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**Datasheet for the decision  
of 8 December 2011**

**Case Number:** T 0577/09 - 3.2.05

**Application Number:** 03077425.1

**Publication Number:** 1388407

**IPC:** B29C 53/36

**Language of the proceedings:** EN

**Title of invention:**  
Performing thermoplastic ducts

**Patent Proprietor:**  
The Boeing Company

**Opponent:**  
AIRBUS France

**Headword:**

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**Relevant legal provisions:**  
EPC Art. 56, 100(b)

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

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**Keyword:**  
"Sufficiency of disclosure - yes (main request)"  
"Inventive step - yes (main request)"

**Decisions cited:**  
T 0063/06

**Catchword:**

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Case Number: T 0577/09 - 3.2.05

**D E C I S I O N**  
of the Technical Board of Appeal 3.2.05  
of 8 December 2011

**Appellant:** AIRBUS France  
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**Decision under appeal:** Interlocutory decision of the Opposition  
Division of the European Patent Office posted  
16 January 2009 concerning maintenance of  
European patent No. 1388407 in amended form.

**Composition of the Board:**

**Chairman:** W. Zellhuber  
**Members:** P. Lanz  
A. Pignatelli

## Summary of Facts and Submissions

I. The appellant (opponent) lodged an appeal against the interlocutory decision of the opposition division maintaining European patent No. 1 388 407 in amended form.

II. The opposition against the patent as a whole was based on Articles 100(a) (lack of novelty, Article 54(2) EPC, and lack of inventive step, Article 56 EPC) and 100(b) EPC.

With respect to the patent proprietor's main request, the opposition division held that the subject-matter of claim 10 as granted did not meet the requirements of Article 54(2) EPC.

Regarding the first auxiliary request the opposition division decided that the amended set of claims met the requirements of the EPC.

III. Oral proceedings were held before the Board of Appeal on 8 December 2011.

IV. The appellant requested that the decision under appeal be set aside and that the European patent No. 1 388 407 be revoked.

V. The respondent (patent proprietor) requested, as a main request, that the appeal be dismissed, and, as an auxiliary measure, that the decision under appeal be set aside and the patent in suit be maintained on the basis of any of the sets of claims filed as first to fifth auxiliary requests on 7 November 2011.

VI. Independent claims 1 and 10 of the patent as maintained by the opposition division (main request) read as follows:

"1. An apparatus (10, 10a) for preforming a thermoplastic member to form a preform generally corresponding to a desired configuration of a thermoplastic duct defining a passage, the apparatus comprising:  
a first rotatable roller (12) extending longitudinally;  
and  
a second rotatable roller (14, 14a) positioned substantially parallel to said first roller and proximate to said first roller such that said first and second rollers define a nip therebetween;  
characterised by  
a heater configured to heat the thermoplastic member to a processing temperature less than a glass transition temperature of the thermoplastic member and within about 40°C (70°F) of the glass transition temperature;  
wherein at least one of said first and second rollers is heated and at least one of said first and second rollers is configured to rotate and thereby translate the thermoplastic member through the nip such that the thermoplastic member is heated, compressed, and bent generally to the desired configuration of the duct."

"10. A method for preforming a thermoplastic member to form a preform generally corresponding to a desired configuration of a thermoplastic duct defining a passage, the method comprising:  
heating the thermoplastic member to a processing temperature less than a glass transition temperature of

the thermoplastic member and within about 40°C (70°F) of the glass transition temperature; rotating at least one of first and second rollers; and transporting the thermoplastic member through a nip defined by the first and second rollers such that the thermoplastic member is heated, compressed, and bent generally to the desired configuration of the duct; characterised in that said heating step comprises heating at least one of the rollers such that the thermoplastic member is heated while being transported through the nip."

VII. The documents referred to in the appeal proceedings included the following:

D1: US-A-3 499 072

D2: US-A-4 826 420

D7: Publication "A New Approach to the Forming of Thermoplastic-Matrix Continuous-Fiber Composites - Part 1: Process and Machine" by K. Ramani, A.K. Miller and M.R. Cutkosky, Journal of Thermoplastic Composite Materials, 1992, pages 184-201

D8: Publication "Die-Less Forming of Large and Variable-Radii of Curvature in Continuous-Fiber Thermoplastic-Matrix Composite Materials" by Y. Gertner and A.K. Miller, Journal of Thermoplastic Composite Materials, 1996, pages 151-182

D14: Test report "Essais de formage de composites thermoplastiques" by Prof. Hascoët, incl. annexes A and B.

VIII. The arguments of the appellant regarding the main request, in writing and during the oral proceedings, can be summarised as follows:

*Insufficiency of disclosure*

The teaching of the patent in suit was very general and did not contain a detailed example of how to carry out the invention. The test report D14 by Prof. Hascoët showed that performing the steps of the method as claimed was not sufficient to achieve a bending of the thermoplastic sheet. Moreover, it was not possible for a skilled person to reproduce the claimed invention even if carbon fibre reinforced polyphenol sulfide (PPS) was chosen as a thermoplastic material, although PPS and carbon fibres were both mentioned as possible materials to be processed. Under these circumstances, the burden of proof regarding sufficiency of disclosure had to be shifted to the patent proprietor, as confirmed by decision T 63/06.

*Inventive step*

Document D7 could be considered the closest prior art, from which the subject-matter of the independent claims differed only in that at least one of the first and second rollers was heated.

It would be obvious also to use the heated roller disclosed in document D8 in the apparatus of document D7 in order to solve the technical problem of simplifying the apparatus known from document D7.

Alternatively, document D1 could be used as a starting point. In this case too the differing feature would be that at least one of the first and second rollers was heated.

The technical effect of lowering the energy consumption and simplifying the apparatus by a local heating of the roller was already known from document D2 (see col. 1, lines 48 to 53), thereby rendering obvious the subject-matter claimed.

- IX. The arguments of the respondent regarding the main request, presented in writing and during the oral proceedings, can be summarised as follows:

*Insufficiency of disclosure*

The disclosure was sufficiently clear and complete for a person skilled in the art. In particular, the description of the patent in suit disclosed different possibilities for achieving the claimed bending. Since none of these options was used when carrying out the tests for report D14, it was not surprising that no significant bending effect was achieved.

Additionally, the tests were not suitable to establish insufficiency of disclosure since neither the testing apparatus nor the testing conditions were appropriately selected.

Consequently, the patent in suit disclosed the invention claimed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

*Inventive step*

Document D1, Fig. 4, was the closest prior art since it was directed to the same purpose as the subject-matter claimed. While document D1 explicitly suggested cooling the rollers of Fig. 4 with cold water, the subject-matter of the independent claims as maintained required that at least one of the first and second rollers was heated. Thus, the skilled person was clearly led away from the solution according to the patent in suit.

Likewise, a combination of documents D1 and D2 could not put the inventive merit of the subject-matter claimed into question, since the apparatus of document D2 did not disclose a nip for compressing and thereby preforming the plastic sheet.

Moreover, document D7 did not show a heated roller but an induction heating of the forming area. On the other hand, document D8 disclosed a heated crosshead cylinder, which, however, was not part of the arrangement forming the nip. Finally, document D7 did not mention a specific forming temperature, while the crosshead cylinder temperature suggested in document D8 was significantly higher than the glass transition temperature of the material to be processed. Consequently, also in view of a combination of documents D7 and D8, the subject-matter claimed was based on an inventive step.



## Reasons for the Decision

### 1. *Main request*

#### 1.1 Insufficiency of disclosure

According to Article 100(b) EPC, the European patent must disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. As confirmed by the established jurisprudence of the Boards of Appeal, sufficiency of disclosure must be assessed on the basis of the patent as a whole, i.e. the description, the claims and the drawings, if any. The disclosure must be reproducible without undue burden for a skilled person using his common general knowledge to supplement the information contained in the patent.

The appellant's essential argument that performing the steps of the method as claimed was insufficient to achieve a bending effect on the thermoplastic sheet is not convincing, even if carbon fibre reinforced polyphenol sulfide (PPS) was chosen as a thermoplastic material. In fact, the disputed patent as a whole offers the skilled person at least three possibilities for putting the claimed invention into practice: disproportional heating of the sample (paragraph [0024], Fig. 1), the use of multiple rollers spaced around the first roller (paragraph [0025], Fig. 5) or providing a deflection roller (paragraphs [0026] and [0027], Fig. 6). None of these options was either challenged as to the underlying theoretical principles or tried in practice within the framework of the tests

forming the basis of Prof. Hascoët's report D14. For this reason alone, the conclusions drawn in test report D14 are not an appropriate basis on which to challenge the sufficiency of disclosure of the invention in the patent in suit.

Moreover, as stated in decision T 63/06, the opponent's reasoning that the teaching of the disputed patent and the common general knowledge would not enable the skilled person to put the invention into practice has to be plausible in order to rebut the legal presumption of validity and thereby shift the burden of proof from the opponent to the patent proprietor. Since, in the present case and for the reasons explained above, the Board does not consider the appellant's (opponent's) arguments convincing, the mentioned criterion of plausibility is obviously not met and the burden of proof must remain with the appellant (opponent).

The Board concludes that the patent in suit discloses the invention claimed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

## 1.2 Inventive step

Document D1, specifically the embodiment of Fig. 4, discloses a method of and an apparatus for forming a cylindrical sleeve from a rectangular thermoplastic sheet (see abstract and col. 2, lines 17 to 29). Since it has the same intended use as and most structural features in common with the subject-matter of the independent claims under dispute, it is considered the closest prior art.

The Board agrees with both parties that the subject-matter of independent claims 1 and 10 differs from this teaching of document D1 at least by the feature that at least one of the first and second rollers is heated; in the context of Fig. 4, document D1 even explicitly suggests cooling the rollers with cold water (see col. 5, lines 4 to 24).

Since the above teaching is contrary to the solution claimed in the disputed patent, the embodiment of Fig. 4 of document D1 leads the skilled person away from a solution using heated rollers.

In spite of mentioning a possible heating of the rollers (see col. 5, line 51), the further embodiment of document D1 as shown in Fig. 5 confirms the above teaching in that the cooling and curling of the thermoplastic sheet is accomplished while it is wrapped around mandrel 43 (see col. 5, lines 49 to 53 and 70 to 74). Consequently, in this arrangement the bending is not achieved by translating the thermoplastic member through a nip such that the thermoplastic member is heated, compressed and bent, as required in the claims under consideration.

Thus, it can be concluded that the content of document D1 alone does not render obvious the subject-matter claimed in the patent in suit.

Furthermore, a combination of the embodiment of Fig. 4 in document D1 as the closest prior art with document D2, as suggested by the appellant, cannot put the inventive merit of the independent claims into

question. In document D2 the sheet to be formed is bent around a heated roller or spool and subsequently held in position while it is cooled. Finally, the spool is released from the apparatus in order to remove the solidified bent sheet (see col. 4, lines 30 to 38). Bending is hence not achieved by translating the thermoplastic member through a nip such that the thermoplastic member is heated, compressed and bent. Since the arrangement of document D2 is thus based on a principle fundamentally different from that of document D1 and of the patent in suit, the disclosure of document D2 is either not able to guide a skilled person, starting from document D1, to the subject-matter of the claims.

The appellant put forward an additional line of argument based on a combination of documents D7 and D8. As pointed out by the respondent, document D7 does not disclose a heated roller but an alternative solution in the form of an induction heating of the forming area (page 186, last paragraph). The appellant argued that the skilled person would replace this heating by a heated roller, known for example from document D8. The Board, however, does not see any motivation apparent in document D7 for considering such a replacement.

Moreover, in the introductory section of document D8 prior forming approaches, including that of document D7 (see document D8, page 153, second paragraph), and their drawbacks are discussed. Document D8 then goes on to propose an improved, self-contained concept called "continuous die-less forming", which eliminates the disadvantages of previously known methods (see document D8, page 157, second paragraph). Consequently, if the

skilled person took the teaching of document D8 into account, he would obviously implement this improved concept shown in Figs. 5 and 6 and not isolate a single element (i.e. the heated roller) from its context in order to combine it with the approach of document D7, which is explicitly presented as less favourable.

Finally, in particular in view of independent method claim 10, it is also noted that document D7 does not mention a specific forming temperature, while the crosshead cylinder temperature suggested in document D8, pages 158 (third paragraph) and 175 (second paragraph), is significantly higher than the glass transition temperature of the material to be processed.

In summary, a combination of documents D7 and D8 can likewise not render obvious the subject-matter claimed in the patent in suit.

Consequently, the prior art on file does not contain a teaching that would motivate a person skilled in the art to modify the apparatuses and methods known from documents D1 or D7 in order to arrive at the claimed invention.

In the judgment of the Board, the arguments put forward by the appellant are thus based on an *ex post facto* analysis.

It is concluded that the subject-matter of independent claims 1 and 10 of the main request is not obvious to the person skilled in the art, and hence involves an inventive step within the meaning of Article 56 EPC.

Likewise, the subject-matter of claims 2 to 9 and 11 to 16, which are dependent on claim 1 or 10, is based on an inventive step.

**Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:

D. Meyfarth

W. Zellhuber