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Datasheet for the decision of 13 April 2010

Case Number: T 1281/07 - 3.2.08

Application Number: 96306602.2

Publication Number: 0829552

IPC: C22F 1/04

Language of the proceedings: EN

Title of invention:
Aluminium alloy products suited for commercial jet aircraft wing members

Patentee:
Alcoa Inc.

Opponents:
Aleris Aluminum Koblenz GmbH
ALCAN France S.A.S.

Headword:
-

Relevant legal provisions:
-

Relevant legal provisions (EPC 1973):
EPC Art. 54, 56

Keyword:
"Novelty (yes)"
"Inventive step (no)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1281/07 - 3.2.08

D E C I S I O N
of the Technical Board of Appeal 3.2.08
of 13 April 2010

Appellant: (Patent Proprietor)
Alcoa Inc.
Alcoa Technical Center
100 Technical Drive
Alcoa Center, PA 15069-0001 (US)

Representative:
Lenzing Gerber Stute
Partnerschaft von Patentanwälten
Bahnstrasse 9
D-40212 Düsseldorf (DE)

Respondents: (Opponent)
Aleris Aluminum Koblenz GmbH
Carl-Spaeter-Str. 10
D-56070 Koblenz (DE)

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

(Opponent)
ALCAN France S.A.S.
Propriété Industrielle
217, Cours Lafayette
F-69451 Lyon Cedex 06 (FR)

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

Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 30 May 2007 revoking European patent No. 0829552 pursuant to Article 102(1) EPC 1973.

Composition of the Board:

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

Summary of Facts and Submissions

I. The patent proprietor filed an appeal on 27 July 2007, paying the appeal fee on the same day, against the decision of the opposition division posted on 30 May 2007 to revoke the European patent No. 829552. The statement setting out the grounds for appeal was filed on 29 September 2007.

II. Oral proceedings before the board of appeal were held on 13 April 2010.

The appellant, which had withdrawn its request for oral proceedings in a letter dated 12 March 2010, after having been duly summoned to oral proceedings, did not attend the oral proceedings.

III. The appellant requested in writing that the decision under appeal be set aside and the patent be maintained as granted.

The respondents (opponents) requested that the appeal be dismissed.

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

D2: Staley, J. T., "Microstructure and Toughness of High-Strength Aluminium Alloys", Properties Related to Fracture Toughness, ASTM STP 605, American Society for Testing and Materials STP 605, Montreal, Canada, 1976, pages 71 -103;

D5: Staley, J. T. et al, "Trends in Alloys for Aircraft", Canadian Inst. of Mining, Metallurgy

and Petroleum, Montreal, Canada, September 1993, pages 1-24;

D8: US -A- 5 221 377

D16: "Aerospace Structural Metals Handbook", 1997, 3. Edition incorporating Supplements through 1996, edited by Brown, W. F. et al., CINDAS/USAF CRDA Handbooks Operation, Purdue University, W. Lafayette comprising
D16a- Code 3220, (first) pages 1-6
D16b- Code 3220, pages 21-26
D16c- Code 3222, pages 1-10
D16d- Code 3222, pages 31-46;

D26b: Declaration of Howard Scott Goodrich, dated 9 March 2010; and

D30: Declaration of Gary Bray, dated 19 August 1997.

V. Independent claims 1 and 5 read as follows:

"1. An airplane wing comprising a lower wing skin structural member comprising an alloy consisting of 5.9 to 6.7% zinc, 1.6 to 1.9% magnesium, 1.8 to 2.4% copper, 0.08 to 0.15% zirconium, not more than 0.06% silicon, not more than 0.06% iron, not more than 0.11% iron plus silicon, the balance aluminum and unavoidable impurities."

"5. A method of producing airplane lower wing skin structural members for a commercial jet aircraft comprising forming said member from an alloy consisting of 5.9 to 6.7% zinc, 1.6 to 1.9% magnesium, 1.8 to 2.4% copper, 0.08 to 0.15% zirconium, not more than 0.06% silicon, not more than 0.06% iron, not more than 0.11% iron plus silicon, the balance aluminum and unavoidable impurities."

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

Novelty

The alloy according to claim 1 exhibited a different composition in comparison to the 7050 alloy, whose use for integrally stiffened lower wing panels was suggested in D5. The latter alloy did not only comprise a high content of Mg, but also exhibited higher upper limits for the contents of Fe and Si. Moreover, it optionally contained Mn as a further purposively added alloying element. Especially concerning Fe and Si, there was no reason for the person skilled in the art to seriously contemplate working with the low contents according to the patent in suit, since a reduction in the content of these impurities was associated with high production costs. Therefore, the subject-matter of claim 1 was novel.

Inventive step

As could be seen from the patent in suit, in particular from Table 3, the composition according to claim 1 provided improved toughness not only at room temperature, but also at low temperatures, as well as increased strength and fatigue properties. These effects were also confirmed by the experiments described in D30. Therefore, the object underlying the claimed invention starting from D5 was to be seen in the improvement of all these properties.

Since D2 did not discuss how to increase low temperature toughness, strength and fatigue resistance in 7XXX alloys, it would not be considered by the person skilled in the art wishing to achieve this object.

Moreover, even considering this document would not have led in an obvious way to the claimed solution. D2, albeit disclosing a number of measures to increase toughness, was silent on an increase of both toughness and strength. Since the person skilled in the art was aware that an increase in toughness generally resulted in a decrease of strength, he would not consider the measures proposed by D2 as appropriate for increasing at the same time strength and toughness. Furthermore, even the selection of a particular single measure out of the ten possible measures disclosed in D2 was not obvious.

Additionally, even the author of D2 himself did not arrive at the alloy of the patent in suit when developing alloys with improved strength, toughness and corrosion resistance described in D8. This further confirmed that D2 could not have rendered the claimed invention obvious.

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

VII. The respondents argued essentially as follows:

Novelty

D5 disclosed the use of a 7050 alloy, as disclosed for example in D16c, for a lower wing skin structural member of an airplane wing. In this alloy Fe, Si and Mn were impurities, whose content was to be kept as low as possible. Accordingly, the content of these elements could not impart novelty to the claimed subject-matter.

The Mg content of the alloy according to claim 1 and that of the 7050 alloy at least punctually overlapped at 1.9%. Moreover, since 1.9% was to be considered with its tolerance and included values as low as 1.85%, the overlap was not restricted to the punctual value of 1.9%. Anyhow, the person skilled in the art would have seriously contemplated producing a 7050 alloy with this low Mg content, as confirmed by D26b. Therefore, the Mg content did not distinguish the alloy of claim 1 from the 7050 alloy used in D5.

Accordingly, the subject-matter of claim 1 lacked novelty.

Inventive step

In the event that the subject-matter of claim 1 was considered to be novel over D5 by virtue of its Mg content, it did not involve an inventive step.

The patent provided no evidence that the low Mg content increased the strength. In particular the test results as described in Table 3, comparing the alloy A of the

patent in suit with a 7050 alloy, were not conclusive in this respect, since the latter alloy exhibited very high Fe and Si contents, which were responsible for its lower strength.

Therefore, starting from D5 the object underlying the claimed invention was to be seen only in improving the toughness.

The person skilled in the art wishing to increase the toughness would have considered D2, which dealt with this problem. One of the measures suggested by D2 for achieving this aim in the case of 7XXX alloys was namely to reduce their Mg content. Adopting this measure he would unsurprisingly also have obtained an improvement in low temperature toughness and fatigue resistance.

Therefore, the claimed subject-matter was obvious in view of D5 in conjunction with D2.

Reasons for the Decision

1. The appeal is admissible.

2. *Novelty*

D5 discloses (see page 18, last paragraph) an airplane wing comprising a lower wing skin structural member comprising an aluminium 7050 alloy. The compositions (in %) of the alloy according to claim 1 and of the aluminium 7050 alloy, as disclosed for instance in D16c

(page 9 of code 3222, revised June 1984), are shown in the following table.

	Claim 1	D16c	D16c,nominal
Zn	5.9-6.7	5.7-6.7	6.2
Mg	1.6-1.9	1.9-2.6	2.25
Cu	1.8-2.4	2.0-2.6	2.3
Zr	0.08-0.15	0.08-0.15	0.12
Si	max. 0.06	max.0.12	
Fe	max. 0.06	max.0.15	
Fe+Si	max.0.11		
Mn		max. 0.10	
Cr		max. 0.04	
Ti		max. 0.06	
others		each 0.05 tot. 0.15	
bal.	Al and unavoidable impurities	Al	Al

The compositions of the alloy according to claim 1 and the 7050 alloy have a region of overlap. This region of overlap can be seen as a sub-range selected from a broader numerical range of the prior art. According to the established case law of the boards of appeal the sub-range is considered novel if each of the following three criteria is satisfied (see Case Law of the Boards of Appeal of the European Patent Office, 5th edition 2006, I.C.4.2.1):

(a) the selected sub-range is narrow compared to the known range;

(b) the selected sub-range is sufficiently far removed from the known range illustrated by means of examples; and

(c) the selected range is not an arbitrary specimen of the prior art, i.e. not a mere embodiment of the prior art, but another invention (purposive selection).

It is clear from the table above that the contents of the alloying elements Zn, Cu, Zr cannot distinguish the alloy of the patent in suit from the known one.

D16c recites a maximum content for the elements Mn, Cr and Ti, without mentioning them in the nominal composition. Therefore, it is apparent that they are to be seen as impurities. This applies in particular to Mn, whose undesirable effect is explicitly mentioned (see D16c, code 3222, page 5, point 3.027721). Since the term "unavoidable" in claim 1 does not specify the maximum allowable amount of these impurities, no difference can be seen in respect of the content of these elements.

The situation is different for the impurities Fe and Si, whose maximum allowable contents in the 7050 alloy are higher than those permitted according to claim 1 of the patent in suit. The nominal composition of the known alloy does not explicitly mention the content of these impurities. However, it is known that these elements have a negative influence on toughness and fatigue life for this type of alloy (see D16C, code 3222, page 1, left-hand column, first paragraph; page 2, point 1.094 and page 5, point 3.02721). Therefore, despite the

manufacturing costs associated with the reduction of the impurity content, the person skilled in the art would take care to keep their content as low as possible, especially when the alloy is to be used in an airplane wing, wherein good toughness and fatigue resistance are required (see for instance D5, page 10 first full paragraph). Accordingly, the nominal composition of the 7050 alloy to be used according to D5 illustrates an alloy whose Fe and Si contents fall within the ranges according to present claim 1. As a consequence, the contents of Fe and Si cannot impart novelty to the subject-matter of claim 1 either.

The Mg contents of the 7050 alloy and of the alloy according to claim 1 punctually overlap at 1.9%. Even if the range of the 7050 is regarded as including values as low as 1.85% the overlap is narrow with respect to the Mg-range according to the 7050 alloy. It is also sufficiently far removed from the content of 2.25% of the nominal composition, and it represents a purposive selection (see for instance page 4, lines 26-29 of the A- publication of the application underlying the patent in suit according to which the low Mg content is selected for improving the toughness). No reason can be seen which would have led the person skilled in the art to seriously contemplate working with a 7050 alloy having a Mg content of 1.9%. D26b also fails to convince to the contrary, since this document gives nothing more than the personal view of its author and cannot be seen as representing the general view of the person skilled in the art.

Therefore, the subject-matter of claim 1 is novel over D5 by virtue of the Mg content of the aluminium alloy.

3. *Inventive step*

3.1 The most relevant state of the art is undisputedly represented by D5, disclosing the use of an alloy with a similar composition, i.e. a 7050 alloy, for manufacturing the same type of product.

3.2 Starting from this prior art the object underlying the claimed invention can be seen in improving toughness and fatigue resistance.

This object is achieved by selecting a Mg content of 1.6 to 1.9%.

The board cannot agree with the appellant's argument that this object also comprised improving the strength. According to the patent in suit, 7050 alloys can be manufactured which exhibit strengths lying within the ranges of values expected for the plates according to the invention (see Figure 7 as well as paragraph [0038] and Table 3). It is true that Table 3 shows that an alloy A according to the invention presents, besides a clear improvement in room temperature toughness and fatigue resistance, also a slight improvement in strength in comparison to a specific 7050 alloy. However, the 7050 alloy chosen for this test exhibits much higher Fe and Si contents than those of the alloy A (see Table 1) and has been submitted to a different temper. Given that high contents of Fe and Si reduce the strength and that different tempers impart different levels of strength (see paragraph [0039] of the patent in suit), Table 3 does not prove that the increase in strength of alloy A depends on its lower Mg

content. No more information can be gathered from D30, since this document does not disclose the composition of the 7050 alloy used for testing. Accordingly, there is no evidence that a Mg content according to claim 1 provides increased strength in comparison to the known alloy, whose use is disclosed in D5.

3.3 D2 deals with increasing the toughness of 7XXX alloys. Since both the toughness and the fatigue resistance relate to crack propagation, the man skilled in the art would at least try to use the teaching of this document to achieve the given object.

D2 discloses that the toughness of 7XXX alloys can be increased by reducing their Mg content (see page 93, point 9). It is true that D2 suggests on page 93 ten measures for increasing the toughness of high strength aluminium alloys. However, only two of them refer directly to 7XXX alloys. Moreover, the hint that a reduction of Mg content in 7XXX alloys results in an improved toughness is repeated on page 89 and page 103, first full paragraph. It would thus be obvious to adopt this measure to improve the toughness, irrespective of the fact that the values at low temperatures are also important, since D2 refers to toughness in a general way and there is no reason to believe that improving it at room temperature would not also result in an improvement at low temperature. Therefore, the person skilled in the art would lower the Mg content, as taught by D2 in order to increase the toughness, without the need for any inventive activity.

Since adopting this measure in the alloy according to D5 leads directly to the alloy of claim 1, the subject-

matter of this claim is rendered obvious by D5 in conjunction with D2.

The fact that a different route was chosen in D8 for improving the alloy properties does not render the claimed product less obvious, since the existence of several ways of achieving a given object cannot generally challenge the obviousness of a certain combination.

3.4 Accordingly, the subject-matter of claim 1 does not involve an inventive step.

Therefore, the patent comprises subject-matter which is not patentable and its revocation is justified.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

V. Commare T. Kriner