

Internal distribution code:

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

**Datasheet for the decision
of 24 September 2013**

Case Number: T 1105/11 - 3.2.08

Application Number: 03782491.9

Publication Number: 1567685

IPC: C22F 1/00

Language of the proceedings: EN

Title of invention:

Edge-on stress-relief of thick aluminium plates

Patent Proprietor:

Constellium France

Opponent:

Aleris Rolled Products Germany GmbH

Headword:

-

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step (no)"

Decisions cited:

-

Catchword:

-



Case Number: T 1105/11 - 3.2.08

DECISION
of the Technical Board of Appeal 3.2.08
of 24 September 2013

Appellant: Aleris Rolled Products Germany GmbH
(Opponent) Carl-Spaeter-Strasse 10
D-56070 Koblenz (DE)

Representative: Schinkel, Reta
Müller Schupfner & Partner
Patentanwälte
Bavariaring 11
D-80336 München (DE)

Respondent: Constellium France
(Patent Proprietor) 40-44, rue Washington
F-75008 Paris (FR)

Representative: Fénot, Dominique
Alcan Centre de Recherches de Voreppe
725, rue Aristide Berges- BP 27
F-38341 Voreppe (FR)

Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted
on 22 March 2011 concerning maintenance of
European patent No. 1567685 in amended form.

Composition of the Board:

Chairman: T. Kriner
Members: R. Ries
D. T. Keeling

Summary of Facts and Submissions

- I. By its interlocutory decision dispatched on 22 March 2011, the opposition division held that the subject matter of the claims according to the main request then on file met the requirements of the EPC and that the patent could be maintained in amended form on the basis of this request.
- II. The appellant (opponent) lodged an appeal against this decision on 13 May 2011, paying the appeal fee on the same day. The statement setting out the grounds of appeal was filed on 28 June 2011.
- III. On appeal, the parties essentially referred to the following documents:
- D2: R. E. Kleint, F. G. Janney: "Compressive Deformation As a Means of Effecting Stress Relief in Aluminum Forgings", Light Metal Age, February 1958, pages 14 to 21;
- X1: Simulations numériques de la trempe d'objets à sections rectangulaires, submitted by the patent proprietor (respondent) on 18 September 2012; 4 pages and Annexes 1 and 2 to X1.
- IV. Oral proceedings took place before the Board on 24 September 2013. The following requests were made:
- The appellant requested that the decision under appeal be set aside and European patent No 1 567 685 be revoked.

- The respondent requested that the appeal be dismissed.

V. Claim 1 as upheld by the opposition division (called main request) reads as follows:

"A method for the manufacture of an aluminum alloy plate having a reduced level of residual stress, said method comprising

a) providing a solution heat-treated and quenched aluminum alloy plate having a longest edge and optionally a second longest edge, and a thickness of at least 127 mm (5 inches),

b) stress relieving said plate by compressing the plate at a total rate of 0.5% to 5% permanent set along the longest or second longest edge thereof,

wherein the edge of the plate that is compressed is no less than twice and no more than eight times the thickness thereof."

In order to avoid undue repetition of wording in this decision, the last three lines of claim 1 are specified as feature c).

VI. The appellant's arguments relevant to the present decision can be summarized as follows:

Document D2 was concerned with a general study of compressive deformation as a means for effective stress relief in solution heat treated (SHT) and quenched (Q) Al alloy plates. According to D2, it was generally recognized in the art that plastic deformation resulting from stretching effectively relieved residual stresses which caused warpage and cracking during

machining Al-alloy parts. With particular respect to large Al parts, D2 pointed out that they did not readily lend themselves to stretching. Instead it was found that large Al parts could be effectively stress relieved by compressive deformation (D2, page 16, column 1, last sentence to column 2, line 5; page 18, paragraph: "Large Samples"; page 20, lines 13 to 34; conclusion, point 1). This statement was confirmed by the test results obtained on 6 x 8 x 30 inches "large samples", referred to in D2 on page 20, which had received approximately 3% compressive deformation on the 6 x 30 in surface (corresponding to the second longest edge according to the definition in claim 1 of the patent). Taking into account the explanations given in the patent specification, paragraphs [0001], [0006] and page 3, point 1.: "Introduction and Problem", it was immediately evident that the technical teaching of D2 was directed to the same purpose as addressed in the patent at issue. Hence document D2 represented the closest prior art.

D2 did not disclose the feature of the claimed method according to which the edge of the plate, which was compressed, was less than twice and not more than 8 times the thickness of the plate (feature c).

However, no indication or hint whatsoever was found anywhere in the patent specification showing which technical effect was actually associated with this feature or, put the other way, which technical problem was solved by it. Therefore, it must be concluded that feature c) was trivial. The method set out in claim 1 therefore did not involve an inventive step.

VII. The respondent's arguments relevant to the present decision can be summarized as follows:

Contrary to the appellant's view, document D2 did not qualify as the closest prior art since it failed to address the object underlying the patent, i.e. the stress relief in "thick" Al plates having the dimensions and geometry set out in the patent. None of the "large samples" (6 x 8 x 30 in) and the "production parts" (3 x 8 x 122 in) described in D2, pages 18 to 21 satisfied the claimed dimensional requirement that the length of the edge which was to be compressed was no less than twice and no more than eight times the thickness of the plate. However, the shape and cross section of the claimed Al-alloy plate was by no means trivial. Rather, the plate geometry represented a highly important technical feature since the residual internal stresses introduced after SHT and water quenching (WQ) in "thick" massive plates of the claimed dimensions could not be compared with the internal stresses which had formed in the non-elongated cross section forgings of D2. In consequence of the different dimensions, the aluminium forgings referred to in D2 resulted, after SHT and WQ, in a fundamentally different stress profile, working characteristics and properties.

It was true that the "large samples" (6 x **8** x 30 in) referred to in D2 received approximately 3% compression deformation on the 6 x 30 inch surface (T-direction) and that D2 disclosed a remarkable amount of stress relief accomplished by this treatment, as was reflected in Table 3. For a 6 x **12** x 30 inch alloy plate, however, which would satisfy the plate geometry required by

feature c) of claim 1, the skilled practitioner would, in accordance with the general state of art, carry out a stress relief by compression only in the S-direction rather than in T-direction.

Moreover, D2 failed to provide any stress relief data obtained by compressing the 6 x 8 x 30 inch plate in the S-direction. Hence, no comparative results existed which would lead the skilled person to conclude that the stress relief by compression in the T-direction was superior to that achieved by conventional compression in the S-direction. In conclusion, the skilled person faced with the problem of relieving the residual internal stresses in "thick" plate according to the patent was not prompted to perform a compression step along the longest or second longest edge of the plate having the dimensions in claim 1 of the patent.

In addition thereto, a technical effect resulted from adhering to the dimensional limitations of the aluminium alloy plate used in the claimed method. The technical advantage which was achieved by selecting a plate thickness S of 5 inches or more and the slenderness ratio or thickness ratio of $T = 2 \times S$ to less than $8 \times S$ was amply supported by the test results described in document X1. This document provided a numerical simulation describing in detail the influence of the thickness S and the T/S ratio on the thermal gradients and, in consequence thereof, on the residual stresses within the SHT and WQ Al plate.

The subject matter of claim 1 therefore involved an inventive step.

Reasons for the Decision

1. The appeal is admissible.
2. The closest prior art
 - 2.1 The determination of the disclosure which is nearest to the claimed invention and which therefore presents the most promising springboard for its development is essential to the assessment of inventive step.

A body of jurisprudence has emerged from the Boards of Appeal according to which that disclosure qualifies as closest prior art which discloses subject matter conceived for the same purpose or aiming at the same objective as the claimed invention and having the most relevant features in common (cf. Case Law of the Boards of Appeal, 7th edition, 2013, I.D.3.1; 3.2, pages 167 to 168).

- 2.2 The respondent disputed that document D2 qualified as representing the closest prior art. For the following reasons, the Board does not agree.

The patent under consideration aims at reducing the internal stress levels which arise by SHT and WQ Al-alloy plates having a thickness of at least 5 inches and a longest and optionally a second longest edge. This objective is achieved by compressing the plate at a total rate of 0.5 to 5% along the longest or second longest edge of the plate, which is preferably no less than twice and no more than eight times the thickness of the plate (the patent specification, paragraph [0006]; claim 1).

Already the title of D2: "Compressive Deformation as a Means of Effecting Stress Relief in Aluminum Forgings" makes it clear for the skilled reader that this document discloses subject matter conceived for the same purpose as claimed. As set out in D2, page 14, column 3, second paragraph, residual stresses, which are formed during SHT and WQ and cause warping and cracking during machining, can be redistributed or minimized (a) by removal of stressed material or (b) by plastic deformation resulting from external forces, such as stretching. D2 notes on page 16, first column, last sentence to the second column, line 5 that there are many "large" aluminum parts which do not readily lend themselves to stretching. To overcome this problem, document D2 proposes compressive deformation as a means for effecting stress relief in aluminium alloys (D2, page 16, Procedure).

As described in more detail in D2, page 18, paragraph "LARGE SAMPLES", an 6 x 8 x 30 inches 2014 Al alloy hand forging (serial number 7S) in the T4 temper (SHT, WQ) received approximately 3 percent compressive deformation on the 6 x 30 inches surface (T-direction) which corresponds to the thickness S, the compressive deformation and the "second longest edge" mentioned in features a) and b) of the claimed method. As further reflected in D2, Table III and described in the accompanying text on page 20, lines 20 to 34, the residual stresses remaining in forging Serial Number 7S were negligible when compared to the residual stresses remaining in forgings which had not been stress relieved after heat treatment. Consequently, document D2 is - like the method set out in claim 1 of the

patent at issue - concerned with accomplishing effective stress relief in "large" or "thick" aluminium alloy plates having a thickness of 5 inches or more by a 3% compression in the T-direction (see also the patent specification, paragraphs [0001], [0010]).

2.3 In application of the principles set out above, document D2 is therefore considered to represent the closest prior art because it is directed to the same purpose, relates to the same problem and even proposes the same solution as claimed in the patent.

3. Inventive step

Having regard to the above mentioned considerations, it was common ground between the parties and the Board that the claimed method differs from the technical disclosure of D2 only by feature c). For the following reasons this feature is, however, not considered to justify an inventive step over the prior art D2.

It is evident from paragraphs [0006] and [0030] of the patent specification that the plate thickness S and the compression rate along the longest or second longest edge are the essential technical features. As reflected by feature c) in claim 1, the length of the plate in the direction of compression (loading) is required to be no less than twice and not more than 8 times the thickness. However, the patent specification fails to give any particular explanation or reason why feature c) should be adhered to, and no specific technical information is found anywhere in the specification showing which technical effect or advantage is attributed to this feature. Since feature c) is the

only distinguishing feature over the technical disclosure of D2, it is therefore impossible to identify and reformulate the objective technical problem to be solved and the solution which is provided by this feature. In line with the established case law of the Boards of Appeal, however, only those features which contribute causally to the solution of the problem set in the description are to be considered in assessing the inventive step of a combination of features. Owing to the absence of such a technical contribution, feature c) must be considered as being a matter of no importance.

The respondent argued that a technical effect is actually achieved by feature c) and pointed in this context to the numerical simulations and explanations which were submitted in that respect by document X1.

It is, however, established case law that, as a matter of principle, any effect achieved by the invention may be used as a basis for reformulating the technical problem only, as long as that effect is derivable from the application as originally filed (cf. Case Law of the Boards of Appeal, 7th edition 2013, I.D.4.4.2, page 175). Disregarding this principle would lead to misleading the public about the real invention which was originally disclosed in the application as filed.

In application of this principle, the technical effect and possible advantages which are said to be provided by feature c) in document X1 do not help to support the inventive merit of the only distinguishing feature of the claimed method.

Given this situation, the subject matter of claim 1 does not involve an inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:

V. Commare

T. Kriner