

Internal distribution code:

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

**Datasheet for the decision
of 22 November 2011**

Case Number: T 0899/10 - 3.2.07
Application Number: 07121706.1
Publication Number: 1930477
IPC: C23F 1/44, C25F 5/00,
C25F 3/14, C23C 10/20,
F01D 5/00

Language of the proceedings: EN

Title of invention:

Method for selectively removing coating from metal substrates

Applicant:

GENERAL ELECTRIC COMPANY

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 56
EPC R. 115(2)
RPBA Art. 15(5)

Keyword:

"Oral proceedings - continued in the absence of the
appeallant"
"Inventive step (all requests - no)"

Decisions cited:

-

Catchword:

-



Case Number: T 0899/10 - 3.2.07

D E C I S I O N
of the Technical Board of Appeal 3.2.07
of 22 November 2011

Appellant: GENERAL ELECTRIC COMPANY
(Applicant) 1 River Road
Schenectady
NY 12345 (US)

Representative: Szary, Anne Catherine
London Patent Operation
GE International Inc.
15 John Adam Street
London WC2N 6LU (GB)

Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 15 October 2009
refusing European application No. 07121706.1
pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: H. Meinders
Members: H. Hahn
I. Beckedorf

Summary of Facts and Submissions

- I. The applicant lodged an appeal against the decision of the Examining Division to refuse the European patent application No. 07 121 706.1.
- II. In this decision the following documents are cited:
- D1 = EP-A-1 162 286
D2 = US-A-6 036 995
D3 = EP-A-1 505 176
D4 = US-A-2003/0062271
- III. The Examining Division held that claim 1 of the single request dated 6 August 2009 met the requirement of Article 123(2) EPC but that its subject-matter lacked inventive step over an obvious combination of the teachings of the closest prior art D1 and D2.
- IV. With its grounds of appeal dated 25 February 2010 the appellant requested to set aside the decision and to grant a patent on the basis of claims 1-8 of the main request as filed with letter of 6 August 2009, of claims 1-7 of the first auxiliary request or of claims 1-6 of the second auxiliary request, both as filed with the grounds of appeal. In case that the Board should consider a decision other than according to the aforementioned requests, oral proceedings were requested.

V. Independent claim 1 of the main request reads as follows:

"1. A method for selectively removing an overlay coating from a substrate, wherein the coating has an aluminum content of less than about 12% by weight, comprising:
diffusing aluminum into the coating; and
contacting the coating with an aqueous composition including at least one of an acid having the formula H_xAF_6 , and precursors to said acid, A being selected from the group consisting of Si, Ge, Ti, Zr, Al, and Ga, and x being 1-6;
wherein diffusing aluminum into the coating comprises:
applying at least one layer of a slurry to the coating, the slurry being substantially free of hexavalent chromium and comprising colloidal silica and particles of an aluminum-based powder; and
heat treating the slurry, under conditions sufficient to remove volatile components from the slurry, and to cause diffusion of aluminum into the coating."

VI. Independent claim 1 of the first auxiliary request reads as follows (amendments compared to claim 1 of the main request are in bold; emphasis added by the Board):

"1. A method for selectively removing an overlay coating from a substrate, wherein the coating has an aluminum content of less than about 12% by weight, comprising:
diffusing aluminum into the coating; and
contacting the coating with an aqueous composition including at least one of an acid having the formula H_xAF_6 , and precursors to said acid, A being selected

from the group consisting of Si, Ge, Ti, Zr, Al, and Ga, and x being 1-6;

wherein diffusing aluminum into the coating comprises: applying at least one layer of a slurry to the coating, the slurry being substantially free of hexavalent chromium and comprising colloidal silica and particles of an aluminum-based powder **and at least one organic stabilizer which contains at least two hydroxyl groups;** and

heat treating the slurry, under conditions sufficient to remove volatile components from the slurry, and to cause diffusion of aluminum into the coating."

VII. Independent claim 1 of the second auxiliary request reads as follows (amendments compared to claim 1 of the main request are in bold; emphasis added by the Board):

"1. A method for selectively removing an overlay coating from a substrate, wherein the coating has an aluminum content of less than about 12% by weight, comprising:
diffusing aluminum into the coating; and
contacting the coating with an aqueous composition including at least one of an acid having the formula H_xAF_6 , and precursors to said acid, A being selected from the group consisting of Si, Ge, Ti, Zr, Al, and Ga, and x being 1-6;

wherein diffusing aluminum into the coating comprises: applying at least one layer of a slurry to the coating, the slurry being substantially free of hexavalent chromium and comprising colloidal silica and particles of an aluminum-based powder; and
heat treating the slurry, under conditions sufficient

to remove volatile components from the slurry, and to cause diffusion of aluminum into the coating;
immersing the substrate in a bath of the aqueous composition, wherein an electric current flows through the bath of aqueous composition while the substrate is immersed therein."

VIII. With a communication dated 2 August 2011 and annexed to the summons for oral proceedings the Board presented its preliminary opinion with respect to claims 1-8 of the main request as filed with letter of 6 August 2009, on claims 1-7 of the first auxiliary request and on claims 1-6 of the second auxiliary request, both as filed with the grounds of appeal dated 25 February 2010. No further amended claims having been filed since.

The Board stated amongst others that the subject-matter of the claims 1 of the main request and the first auxiliary request lacked inventive step over a combination of the teachings of D1 and D3 while the subject-matter of claim 1 of the second auxiliary request lacked inventive step over an obvious combination of the teachings of D1, D3 and D4:

*"3.1 The appellant is correct in that D2 does **not** disclose any aluminiding slurry comprising colloidal silica. The appellant's arguments concerning the combination of the teachings of D1 and D2 are therefore accepted.*

However, a combination of the teachings of D1 and D3 likewise appears to arrive in an obvious manner at the subject-matter of claims 1 of the main and first auxiliary request, while an obvious combination of the

teachings of D1, D3 and D4 appears to arrive at the subject-matter of claim 1 of the second auxiliary request as will be explained below:

3.2 D1 discloses a method for selectively removing a coating from a substrate, comprising: diffusing aluminium into the coating (see column 12, item 39); and contacting the coating with an aqueous solution including at least one of an acid having the formula H_xAF_6 and precursors to said acid, A being selected from the group consisting of Si, Ge, Ti, Zr, Al and Ga (preferably H_2SiF_6 or H_2ZrF_6) and x being 1-6, more preferably 1-3 (see column 2, paragraph [0007]; claims 1-8). Examples 1-5 disclose such processes wherein the coating is an overlay coating on nickel-base superalloy substrates of the formula MCrAlY (M = Ni, Co or Fe or their combinations; see also column 1, paragraph [0003] and column 11, items 23 and 26) and have an Al content of less than about 12% by weight (Example 1, Al = 10 wt%; Example 2, Al = 6 wt %). The solution for immersion of the MCrAlY coated and aluminided superalloy substrates according to examples 1-4 comprised a mixture of fluorosilicic acid and phosphoric acid while that of example 5 comprised only fluorosilicic acid at elevated temperatures of 72°C and 80°C for periods between 15 hours and 3 hours, respectively (see examples 1-5).

The subject matter of claim 1 of the main request thus appears to differ from the disclosure of D1 only in that the manner of diffusing Al into the overlay coating is not specified, namely that the slurry is substantially free of hexavalent chromium and comprises colloidal silica and particles of an aluminium-based

powder and heat treating the slurry, under conditions to remove volatile components from the slurry, and cause diffusion of aluminium into the coating.

These distinguishing features can be regarded as solving the problem of providing for an Al diffusion method that is suitable for providing aluminium enrichment to the coating, which is based on a slurry that does not contain toxic components but is stable and does not generate gases (compare D3, page 2, paragraph [0010] to page 3, paragraph [0016]).

The aluminiding method as required by claim 1 of the main request is, however, already known from document D3 which discloses a specific aluminising slurry which is substantially free of hexavalent chromium and includes colloidal silica and aluminium particles (and optionally an organic stabilizer containing at least two hydroxyl groups; see page 2, lines 3 to 18; page 3, lines 28 to 40; page 5, lines 29 to 33; page 6, lines 4 to 16; page 7, line 31 to page 8, line 10; and claims 1-9).

The person skilled in the art would therefore regard it as a normal procedure to include the slurry aluminiding method features of document D3 in the aluminising step of the selective coating removal method of document D1. In this context it should additionally be considered that both documents D1 and D3 are applications from one and the same company so that the person skilled in the art starting from the method of D1 would purchase and use or apply commercial products provided by the company performing that method. In so doing, it appears that the skilled person would arrive at the entire

subject matter of claim 1 of the main request. The subject matter of claim 1 of the main request therefore appears to be devoid of inventive step (Article 56 EPC).

3.3 The same conclusion as in point 3.2 above appears to be valid with respect to the subject-matter of claim 1 of the first auxiliary request - which claim 1 additionally defines that the slurry further comprises "and at least one organic stabilizer which contains at least two hydroxyl groups" - since a preferred aluminiding slurry according to D3 includes such an organic stabilizer containing at least two hydroxyl groups (see page 3, lines 28 to 40; claims 1, 4, 6 to 9). The subject matter of claim 1 of the first auxiliary request thus appears to be devoid of inventive step, as well (Article 56 EPC).

3.4 The subject-matter of claim 1 of the second auxiliary request appears to differ from the disclosure of D1 in that

*i) the manner of diffusing Al into the coating using a specific aluminiding slurry is not specified; and
ii) that the substrate is immersed in a bath of aqueous composition, wherein electric current flows through the bath of aqueous composition while the substrate is immersed therein.*

The first feature i) appears to provide for an Al diffusion method that is suitable for providing aluminium enrichment to the coating, which is based on a slurry that does not contain toxic components but is stable and does not generate gases (compare D3, page 2, paragraph [0010] to page 3, paragraph [0016]).

The second feature ii) appears to provide for an accelerated removal of the coating from the immersed substrate (compare present application as originally filed, page 14, second paragraph). Thus feature ii) appears to deal with **a different second (partial) problem** which appears to have nothing in common with the first (partial) problem of providing a specific aluminiding method. Consequently, in full agreement with the longstanding practice of the Boards of Appeal (see Case Law of the Boards of Appeal of the European Patent Office, 6th edition 2010, chapter I.D.8.2.2) a further document can be used in order to discuss the second partial problem.

D4 discloses an electrochemical stripping method for selectively removing at least one coating from the surface from a substrate (e.g. a turbine component) wherein the substrate is immersed in an aqueous composition through which electrical current flows; said composition includes an acid having the formula H_xAF_6 or precursors to said acid, wherein A is selected from the group consisting of Si, Ge, Ti, Zr, Al and Ga (preferably H_2SiF_6 or H_2ZrF_6) and x being 1-6, more preferably 1-3 (see abstract; page 1, paragraphs [0001] to [0004] and page 2, paragraphs [0014] to [0016]; claims 1-6; figures 1, 4, 9). Said coating can be an overlay coating of the type $MCrAl(X)$, where M is Ni, Co, or Fe, or combinations thereof; and X is an element selected from the group consisting of Y, Ta, Si, Hf, Ti, Zr, B, C, and combinations thereof; and the substrate is preferably a nickel-based or cobalt-based superalloy which is a component of a turbine engine (see page 3, paragraphs [0045] to [0048] and page 6, paragraph

[0077]; claims 12, 15 and 18-20). D4 mentions electrochemical stripping times which are usually in the range of from about 1 minute to about 36 hours, preferably from about 5 minutes to about 8 hours, and especially preferred in the range of about 10 minutes to about 3 hours (see page 5, paragraph [0066]).

Taking account of the fact that D4 utilizes basically the same aqueous stripping composition as D1 but, due to the use of an electrochemical stripping system, allows to considerably shorten the treatment time of the mere chemical stripping system according to D1, it appears to be obvious that the person skilled in the art would apply the electrochemical stripping system according to D4 in order to solve the said partial problem of accelerating the selective removal of the overlay coating. Thereby the person skilled in the art appears to arrive at the subject-matter of claim 1 of the second auxiliary request without inventive skill. Claim 1 of the second auxiliary request therefore appears to lack inventive step, as well (Article 56 EPC)."

The appellant was given the opportunity to file observations to this communication which should be filed well in advance, i.e. at least one month, before the date of the oral proceedings in order to give sufficient time to the Board to prepare for the oral proceedings.

- IX. With fax of 21 November 2011 the appellant submitted that it will not be presented at the oral proceedings. Furthermore, it requested "a decision based on the requests and arguments at present on file".

- X. Oral proceedings were held on 22 November 2011. As announced with its fax dated 21 November 2011 the appellant did not appear so that the oral proceedings were continued in its absence in accordance with Rule 115(2) EPC and Article 15(3) RPBA. At the end of the oral proceedings the Board announced its decision.

Reasons for the Decision

1. The statement of the appellant in its fax dated 21 November 2011 that it did not intend to attend the oral proceedings and its request to decide on the state of the file (see point IX above) is considered by the Board as a withdrawal of the auxiliary request for oral proceedings, as is consistent case law (see Case Law of the Boards of Appeal, 6th edition 2006, VI.C.2.2), the appellant thus relying on its written submissions.
2. In the communication accompanying the summons for oral proceedings the Board, taking account of these submissions, raised objections under Article 56 EPC, explaining why in the Board's opinion the subject-matter of claims 1 of the main and the first auxiliary requests and of claim 1 of the second auxiliary request lacked inventive step over the combination of either the teachings of D1 and D3, or of D1, D3 and D4 (see point VIII above).
3. The appellant did not reply in substance to these objections. Since there has been no attempt by the appellant to refute or overcome the objections raised

in the above communication, the Board sees no reason to depart from its preliminary opinion expressed therein.

4. With regard to the above, the Board concludes - for the reasons set out in the communication (see point VIII above) - that the subject-matter of claims 1 of the main and the first auxiliary requests and of claim 1 of the second auxiliary request lack inventive step over a combination of the teachings of D1 and D3, and of D1, D3, and D4, respectively (Article 56 EPC).

The Board thus principally confirms the Examining Division's decision concerning lack of inventive step of claim 1 of the main request.

5. Consequently, none of the three requests is allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

G. Nachtigall

H. Meinders