

Internal distribution code:

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

**Datasheet for the decision
of 28 March 2023**

Case Number: T 2284/19 - 3.2.06

Application Number: 15166328.3

Publication Number: 2960431

IPC: F01D5/00

Language of the proceedings: EN

Title of invention:

SYSTEMS AND METHODS FOR REPAIRING A SURFACE OF DAMAGED METAL
COMPONENTS

Patent Proprietor:

Raytheon Technologies Corporation

Opponents:

Siemens Aktiengesellschaft
Safran Aircraft Engines

Headword:

Relevant legal provisions:

EPC Art. 54, 56

Keyword:

Novelty - (no)

Inventive step - (no)

Auxiliary requests 11 and 12 - Contravention of the principle
of prohibition of reformatio in peius (yes)

Decisions cited:

G 0001/99

Catchword:



Beschwerdekammern
Boards of Appeal
Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 2284/19 - 3.2.06

D E C I S I O N
of Technical Board of Appeal 3.2.06
of 28 March 2023

Appellant: Siemens Aktiengesellschaft
(Opponent 1) Werner-von-Siemens-Straße 1
80333 München (DE)

Representative: Paul & Albrecht Patentanwälte PartG mbB
Stresemannallee 4b
41460 Neuss (DE)

Respondent: Raytheon Technologies Corporation
(Patent Proprietor) 10 Farm Springs Road
Farmington, CT 06032 (US)

Representative: Dehns
St. Bride's House
10 Salisbury Square
London EC4Y 8JD (GB)

Party as of right: Safran Aircraft Engines
(Opponent 2) 2 boulevard du Général Martial Valin
75015 Paris (FR)

Representative: Cabinet Beau de Loménie
158, rue de l'Université
75340 Paris Cedex 07 (FR)

Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
19 July 2019 concerning maintenance of the
European Patent No. 2960431 in amended form.**

Composition of the Board:

Chairman	M. Harrison
Members:	M. Dorfstätter
	W. Sekretaruk

Summary of Facts and Submissions

- I. An appeal was filed by the appellant (opponent 1) against the interlocutory decision of the opposition division in which it found that, account being taken of the amendments made during the proceedings before the opposition division, European patent No. 2 960 431 met the requirements of the EPC.
- II. The appellant (opponent 1) and the other party (opponent 2) requested that the decision under appeal be set aside and that the European patent be revoked.
- III. The respondent (patent proprietor) requested that the appeal be dismissed as a main request or, failing this, that the patent be maintained in amended form based on the claims of one of the auxiliary requests 1 to 13 filed with the reply to the grounds of appeal or based on one of auxiliary requests 2A, 5A, 8A, 9A, 10A or 13A filed with the submission of 20 March 2023.
- IV. The following document is relevant for the present decision:

D601 EP 1 522 375 A1
- V. The Board issued a summons to oral proceedings and a subsequent communication, in which it indicated *inter alia* that the subject-matter of claim 1 of all requests was seemingly not novel over D601, and that in regard to inventive step, it failed to see which technical effect might be attributed to the particular range defined in claim 1 when considering the whole scope thereof. The Board further noted that the auxiliary

requests might be considered to lack substantiation and that they could be held inadmissible. The Board also indicated that each of auxiliary requests 11 and 12 appeared to contradict the prohibition of *reformatio in peius*.

- VI. With the consent of all parties the oral proceedings were held as a videoconference.
- VII. At the end of the oral proceedings, the requests were as stated above.
- VIII. Claim 1 of the main request reads as follows:
- "A method for repairing a metal component comprising: applying a repair material comprising an additive material on to a surface of a damaged portion (114) of the metal component wherein the additive material is capable of lowering the melting point of the repair material between 6 to 33°C (10 to 60 degrees Fahrenheit); applying a layer of diffusive metal material (202) to a surface of the repair material; applying heat to the layer of diffusive metal material (202) to bond the repair material to the metal component; allowing the additive material of the repair material to diffuse at least partially into the layer of diffusive metal material (202); and removing the layer of diffusive metal material (202)."
- IX. Claim 1 of auxiliary request 1 reads as for the main request, but with the following changes (emphasis added by the Board):

The feature

"wherein the additive material is capable of lowering the melting point of the repair material between 6 to 33°C (10 to 60 degrees Fahrenheit)"

is amended to:

"wherein the additive material is capable of lowering the melting point of the repair material by 6 to 33°C (10 to 60 degrees Fahrenheit)".

The feature

"allowing the additive material of the repair material to diffuse at least partially into the layer of diffusive metal material (202)"

is amended to:

"allowing the additive material of the repair material to diffuse ~~at least~~ partially into the layer of diffusive metal material (202)".

- X. Claim 1 of auxiliary request 2 reads as for the main request, but with the following changes (emphasis added by the Board):

The feature

"wherein the additive material is capable of lowering the melting point of the repair material between 6 to 33°C (10 to 60 degrees Fahrenheit)"

is amended to:

"wherein the additive material lowers the melting point of the repair material between 6 to 33°C (10 to 60 degrees Fahrenheit)".

- XI. Claim 1 of auxiliary request 3 reads as for the main request, but with the temperature range narrowed to "between 11 to 33°C (20 to 60 degrees Fahrenheit)".

XII. Claim 1 of auxiliary request 4 reads as for the main request, but with the temperature range narrowed to "between 22 to 33°C (40 to 60 degrees Fahrenheit)".

XIII. Claim 1 of auxiliary request 5 reads as for auxiliary request 2, but with the temperature range narrowed to "between 22 to 33°C (40 to 60 degrees Fahrenheit)".

XIV. Claim 1 of auxiliary request 6 reads as for the main request, but with the following feature added:

"and wherein the additive material comprises boron".

XV. Claim 1 of auxiliary request 7 reads as for auxiliary request 6, but with the following changes (emphasis added by the Board):

The feature

"allowing the additive material of the repair material to diffuse at least partially into the layer of diffusive metal material (202)"

is amended to:

"allowing the additive material of the repair material to diffuse ~~at least~~ partially into the layer of diffusive metal material (202)".

XVI. Claim 1 of auxiliary request 8 reads as for auxiliary request 2, but with the following feature appended:

"wherein the repair material comprises a same material as the metal component."

XVII. Claim 1 of auxiliary request 9 reads as for auxiliary request 2, but with the following feature appended:

"wherein the layer of diffusive metal material (202) comprises a metal material capable of receiving the additive material."

XVIII. Claim 1 of auxiliary request 10 reads as for auxiliary request 2, but with the following feature appended:

"wherein the repair material comprises cobalt or nickel."

XIX. Claim 1 of auxiliary request 11 reads as follows (additions to the main request are underlined, deletions are struck-through):

"A method for repairing a metal ~~component~~ sealing interface of a blade outer air seal segment comprising: applying a repair material comprising an additive material on to a surface of a damaged portion (114) of the ~~metal component~~ sealing interface such that the repair material forms a layer with a profile that is larger than the original, undamaged shape and configuration of the damaged portion of the sealing interface; ~~wherein the additive material is capable of lowering the melting point of the repair material between 6 to 33°C (10 to 60 degrees Fahrenheit);~~ applying a layer of diffusive metal material (202) to a surface of the repair material; applying heat to the layer of diffusive metal material (202) to bond the repair material to the ~~metal component~~ sealing interface; allowing the additive material of the repair material to diffuse at least partially into the layer of diffusive metal material (202); and removing the layer of diffusive metal material (202)."

XX. Claim 1 of auxiliary request 12 reads as for auxiliary request 11, but with the following changes (emphasis added by the Board):

The feature

"allowing the additive material of the repair material to diffuse at least partially into the layer of diffusive metal material (202)"

is amended to:

"allowing the additive material of the repair material to diffuse ~~at least~~ partially into the layer of diffusive metal material (202)".

XXI. Claim 1 of auxiliary request 13 reads as follows (additions to the main request are underlined, deletions are struck-through):

"A method for repairing a metal ~~component~~ sealing interface of a blade outer air seal segment comprising: applying a repair material comprising an additive material on to a surface of a damaged portion (114) of the ~~metal component~~ sealing interface such that the repair material forms a layer with a profile that is larger than the original, undamaged shape and configuration of the damaged portion of the sealing interface and wherein the additive material ~~is capable of lowering~~ lowers the melting point of the repair material between 6 to 33°C (10 to 60 degrees Fahrenheit); applying a layer of diffusive metal material (202) to a surface of the repair material; applying heat to the layer of diffusive metal material (202) to bond the repair material to the ~~metal component~~ sealing interface;

allowing the additive material of the repair material to diffuse at least partially into the layer of diffusive metal material (202); and removing the layer of diffusive metal material (202)."

XXII. In the auxiliary requests, further amendments were made to other claims, which are however not relevant for the present decision.

XXIII. Claim 1 of auxiliary requests 2A, 5A, 8A, 9A, 10A and 13A read as the respective claim 1 of auxiliary requests 2, 5, 8, 9, 10 and 13.

XXIV. The arguments of the appellant and the other party may be summarised as follows:

Claim 1 of the main request was not novel over D601. The feature that the additive material was capable of lowering the melting point of the repair material between 6 to 33°C only defined the capability of the melting point suppressant but did not limit the claim to the actual provision of an amount achieving such drop of the melting point.

The definition of a melting point drop relative to the melting point of the repair material without the additive did not render the claimed method inventive. Without any limitation as to the properties of the repair material and its initial melting point the claimed temperature range was arbitrary.

None of the auxiliary requests could establish novelty and inventive step.

XXV. The respondent's arguments may be summarised as follows:

Claim 1 of the main request was novel over D601. The feature that the additive material was capable of lowering the melting point of the repair material between 6 to 33°C only made sense if the repair material and the component to be repaired were materials with similar properties. The definition thus also related to a melting point drop relative to the material of the component.

The claimed method also involved an inventive step. Lowering the melting point of the repair material by only 6 to 33°C allowed for a better bond between the repair material and the material of the component.

XXVI. Further arguments of the parties are dealt with in the Reasons below.

Reasons for the Decision

1. Main request - novelty

The subject-matter of claim 1 is not novel over D601 (Article 54 EPC). The claimed method is not limited to the provision of additive material in an amount that actually lowers the melting point by 6 to 33°C.

1.1 D601 describes a method for repairing a turbine component made of metal. The method comprises applying a repair material comprising an additive material onto a surface of a damaged portion of the turbine component, whereby boron is mentioned as the preferred melting point suppressant (which is considered as an additive material in the sense of the contested patent). It also comprises the other steps of claim 1. All this was not contested by the parties.

- 1.2 D601 does not describe by which amount the melting point of the repair material is suppressed. Nor does it describe how much boron is present in the repair material. D601 therefore does not disclose that the additive material is present in an amount that actually lowers the melting point of the repair material between 6 to 33°C. This was also not contested by the parties.

However, the use of boron as a melting point suppressant in D601 fulfills the definition in claim 1, that "the additive material is capable of lowering the melting point of the repair material between 6 to 33°C (10 to 60 degrees Fahrenheit)". As already explained in the Board's communication (see point 2), boron indeed constitutes an additive material that is capable of lowering the melting point of a repair material by a wide range of temperatures. Boron is also considered capable of lowering the melting point by any value between 6 and 33°C, this merely depending on how much boron is actually added to the repair material. This fact was also not contested by the parties.

- 1.3 The respondent interpreted the contentious definition as defining not only the identity of the additive but also the amount in which it is actually provided. The respondent argued that the definition that the additive was "capable of lowering the temperature between 6 to 33°C" meant that the additive was provided in an amount that it actually lowered the temperature by a certain amount. Already the term "additive" allegedly conveyed the concept of the amount in which the additive was present. Furthermore, the defined temperature range only made sense when the additive was actually used in an amount achieving the claimed temperature suppression.

These arguments are not accepted. The term "additive" refers to the substance used to suppress the melting point of the repair material. It is clear that boron as used in the embodiment of D601 exemplifies a possible additive for this purpose. Claim 1 does not define the type of additive. The type, or the "identity" as the respondent put it, is only indirectly defined via its capability of lowering the melting point of the repair material. As opposed to "constituents" which could be considered as being present in higher percentages than additives, the term "additive" might convey the concept of relatively small amounts. However, the Board cannot see how this could imply that any amount referred to thereafter would imply that the additive is actually present in that amount. Nothing speaks against interpreting the contentious feature as defining the type of the melting point suppressant by referring to a certain capability. It does so by defining that the additive is capable of lowering the melting point of the repair material by a certain amount. Other melting point suppressants, which are capable of lowering it only by a smaller or only by a greater amount, are thereby excluded.

This understanding is also in line with long-standing case law of the boards of appeal to the nature of expressions like "suitable for" or "capable of", in that they do not limit the claimed subject-matter to actually performing what they are capable of or intended for.

- 1.4 With claim 1 not defining by which amount the melting point of the repair material is actually lowered, and with D601 describing boron as a melting point suppressant that is capable of lowering the melting

point by an amount within the claimed range, the subject-matter of claim 1 lacks novelty over D601 (Article 54 EPC).

Already for this reason, the main request is not allowable.

2. *Main request - inventive step*

In view of various auxiliary requests on file, the Board also considered inventive step and decided that the subject-matter of claim 1, even if the melting point of the repair material was actually lowered by 6 to 33°C, would not involve an inventive step (Article 56 EPC). With the nature of the repair material not being stated, and thus the initial melting point of the repair material without the additive not being known, the claimed range for lowering the melting point becomes entirely arbitrary.

2.1 Claim 1 does not define the type of repair material. The respondent, however, argued that the term "repair material" conveyed certain physical properties. In order to retain the characteristics of the component, the repair material had to have similar physical properties to the component. Even if the repair material were different to the metal component, a skilled person would still choose a material having similar characteristics.

This is also not accepted. That the repair material must be suitable to retain the characteristics of the unrepaired component is by no means implicit. As argued by the other party, it is equally conceivable that the component will see "a second life" in which it is put to action in a less demanding environment. In the case

of a turbine component this would mean being used at a lower temperature or running at a lower speed. In such a case, the repair material can be different from the material of the component. It can have a considerably lower melting point than the component.

The respondent's argument that one always tried to repair a component back to its original characteristics, is no more than an unfounded allegation and found unconvincing by the Board. There might be good reasons to settle for an imperfect repair not achieving the full potential of the undamaged component but at a considerably lower cost.

- 2.2 The respondent also argued that due to the claimed temperature range, the heating took place at a temperature as high as possible with respect to the component. Heating closer to the melting point of the component provided a better bond between the repair material and the component.

The Board comprehends this argument but does not accept that it is applicable to the claim as formulated. Claim 1 is not restricted to a repair material having a melting point close to the one of the metal component. Starting from the repair material already having a considerably lower melting point than the metal component, lowering this melting point further (and even by only 6°C) would not achieve a better bond. On the contrary, adding a melting point depressant to a repair material already having a low melting point would even be detrimental to achieving a good bond.

Furthermore, and as argued by the appellant, claim 1 does not define a specific method to be applied. As claim 1 covers different bonding methods including

welding, brazing and soldering, the same temperature difference may yield strong bonds but with different strengths, possibly without fusing the metal of the component to be repaired.

- 2.3 Claim 1 does therefore not define the melting point of the repair material in absolute terms. Nor does it define the relation between the melting point of the repair material relative to the one of the component. It is left open how big a difference there is between the two melting points.

The range of 6 to 33°C is thus arbitrary. It cannot therefore contribute to an inventive step.

- 2.4 The main request is thus also not allowable due to the subject-matter of claim 1 not involving an inventive step (Article 56 EPC).

3. *Auxiliary requests 1-7*

Claim 1 of auxiliary requests 1 to 7 does not involve an inventive step (Article 56 EPC). The amendments made therein do not change the finding with respect to the main request.

Having been explicitly asked by the Chairman during the oral proceedings, the respondent answered that its arguments for these requests would be the same as for the main request. The Board thus has no reason to change its view, which is as follows:

Auxiliary request 1

The substitution of the expression "between 6 to 33°C" by the expression "by 6 to 33°C" does not have any impact on the lack of definition with

respect to the nature of the repair material and its melting point. Nor does the deletion of the term "at least". This was also not contested. The subject-matter of claim 1 of the first auxiliary request therefore lacks novelty (Article 54 EPC) and inventive step (Article 56 EPC) for the same reasons as apply to the main request.

Auxiliary request 2

The substitution of the feature that the additive material is capable of lowering the melting point of the repair material by the feature that the additive material lowers it, whilst it may be capable of overcoming the lack of novelty, has no impact on the considerations regarding inventive step as laid out above in view of the main request. The subject-matter of claim 1 of the second auxiliary request therefore lacks inventive step (Article 56 EPC) for the same reasons as apply to the main request.

Auxiliary request 3

Claim 1 of the third auxiliary request is identical to claim 1 of the main request with the exception of defining the lower end of the temperature range as 11°C instead of 6°C. The claim still merely defines the capability of the additive of lowering the melting point by a certain degree. The subject-matter of claim 1 of the third auxiliary request thus lacks novelty (Article 54 EPC) and inventive step (Article 56 EPC) for the same reasons as apply to the main request.

Auxiliary request 4

The same considerations apply *mutatis mutandis* for claim 1 of the fourth auxiliary request in which

the lower end of the temperature range is defined as 22°C instead of 6°C. The subject-matter of claim 1 of the fourth auxiliary request thus lacks novelty (Article 54 EPC) and inventive step (Article 56 EPC) for the same reasons as apply to the main request.

Auxiliary request 5

With respect to claim 1 of the fifth auxiliary request the same considerations apply *mutatis mutandis* as for the second and fourth auxiliary request. The subject-matter of claim 1 of the fifth auxiliary request thus lacks inventive step (Article 56 EPC) for the same reasons as apply to auxiliary requests 2 and 4.

Auxiliary request 6

Claim 1 of the sixth auxiliary request is identical to claim 1 of the main request with the exception of additionally defining boron as the additive material. As D601 already discloses boron as the melting point depressant, the subject-matter of claim 1 of the sixth auxiliary request lacks novelty (Article 54 EPC) and inventive step (Article 56 EPC) for the same reasons as apply to the main request.

Auxiliary request 7

As already explained above with respect to the first auxiliary request, the deletion of the term "at least" does not have any impact on the lack of definition of the repair material. Despite the additive material being defined as comprising boron, the subject-matter of claim 1 of the sixth auxiliary request lacks novelty (Article 54 EPC) and inventive step (Article 56 EPC) for the same

reasons as apply to the first and sixth auxiliary requests.

None of auxiliary requests 1 to 7 is therefore allowable.

4. *Auxiliary request 8*

Claim 1 of the eighth auxiliary request includes a definition of the repair material in that it states that "it comprises a same material as the metal component."

The respondent argued that it was intended to link the repair material with the component. Although the melting point drop related to the repair material, the melting point of the repair material was to be understood as being also slightly below the melting point of the component.

This is not accepted. The formulation "comprises a same material" is much broader than the understanding put forward by the respondent. "Comprising a same material" could still refer to a very small amount of that same material whilst the remainder making up the majority of the material is different. The introduced wording therefore does not restrict the repair material to having properties similar to the component. Claim 1 still embraces repair materials having a considerably lower melting point than the material of the component. The relative temperature drop of 6 to 33°C with respect to the non-defined melting point of the repair material without the additive is therefore just as arbitrary as for the main request. The subject-matter of claim 1 of the eighth auxiliary request thus lacks inventive step

(Article 56 EPC) for the same reasons as apply to the main request.

Auxiliary request 8 is therefore not allowable.

5. *Auxiliary request 9*

The respondent did not put forward any arguments with respect to inventive step of claim 1 of the the ninth auxiliary request. The Board also cannot see a further difference over D601 in the feature that the layer of diffusive metal material comprises a metal material capable of receiving the additive material. The subject-matter of claim 1 of the ninth auxiliary request thus lacks inventive step (Article 56 EPC) for the same reasons as apply to the second auxiliary request.

Auxiliary request 9 is therefore not allowable.

6. *Auxiliary request 10*

The respondent also did not put forward any arguments with respect to inventive step of claim 1 of the 10th auxiliary request. The further definition that the repair material comprises cobalt or nickel still leaves open what the component comprises. The combination of repair material and metal components as well as their respective melting points can therefore still be arbitrarily chosen. The relative melting point drop with respect to the repair material is therefore also arbitrary, just as for the second auxiliary request. The subject-matter of claim 1 of the 10th auxiliary request thus lacks inventive step (Article 56 EPC) for the same reasons as apply to the 10th auxiliary request.

Auxiliary request 10 is therefore not allowable.

7. *Auxiliary requests 11 and 12*

In claim 1 of auxiliary requests 11 and 12 the definition of the melting point drop has been removed, resulting in broadening of the scope of the claim as found allowable by the opposition division. Allowing such a claim would put the appellant in a worse situation than it was before filing its appeal, something which goes against the principle of prohibition of *reformatio in peius*. The Enlarged Board of Appeal has established very limited exceptions to this general principle (see G1/99). These are however not applicable to the present case. Nor was this argued by the respondent.

Auxiliary requests 11 and 12 are therefore not allowable.

8. *Auxiliary request 13*

Claim 1 of the 13th auxiliary request includes two amendments with respect to the main request. The first amendment is the limitation to the component being a sealing interface of a blade outer air seal segment. The second amendment is a definition that the repair material forms a layer with a profile that is larger than the original undamaged shape and configuration of the damaged portion of the sealing interface.

8.1 As to the first amendment, the respondent argued that D601 did not mention a sealing interface of a blade outer air seal segment and that it was not obvious for

a skilled person to apply the method described in D601 to such a turbine component.

The Board does not concur. As argued by the appellant, D601 mentions that the disclosed method can be applied to parts of a turbine. This is also explicitly claimed in claim 16 of D601. The respondent's argument that there was no motivation for a skilled person to apply the specific method steps to a blade outer air seal segment is not convincing. As also argued by the other party, there is nothing unexpected when applying the known technique to that particular component of the turbine. The blade outer air seal segment may well be particularly susceptible to damage as argued by the respondent. However, this makes the repair method of D601 just more useful but cannot render its application inventive.

The further argument of the respondent involves having to apply the method of D601 to the blade outer air seal segment and that this had not been recognised, which is not convincing either. D601 discloses the method for repairing any turbine component (including e.g. a blade outer air seal segment) without mentioning a single specific one of them. Selecting and mentioning a component known to be prone to damage and suitable for repair by the known method cannot however establish inventive step.

8.2 As to the second amendment, the respondent did not argue that this feature contributed to inventive step. Nor can the Board see any such contribution.

8.3 The subject-matter of claim 1 of the 13th auxiliary request thus lacks inventive step (Article 56 EPC) for

the same reasons as apply to the second auxiliary request.

Auxiliary request 13 is therefore not allowable.

9. *Auxiliary requests 2A, 5A, 8A, 9A, 10A and 13A*

Claim 1 of auxiliary requests 2A, 5A, 8A, 9A, 10A and 13A is identical to claim 1 of auxiliary requests 2, 5, 8, 9, 10 and 13 respectively. Therefore, the Board comes to the same conclusions with respect to novelty and inventive step as for these requests.

None of auxiliary requests 2A, 5A, 8A, 9A, 10A or 13A is therefore allowable.

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:



D. Grundner

M. Harrison

Decision electronically authenticated