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Datasheet for the decision of 20 July 2012

Case Number: T 0114/10 - 3.3.06

Application Number: 05781453.5

Publication Number: 1789175

IPC: B01J 19/02, F28F 11/00, F28F 19/06, F28F 9/18

Language of the proceedings: EN

Title of invention:
Method for replacing corroded fluid conducting parts in equipment via welding, and parts obtained thereby

Applicant:
ATI Properties, Inc.

Headword:
Replacing corroded fluid conducting parts/ATI

Relevant legal provisions (EPC 1973):
EPC Art. 56

Keyword:
"Inventive step - no (all requests)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0114/10 - 3.3.06

D E C I S I O N
of the Technical Board of Appeal 3.3.06
of 20 July 2012

Appellant: (Applicant)
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Decision under appeal:
Decision of the Examining Division of the European Patent Office posted 16 June 2009 refusing European patent application No. 05781453.5 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: P.-P. Bracke
Members: G. Dischinger-Höppler
U. Tronser

Summary of Facts and Submissions

I. This appeal is from the decision of the Examining Division to refuse the European patent application No. 05 781 453.5 (international publication number WO-A-2006/020381) for a method for replacing corroded fluid conducting parts in equipment via welding.

II. The decision was based on the grounds of Articles 84 and 56 EPC and, amongst others, on documents

D4 US-A-3 962 767 and
D7 US-A-5 259 547.

III. The Applicant (hereinafter Appellant) filed an appeal against this decision and filed amended sets of claims in five new requests and an amended description.

IV. In a communication annexed to the summons for oral proceedings on 20 July 2012, the Board indicated its provisional opinion that none of the requests on file seemed to fulfil the provisos of Article 84 EPC.

The Board further indicated that the claimed method seemed to differ from that disclosed in document D4 only in that the first material was a corrosion resistant material like zirconium and that the first and second regions were solid welded. The technical problem actually solved in view of document D4 thus appeared to consist in providing a process suitable to replace in an apparatus an existing fluid conducting part by one which is corrosion resistant. However, it appeared that a skilled person would consider using a

material like zirconium for that purpose and adapt the welding method as suggested in the prior art.

V. With its response dated 28 June 2012, the Appellant filed amended claims in a new main and seven auxiliary requests and document

D9 ASM Handbook®, Volume 6, Welding, Brazing, and Soldering, 1995, pages 315 to 317.

The only independent claim of the main request has the following wording:

"1. A method for replacing at least one fluid conducting part in an article of equipment having a mounting region, the method comprising:

replacing an existing fluid conducting part of the article of equipment with a replacement fluid conducting part (10,210), characterised in that the replacement fluid conducting part (10,210) comprises:

a fluid conducting first region (14,214) including a corrosion resistant first material, the corrosion resistant first material being at least one material selected from the group consisting of zirconium, zirconium alloys, titanium, titanium alloys, tantalum, tantalum alloys, niobium, and niobium alloys; and

a second region (16,216) including a second material, the second material being at least one material selected from the group consisting of titanium, titanium alloys and stainless steel;

said first and said second material being dissimilar reactive metals or metal alloys, wherein either:

the second region (16,216) comprises a fluid conducting region and the first region (14,214) and the second region (16,216) are one of directly and indirectly axially joined by solid state welding to form a unitary fluid conducting part; or

the second region (216) comprises an inner layer (219b) of the corrosion resistant first material surrounding a fluid conducting passageway (212) through the fluid conducting part (210), and an outer layer (219a) comprising the second material, wherein the inner layer (219b) is one of directly and indirectly metallurgically bonded to the outer layer (219a) by a process including at least one technique selected from the group consisting of extrusion bonding, explosive bonding, hot isostatic pressing, and centrifugal casting, and the first region (14,214) and the second region (16,216) are one of directly and indirectly axially joined by solid state welding (17,217) to form a unitary fluid conducting part (10,210); and

securing the fluid conducting part to the article of equipment by fusion welding the second material of the second region of the fluid conducting part to the material of the mounting region of the article of equipment."

The first auxiliary request differs there from by deletion of Claims 13 and 14.

The second auxiliary request differs from the main request by introducing in Claim 1 the term "end-to-end" after the terms "axially joined".

The third auxiliary request differs from the second one by deletion of Claims 13 and 14.

The fourth auxiliary request differs from the second one by substituting in Claim 1 the term "solid state welding" with the term "friction welding" and by deleting Claim 5 with corresponding renumbering of Claims 6 to 14 into 5 to 13.

The fifth auxiliary request differs from the fourth one by deletion of Claims 12 and 13.

The sixth auxiliary request differs from the second one substituting in Claim 1 the term "solid state welding" with the term "inertia welding" and by deleting Claim 5 with corresponding renumbering of Claims 6 to 14 into 5 to 13.

The seventh auxiliary request differs from the sixth one by deletion of Claims 12 and 13.

VI. With respect to inventive step, the Appellant, orally and in writing, submitted in essence the following arguments:

- Document D4 did not address replacement of a fluid conducting part by one including a corrosion resistant material in a first region nor that this first region should be solid state welded to a second region of the fluid conducting part of dissimilar material.

- Due to the fact that in document D4 damaged equipment was only repaired, it was critical for the method disclosed therein that a sleeve was concentrically joined to the tube by gas tungsten arc welding instead of retrofitting an entire tube by axially joining end-

to-end the first and second regions by solid state welding as in the claimed method.

- Thus, in view of document D4 the skilled person would not have considered replacing an entire tube by axially joining the ends of the tubes.

VII. The Appellant requested that the decision under appeal be set aside and a patent be granted on the basis of the main or one of the auxiliary requests 1 to 7 submitted with the letter dated 28 June 2012.

Reasons for the Decision

1. *Amendments (Article 84 and 123(2) EPC)*

The Board is satisfied that the amendments made to the claims overcome the objections made by the Examining Division under Article 84 EPC.

2. *Inventive Step*

2.1 The application in suit is conceived for retrofitting corrosion-prone parts of equipment with corrosion resistant replacement parts made for example from zirconium or stainless steel (page 5, lines 17 to 20).

2.2 According to the Case Law of the Boards of Appeal of the European Patent Office (see I.D.3.1), a suitable starting point for the assessment of inventive step is normally a prior art document disclosing subject-matter conceived for the same or a similar purpose as the claimed invention.

In the present case, the state of the art disclosed in document D4 qualifies as a starting point for the assessment of inventive step since it relates to the replacement of worn portions of a fluid conducting part in a heat exchanger (column 1, lines 34 to 39).

The other prior art on file is less suitable as a starting point since none of those documents is conceived for a similar purpose.

2.3 Document D4 specifically discloses in Figure 1 and the corresponding description, a method for replacing at least one fluid conducting part in an article of equipment (here a heat exchanger) having a mounting region (tube sheet 5) by replacing an existing fluid conducting part (tube 1) with a replacement fluid contacting part. The replacement part comprises a first fluid conducting region including a first material (sleeve 7b) and a second region (tubing 11) including a second material that is compatible for fusion welding (gas tungsten arc welding - TIG) with the material in the mounting region. The first and second materials are dissimilar reactive metals or metal alloys (column 3, lines 19 to 23). The second region comprises a fluid conducting region and the first and second materials are joined by welding to form a unitary fluid conducting part.

2.4 The Appellant argued that document D4 was not concerned with a process for replacement of an entire tube by one including a corrosion resistant material but only with the repair of damaged tubes which involved as an essential feature that a sleeve was concentrically

joined to the damaged tube. In contrast, according to Claim 1 an entire tube was retrofitted by axially joining end-to-end the first and second regions by solid state welding.

2.5 The Board is not convinced by these arguments. Claim 1 covers a repair of a worn tube by replacing the damaged part of it since the term "replacing at least one fluid conducting part" used in Claim 1 does not limit the claimed method to the replacement of entire tubes. Apart from that, replacing entire tubes is economically less advantageous than repairing corroded parts thereof (see also page 4, line 29 to page 5, line 2 of the application).

It may be true that according to document D4 a sleeve is concentrically joined to the tube. However, this joint is also an axial end-to-end joint since it provides a bond of the ends of tubes 1 and 11 in axial direction.

In the Board's opinion, the first embodiment of the claimed method differs from that disclosed in document D4 only in that the first material is defined to be a corrosion resistant material like zirconium, titanium, tantalum or niobium, and that the first and second regions are solid state welded, e.g. friction or inertia welded (fourth and sixth auxiliary requests).

2.6 In applying the so-called problem-solution approach which is normally used by the Boards of Appeal for the assessment of inventive step (see Case Law of the Boards of Appeal of the European Patent Office I.D.2) to the present case, the technical problem actually

solved by the claimed invention in comparison with the disclosure of document D4 must be considered to consist in providing a process of replacing worn fluid conducting parts with corrosion resistant replacement parts (page 5, lines 7 to 20 of the application).

It is credible that this technical problem is solved by the method of Claim 1.

2.7 It remains to be decided whether it was obvious for someone skilled in the art to modify the process of D4 by the above distinguishing features, namely to select a corrosion resistant material as the first material and to join the first and second region by solid state welding, in the reasonable expectation of solving the above stated technical problem.

2.8 Document D4 does not mention the using of corrosion resistant material nor suggest how such material should be welded to an existing part made for example of stainless steel.

However, it is well-known in the art, e.g. from document D7, that metals like zirconium or titanium or their alloys are corrosion resistant (column 5, lines 63 to 68) and from document D9 (page 317, right-hand column, lines 10 to 13) that solid state welding like friction welding or inertia welding is the choice for weld bonding dissimilar metals, e.g. refractory or exotic metals, that are difficult to weld by other processes, hence metals like zirconium and titanium as also stated in the application in suit (see page 26, lines 13 to 16).

2.9 In the Board's judgment, a skilled person seeking to replace in the method disclosed in document D4 a fluid conducting part with a corrosive resistant replacement part would select materials like zirconium and titanium as suggested in document D7 and adapt the welding method as suggested in document D9, thereby arriving in an obvious manner at the subject-matter of Claim 1 of the main request as well as of the second, fourth and sixth auxiliary requests.

2.10 The subject-matter of Claim 1 of the first, third, fifth and seventh auxiliary requests does not differ from that of the main request or, respectively second, fourth and sixth auxiliary requests. Therefore, the above reasoning applies as well to the subject-matter of the auxiliary requests.

2.11 For these reasons, none of the Appellant's requests is allowable under the proviso of Article 56 EPC due to lack of inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

K. Götz P.-P. Bracke