oral proceedings at a very late stage thereof, the Board exercised its discretion under Article 13(1) of the Rules of Procedure of the Boards of Appeal (RPBA) and admitted the requests into proceedings, because the requests were a reaction to inventive step arguments of the appellant relying on a line of attack which had not been apparent in the written submissions. Also, of the three independent claims in the patent as granted, only one was pursued by way of the auxiliary requests; at least for this reason an economy of procedure was also assured.

3. *First auxiliary request*

3.1 The features "selected locations" and "slight amount" introduced by way of this request are unclear, contrary to Article 84 EPC 1973.

3.1.1 "Selected locations" have not been defined in any sense whatsoever, since there is no criteria for identifying when a location has been selected or when not, nor which locations can be regarded as selected. It may be correct that this terminology would be understood to exclude a total coverage of the plies by resin, but a skilled person is not able to identify when a location can be regarded as being a selected location in the process of claim 1.

The respondent argued that "selected locations" did not involve a "selection" at all, but merely referred to individual locations rather than total coverage, at some points between the adjacent fibres, rather than along their entire length. However, the wording of claim 1 itself does not unambiguously state this, in particular because it defines "contacting each 0° ply at selected locations" (emphasis added) with resin, rather than defining any individual locations between the fibres in a ply, at which resin is to be added. In this regard, the respondent argued that the wording of the claim referred to the connections between fibres, and not a connection between plies, and referred to paragraphs [0062] and [0063] as support for this argument. However, also on this point, the Board finds the respondent's arguments unconvincing. In paragraph [0062] it is stated that the amount of resin which is supplied at selected locations "is only sufficient to



merely hold the individual fibers and plies in a parallel array"; it is not stated that only the individual fibres are held in a parallel array either in or within a ply by such resin application. Thus, whilst the applicant may have had the intention of defining the use of resin at random locations between fibres, as also argued by the respondent, this is not what is stated in the description, nor what is defined in the claim.

This latter aspect also makes the claim unclear for the further reason that the slight amount of resin which is applied by contacting each 0° ply at selected locations therewith is not unambiguously associated with an off-the-belt process as defined in the claim "to fix the fibres of the ply so that the fibres are stabilised", but appears also to concern also a latter process in which the plies themselves are held together. The requirements of Article 123(2) EPC would also not be met in this regard, since it is not unambiguously disclosed that such a process would occur in the off-the-belt location.

- 3.1.2 The expression "slight amount" is also not clear, contrary to Article 84 EPC 1973. What the skilled person may in one situation regard as a "slight" amount, may in another situation be regarded as a large amount. No limits are defined which can be seen as restricting the boundaries of this terminology.

The respondent argued that a slight amount was clear when seen in the correct context of paragraphs [0062] and [0063] and through the eyes of a skilled person who would understand this sufficiently clearly, not least

in light of the fact that the claim should not be unduly limited to any particular amounts due to the fact that the fibre type and size and resin type may all vary. The Board however finds this argument unconvincing, since the claims must be clear themselves and the description of the intended purpose of the slight amount in the description was itself not clear anyway, since it referred to an example which might "usually" be used where 2% to 6% resin by weight of fibre was applicable, without however stating any conditions which made such a selection suitable. Moreover, even in as far as the description might be interpreted to mean that the resin merely formed the connection at isolated locations between adjacent fibres, this was described as being "only sufficient to merely hold the individual fibers ... in a parallel array", whereby the terminology "merely hold" itself is entirely unspecific, since the conditions under which the determination of whether adjacent fibres are considered to be "held" depends entirely on a set of unknown forces acting on the fibres and plies and other operating conditions in the process.

3.2 Since the requirement of clarity in accordance with Article 84 EPC 1973 is not fulfilled by claim 1, the first auxiliary request is not allowable.

4. *Second and third auxiliary requests*

4.1 Claim 1 of each of these requests is the same. Each includes the additional definition that the slight amount of curable resin should be "only sufficient to merely hold the individual fibers and plies in a parallel array". As stated above in regard to the first

auxiliary request however, the definition according to which the fibres are "merely" held together, let alone if additionally the plies should also be merely held together (as defined in claim 1), does not overcome the existing lack of clarity because it is not stated anywhere, nor known generally to a skilled person, what can be regarded as being "merely held". The objections made against the first auxiliary request thus apply equally.

4.2 The additional amendment made in claim 1, according to which the wording "in the sheet other than on the upper surface thereof" is replaced by "intermediate an upper ply and a lower ply of said sheet", does not alter the foregoing conclusions reached on the clarity of claim 1, as it relates to a different aspect of the claim.

4.3 Claim 1 of each of the second and third auxiliary requests thus fails to meet the requirements of Article 84 EPC 1973 and these requests are therefore not allowable.

5. *Fourth auxiliary request*

5.1 The additional wording "the amount being between 2% to 6% by weight of fiber," added to claim 1 to further specify the amount of resin used, does not overcome the foregoing objections. The feature "selected locations" at which the resin is applied is still unclear in the claim as this is not overcome by specifying the weight range of resin. Further, whilst a range of weight values for the resin has been defined, the amount to be used within this range must still be selected in a way

such that the fibres (and indeed the plies, according to claim 1) are considered to be "merely held" together, whereby the skilled person has no guidance to know when this process feature has been achieved, primarily because no limits are given to the term "merely".

5.2 The argument that a skilled person would, given the applicable weight range as now defined, be able to easily arrive at something which fell within the claim, is rather an argument towards sufficiency of disclosure rather than clarity. In terms of clarity, the skilled person, even when working within the weight range of resin now defined (i.e. 2% to 6%) would still need to understand what is meant by the terminology "selected locations" and when something should be considered to be "merely held", since applying even a miniscule amount of resin would always have some holding effect, but whether this was an amount which could be regarded as being such as to "merely hold" the fibres in a parallel array or to have too strongly held the fibres together, is entirely unknown.

5.3 The requirement of Article 84 EPC 1973 is therefore also not fulfilled by claim 1 of the fourth auxiliary request, whereby the fourth auxiliary request is not allowable.

6. In the absence of any allowable requests, the Board must revoke the patent.

**Order**

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

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

The Registrar

The Chairman

U. Bultmann

P. Alting van Geusau