BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Internal distribution code:
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [ ] To Chairmen
(D) [X] No distribution

Datasheet for the decision of 27 July 2010

Case Number: T 0563/08 - 3.2.08

Application Number: 97118981.6

Publication Number: 0913493

IPC: C22F 1/04

Language of the proceedings: EN

Title of invention:
Friction boring process for aluminium alloys

Patentee:
BOEING NORTH AMERICAN, Inc.

Opponent:
AIRBUS Deutschland GmbH/AIRBUS France SAS/AIRBUS UK Limited/AIRBUS España S.L./AIRBUS SAS

Headword:
-

Relevant legal provisions:
EPC R. 103

Relevant legal provisions (EPC 1973):
EPC Art. 114(2), 100(b), 56

Keyword:
"Late filed documents (admitted in part)"
"Late filed amended claims (admitted)"
"Sufficiency of disclosure (yes)"
"Inventive step (yes)"
"Reimbursement of appeal fee (no)"

Decisions cited:
-

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0563/08 **-** 3.2.08

D E C I S I O N
of the Technical Board of Appeal 3.2.08
of 27 July 2010

Appellant: (Opponent)
AIRBUS Deutschland GmbH/AIRBUS France SAS/AIRBUS UK Limited/AIRBUS España S.L./AIRBUS SAS
Kreetslag 10
D-21129 Hamburg (DE)

Representative:
Reinhard - Skuhra - Weise & Partner GbR
Patent- und Rechtsanwälte
Friedrichstraße 31
D-80801 München (DE)

Respondent: (Patent Proprietor)
BOEING NORTH AMERICAN, Inc.
2201 Seal Beach Boulevard
P.O. Box 2515
Seal Beach
California 90740-1515 (US)

Representative:
McLeish, Nicholas Alistair Maxwell
Boult Wade Tennant
Verulam Gardens
70 Gray's Inn Road
London WC1X 8BT (GB)

Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 28 January 2008 rejecting the opposition filed against European patent No. 0913493 pursuant to Article 102(2) EPC.

Composition of the Board:

Chairman: T. Kriner
Members: M. Alvazzi Delfrate
U. Tronser

Summary of Facts and Submissions

I. With the decision posted on 28 January 2008 the opposition division rejected the opposition against European patent No. 913 493.

II. The appellants (opponents) lodged an appeal on 28 February 2008, paying the appeal fee on the same day. The statement setting out the grounds for appeal was filed on 30 April 2008.

III. Oral proceedings before the board of appeal were held on 27 July 2010.

IV. The appellant requested that the decision under appeal be set aside, that European patent No. 913 493 be revoked and the appeal fee reimbursed.

V. The respondent (patent proprietor) requested that the patent be maintained on the basis of

- claims 1 to 6 filed during the oral proceedings,
- description columns 1 to 6 as granted, column 7 as filed during the oral proceedings,
- Figures 1 to 7 as granted.

VI. The following documents are relevant for the present decision:

D2: DE -A- 4 417 446;
D3: DE-C-33 43 521;

D9: A.H. Streppel, H.J.J. Kals, "Flowdrilling: a Preliminary Analysis of a New Bush-Making Operation", Annals of the CIRP, Vol. 32/1/1983, pages 167-171;

D10: H.J.J. Kals, "Fließbohren - ein neuartiges Verfahren für die spanlose Fertigung von Durchzügen" VDI-Berichte Nr. 330, 1978, pages 37_38; and

S3: F. Tikal et al., "Fließlochformen und Gewindefurchen in Baustahl St37", Bänder, Bleche, Rohre Magazin, (July/August 1997), pages 50-57.

VII. Claim 1 underlying the present decision reads as follows:

"A method of forming a hole (44) having a corrosion resistant layer of fine grain microstructure around said hole in an aluminum alloy material (42), comprising the steps of:
inserting a rotating tool (30) into the material (42);
working, frictionally heating, and extracting a portion of the material (42) with said rotating tool (30) to form the hole (44); and
adjusting the rotational velocity and insertion rate of the tool (30) such that working extends around the hole (44) beyond the diameter of the tool (30) and such that frictional heat generated in the hole (44) causes rapid recrystallization of the worked metal (42); and the method further comprising the steps of:
providing said tool having a rotating shaft;
providing said rotating shaft with a boring segment (32) having helical threads;
wherein said inserting comprises inserting said rotating boring segment (32) into the material;

wherein said working, frictionally heating, and extracting a portion of the material is carried out with said rotating boring segment (32) without a cutting action; and
wherein said adjusting comprises adjusting the rotational velocity and insertion rate of the boring segment such that working extends around the hole (44) beyond the diameter of the boring segment and such that frictional heat generated in the hole (44) causes rapid recrystallization of the worked metal."

VIII. The appellant's arguments can be summarised essentially as follows:

Admissibility of documents D9, D10 and S3

It was true that D9, D10 and S3 had been filed after the time limit for filing the opposition. However, D9 and D10 were prima facie highly relevant, since they related to flow drilling in an aluminium alloy material and explicitly disclosed the occurrence of dynamic recrystallisation. Therefore, these documents, as well as S3 which also related to flow drilling, should be admitted into the proceedings.

Admissibility of the respondent's request

The request of the respondent had been filed at a very late stage of the proceedings. Therefore, it should not be admitted into the proceedings.

Sufficiency of disclosure

The patent in suit did not describe in detail any specific example of the claimed process. Moreover, it did not concretely teach how the different process parameters were to be adjusted in order to obtain recrystallisation. Therefore, extensive experimentation was necessary in order to find out the correct values of all those parameters, resulting in an undue burden for the person skilled in the art attempting to carry out the claimed invention.

Accordingly, the patent in suit did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

Inventive step

The method according to claim 1 was distinguished from the flow drilling process disclosed in D9 solely by the use of a boring segment having helical threads. The sole effect associated with this feature was the extraction of the aluminium material from the hole. Therefore, starting from the process disclosed in D9, the object to be achieved by the claimed invention was to provide a method wherein the material was removed from the workpiece, while forming a hole.

It was part of the common general knowledge of the person skilled in the art that boring bits with helical threads could be used to drill a hole in a workpiece while removing material from it. Therefore, it would have been obvious to achieve the above object by

providing the tool used in the method of D9 with a boring segment having helical threads. As a consequence, the subject-matter of claim 1 did not involve an inventive step.

Moreover, a boring segment with helical threads was also known from each of D3 and D2. Since both documents related to flow drilling processes, they also rendered the use of said boring segment in the flow drilling process of D9 obvious. Accordingly, the subject-matter of claim 1 did not involve an inventive step also in view of the combination of D9 with each of D3 and D2.

Additionally, the inventiveness of the subject-matter of claim 1 could be questioned starting from the method disclosed in D3. This document disclosed a tool comprising a boring segment having helical threads to be used for forming holes by flow drilling. Even if a recrystallisation was not explicitly mentioned, it was implicit for the person skilled in the art that flow drilling resulted in dynamic recrystallisation and structure refinement of the surface of the hole, as evidenced for instance by D9 (page 167, left-hand column, first paragraph). Therefore, the claimed method was distinguished from that disclosed in D3 solely in that the working causing the dynamic recrystallisation was carried out by the segment with the helical threads, and in that the method was applied to aluminium alloys. The object to be achieved starting from the flow drilling method disclosed in D3 was to be seen in providing a method for removing the material during hole formation in aluminium. Since D3 did not exclude a removal of the material during the flow drilling process, the common general knowledge of the

person skilled in the art would have rendered it obvious to achieve this object by carrying out the working by means of the boring segment comprising helical threads and by applying the flow drilling to aluminium alloys. Therefore, the subject-matter of claim 1 lacked an inventive step also when starting from the method disclosed in D3.

Refund of the appeal fee

The opposition division had found that documents D9 and D10 were late-filed and not relevant. As a consequence, it had decided not to admit them into the proceedings. Since these documents were in fact prima facie highly relevant, the opposition division had committed a substantial procedural violation.

The present appeal had been rendered necessary in order to have these documents taken into consideration. Therefore, the refund of the appeal fee was justified.

IX. The respondent's arguments can be summarised essentially as follows.

Admissibility of documents D9, D10 and S3

The late-filed documents D9, D10 and S3 related to flow-drilling, which was a process treated also in other documents taken into consideration by the opposition division. Accordingly, D9, D10 and S3 were not more relevant than said documents already present in the proceedings. In addition, S3 did not even mention aluminium.

Therefore, D9, D10 and S3 were not prima facie relevant and should be disregarded.

Admissibility of the respondent's request

The amended claims had been filed as a reaction to the introduction of D9 and D10 into the proceedings and their discussion during the oral proceedings. In addition, amended claim 1 merely resulted from a combination of granted claims 1 and 13. Therefore, the respondent's request could not take the appellant by surprise and should be admitted into the proceedings.

Sufficiency of disclosure

The phenomenon of recrystallisation was well known to the person skilled in the art. Therefore, the instructions provided by the patent in suit were sufficient to carry out the invention, if necessary with a minor amount of routine experimentation. Accordingly, the claimed invention was sufficiently disclosed.

Inventive step

Starting from the flow drilling method disclosed in D9, the object to be achieved by the claimed invention was to provide improved corrosion resistance. Neither the common general knowledge of the person skilled in the art nor D3 nor D2 rendered it obvious to achieve this object by performing the flow drilling by means of a bore segment comprising helical threads.

In flow drilling the hole was formed without removal of material from the workpiece. Therefore, the common general knowledge of the person skilled in the art led away from the use in such a process of a tool with a helical thread, which removed material from the workpiece. As to D3 and D2, the bore segments with helical threads disclosed in these documents were conventional drilling bits, which were not used to perform flow drilling.

The claimed method was not rendered obvious starting from D3 either. This document did not even mention aluminium materials and related, like D9, to flow drilling. Since the latter process did not involve material removal, it was not obvious to perform it with a tool having helical threads.

Accordingly, the subject-matter of claim 1 involved an inventive step.

Reasons for the Decision

1. The appeal is admissible.

2. Late-filed documents D9, D10 and S3

In the decision under appeal the opposition division found that the prior art concerning flow drill processes provided no indication that some sort of rotating tool could provide sufficient frictional heat to recrystallise an aluminium internal hole structure (see appealed decision, page 7). On the basis of this

finding it held that the claimed invention involved an inventive step.

However, each of D9 (see page 167, left-hand column, first paragraph and page 167, right-hand column, third paragraph) and D10 (see page 37, middle column, third full paragraph and page 38, centre column 6 lines before the bottom of the page) concerns flow drill processes where dynamic recrystallisation of aluminium occurs by means of frictional heat. Therefore, both these documents relate to an issue crucial to the patentability of the claimed method. As a consequence, they are considered prima facie highly relevant and are admitted into the appeal proceedings.

S3 is less relevant, since its disclosure is limited to steel. Therefore, it is not admitted into the appeal proceedings.

3. Admissibility of the respondent's request

During the oral proceedings the board of appeal pointed out that each of D9 and D10 discloses a flow drilling process wherein, due to the dynamic recrystallisation in the bush material, working extends around the hole beyond the diameter of the tool. The submission of a new request comprising amended claims during the oral proceedings can be considered as a reaction to this finding.

Moreover, claim 1 of this request is essentially a combination of granted claims 1 and 13, on which the appellants had already taken position in the notice of opposition (see page 9). Therefore, even if the

respondent's new request has been filed at a very late stage of the proceedings, the appellants could not have been taken by surprise by this submission, which does not raise issues which they could not reasonably be expected to deal with without adjournment of the oral proceedings. As a consequence, the respondent's request is admitted into the proceedings.

4. Sufficiency of disclosure

In order to comply with Article 100(b) EPC 1973 a patent does not necessarily need to disclose in detail an example of the claimed invention. It is enough that the whole patent specification provides sufficient information to enable the person skilled in the art, if necessary with a reasonable amount of trial and error, to carry out the invention.

In the present case claim 1 requires that rapid recrystallisation of the worked metal is obtained. The phenomenon of recrystallisation, as well as the influence on it of temperature and working ratios, are well known in the art. For the person skilled in the art it is a matter of routine experimentation to check whether the working resulted in recrystallisation or not. In the negative case he is taught by the patent (see paragraph [0009]) to increase feed rate and rotational speed to obtain it. Therefore, the patent in suit discloses what has to be achieved, which parameters have to be adjusted for this purpose and how they have to be adjusted. Accordingly, the experiments that may be required to achieve the recrystallisation according to present claim 1 are within the frame of

routine trial and error and do not constitute an undue burden for the person skilled in the art.

Therefore, the patent in suit complies with Article 100(b) EPC 1973.

5. Inventive step

5.1 D9 relates to flow-drilling, which is a method of forming a hole (see for instance Figure 1B) having a corrosion-resistant layer (see page 167, right-hand column, last paragraph) of fine grain microstructure around it (see page 167, left-hand column, first paragraph). Moreover, D9 discloses that flow drilling can be applied to an aluminium alloy material (see page 167, right-hand column, last paragraph) and comprises the steps of: inserting a rotating tool having a rotating shaft into the material (see for instance Figure 3); working (as implied by the term "dynamic recrystallisation", see page 167, left-hand column, first paragraph), frictionally heating (see page 167, right-hand column , first paragraph), and extracting a portion of the material by displacement (see page 167, left-hand column, first paragraph) with said rotating tool to form the hole.

The process disclosed in D9 results in the formation of a bush which extends upwards and downwards from the original workpiece (see page 167, right-hand column, first paragraph). Therefore, said bush constitutes the walls of the hole formed by the flow-drilling process. The bush material has a finer structure because of the occurrence of dynamic recrystallisation (see page 167, left-hand column, first paragraph). Accordingly, in the

process of D9 the rotational velocity and insertion rate of the tool have been adjusted such that working extends around the hole beyond the diameter of the tool and such that frictional heat generated in the hole causes rapid recrystallisation of the worked metal.

5.2 According to the appellants, the object to be achieved by the claimed invention starting from the process disclosed in D9 was to provide a method wherein the material is removed from the workpiece while forming a hole. This formulation of the object is not convincing. Flow drilling, to which D9 relates, is a bush-making operation where the hole is formed not by removing material but by displacing it (see page 167, left-hand column, first paragraph). Therefore, the object of removing material from the hole would be in contradiction to the purpose of forming a bush. Accordingly, the person skilled in the art starting from the flow-drilling process disclosed in D9 without the knowledge of the invention claimed in the patent in suit would not consider the object formulated by the appellant.

The object formulated by the respondent, namely an improvement in corrosion resistance, is not convincing either. The patent in suit discloses indeed that the rotation of the boring segment results in a fine-grained and corrosion-resistant layer formed by recrystallisation. However, the flow drilling according to D9 also results in a fine-grained layer of material formed by recrystallisation which inevitably has improved corrosion resistance compared to the material surrounding the layer.

Therefore, the object underlying the claimed invention starting from the method disclosed in D9 can be seen in the provision of an alternative method for forming holes having a corrosion-resistant surface (see paragraph [0001] of the patent in suit).

According to claim 1, this object is achieved by providing the rotating shaft with a boring segment having helical threads, which carries out without a cutting action said working, frictionally heating, and extracting a portion of the material, and whose rotational velocity and insertion rate is adjusted such that working extends around the hole beyond the diameter of the boring segment and such that frictional heat generated in the hole causes rapid recrystallisation of the worked metal.

5.3 Neither the common general knowledge of the person skilled in the art nor the prior art renders it obvious to achieve the object above according to present claim 1 when starting from D9.

As already mentioned, in a flow-drilling process the removal of material from the workpiece is not desired (see D9, page 167, left-hand column, first paragraph). Therefore, the person skilled in the art would not consider the use of a boring segment with helical threads, which remove the material from the workpiece, in flow drilling.

The appellant correctly pointed out that each of D3 and D2 relates to flow drilling and discloses a boring segment with a helical thread. However, these boring segments have functions unrelated to the formation of

the hole by flow drilling and the working of its walls by recystallisation. In D3 the boring segment with the helical threads drills a small hole previous to the actual flow drilling (see column 1, line 38-55). In D2 a conventional drill bit with helical threads (11) is used after the flow drilling to finish the hole (see column 3, line 1-7). Therefore, none of these documents renders it obvious to provide the boring segment used in the method according to D9 with helical threads.

5.4 Compared to D9, D3 is a less promising starting point for the assessment of inventive step by means of the problem-solution approach.

D3, which refers to a flow drilling process, does not disclose its application to aluminium, and does not mention that recrystallisation occurs during the flow drilling process. Nevertheless, the board agrees with the appellants that the person skilled in the art would be aware that the flow-drilling process mentioned in this document implies a refinement of the structure by dynamic recrystallisation, as evidenced for instance by the first paragraph of the left-hand column on page 167 of D9. However, by the same token he would also be aware that said flow-drilling process does not involve material's removal but its displacement, as evidenced by the very same first paragraph of the left-hand column on page 167 of D9.

Therefore, for the same reasons as explained above, the person skilled in the art would not consider in the process according to D3 the use of a boring segment with helical threads to form a hole by flow drilling, and in particular to carry out, without a cutting

action, working and frictionally heating to cause rapid recrystallisation in the material extending around the hole beyond the diameter of the boring segment.

5.5 In view of the above findings, the subject-matter of claim 1 involves an inventive step.

6. Refund of the appeal fee

According to Rule 103 EPC the appeal fee is reimbursed where the board of appeal deems an appeal to be allowable, if such reimbursement is equitable by reason of a substantial procedural violation.

In the present case the opposition division did not admit the late-filed documents D9 and D10, since they were considered not to be prima facie relevant (see the decision under appeal, page 5). That is a correct criterion for deciding whether or not to admit late-filed documents.

It is true that the board, unlike the opposition division, found that these documents were indeed prima facie relevant. However, this means merely that the opposition division weighed up the contents of D9 and D10, and their impact on the patent in suit, differently from the board. This fact does not amount to a substantial procedural violation.

Under these circumstances, the conditions for reimbursing the appeal fee are not met.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent on the basis of

   – claims 1 to 6 filed during the oral proceedings,
   – description columns 1 to 6 as granted, column 7 as filed during oral proceedings,
   – Figures 1 to 7 as granted.

3. The request for reimbursement of the appeal fee is dismissed.

The Registrar: The Chairman:

V. Commare T. Kriner