

**Internal distribution code:**

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

**Datasheet for the decision  
of 11 January 2018**

**Case Number:** T 0685/15 - 3.2.08

**Application Number:** 06762282.9

**Publication Number:** 1902149

**IPC:** C22C21/02, C22F1/043,  
C22C21/00, C22F1/04

**Language of the proceedings:** EN

**Title of invention:**

PROCESS OF PRODUCING A FOIL OF AN AL-FE-SI TYPE ALUMINIUM  
ALLOY AND PRODUCT THEREOF

**Patent Proprietor:**

Eurofoil Luxembourg S.A.

**Opponent:**

Hydro Aluminium Deutschland GmbH

**Headword:**

**Relevant legal provisions:**

EPC Art. 54, 56

**Keyword:**

Novelty  
Inventive step

**Decisions cited:**

**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 0685/15 - 3.2.08

**D E C I S I O N**  
**of Technical Board of Appeal 3.2.08**  
**of 11 January 2018**

**Appellant:** Hydro Aluminium Deutschland GmbH  
(Opponent) Aluminiumstrasse 1  
41515 Grevenbroich (DE)

**Representative:** Cohausz & Florack  
Patent- & Rechtsanwälte  
Partnerschaftsgesellschaft mbB  
Bleichstraße 14  
40211 Düsseldorf (DE)

**Respondent:** Eurofoil Luxembourg S.A.  
(Patent Proprietor) Z.I. Riedgen, P.O. Box 91  
3401 Dudelange (LU)

**Representative:** Hoffmann Eitle  
Patent- und Rechtsanwälte PartmbB  
Arabellastraße 30  
81925 München (DE)

**Decision under appeal:** **Interlocutory decision of the Opposition  
Division of the European Patent Office posted on  
28 January 2015 concerning maintenance of the  
European Patent No. 1902149 in amended form.**

**Composition of the Board:**

**Chairwoman** P. Acton  
**Members:** M. Alvazzi Delfrate  
F. Blumer

## Summary of Facts and Submissions

- I. By its decision posted on 28 January 2015 the opposition division found that European patent No. 1902149, in amended form according to the main request then on file, and the invention to which it related met the requirements of the EPC.
- II. The appellant (opponent) lodged an appeal against this decision in the prescribed form and within the prescribed time limit.
- III. Oral proceedings before the board of appeal were held on 11 January 2018.

The appellant requested that the decision under appeal be set aside and that the patent be revoked. The appellant further requested that none of the auxiliary requests be admitted.

The respondent requested that the appeal be dismissed and the patent maintained on the basis of the main request or, in the alternative, that the patent be maintained on the basis of any one of auxiliary requests 1 to 4, all as re-filed with letter dated 29 September 2017 or any of auxiliary requests M(A1-A3) as filed with letter dated 2 January 2018.

- IV. Claims 1 and 18 of the main request read as follows:

"1. A process of manufacturing an aluminium alloy product comprising the following steps:  
(a) continuous casting an aluminium alloy melt of the following composition, (in weight %):  
Fe 1.1-1.7  
Si 0.4-0.8

Mn up to 0.25  
other elements less than or equal to 0.05 each and  
less than or equal to 0.15 in total  
balance aluminium  
(b) cold rolling the cast product without an  
interanneal step to a gauge below 200µm  
(c) final annealing the cold rolled product."

"18. An aluminium alloy product having a gauge below  
200µm and the following composition in weight %:

Fe 1.1-1.7

Si 0.4-0.8

Mn up to 0.25

other elements less than or equal to 0.05 each and  
less than or equal to 0.15 in total  
balance aluminium

wherein the aluminium alloy product possesses the  
following properties:

in the transverse direction:

a yield stress >100MPa

a UTS >130MPa

an elongation >19, and

a product of UTS x elongation >2500

in the longitudinal direction:

a yield stress >100MPa

a UTS >140MPa

an elongation >18, and

a product of UTS x elongation >2500."

The auxiliary requests have no bearing on the present  
decision.

V. The following documents played a role for the present  
decision:

D1: WO -A- 03/069003;

D2: WO -A- 02/064848;

D3: US -B- 6,402,861

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

*Novelty*

Claim 11 of D2 disclosed a foil with a composition according to present claim 18 and a UTS (Ultimate Tensile Strength) greater than 130 MPa. Page 1, lines 17 and 18, of the description explained that a "foil" had a thickness between 5 and 150  $\mu\text{m}$ , hence smaller than 200  $\mu\text{m}$ . Elongation values were disclosed in Table 2.

Admittedly, D2 did not explicitly disclose the yield stress. However, the mechanical properties recited by present claim 18 would be obtained also in D2, since the same relevant process steps, namely continuous casting, cold rolling and soft annealing, were performed on the same composition. The fact that in the patent in suit, contrary to D2, no interannealing was performed did not influence the final properties but merely softened the cold rolled product before final cold rolling. Example 2 of the patent in suit did not contradict this assumption, because the values of UTS and elongation for the interannealed samples were different from those of Table 2 of D2. Thus, the product according to claim 18 was an inevitable result of the method of D2.

In any event, the patent in suit did not specify the geometry of the probe used for the measurement of the mechanical properties. Also the reference to norm DIN-EN-10002 did not clarify this point because the norm allowed different probe geometries. Since different

geometries of the probe might lead to different values of the measured properties, the mechanical properties of claim 18 could not be considered as distinguishing features.

Therefore, the subject-matter of claim 18, and as a consequence also of claim 20, was not novel.

*Inventive step starting from D1*

Starting from D1, the subject-matter of claim 1 lacked inventive step. D1 disclosed an aluminium alloy product produced by continuous casting, cold rolling with or without interannealing, and final annealing. The obtained product had a gauge below 200µm. The process of claim 1 differed from that of D1 solely in a slightly higher Si content.

Table 2 of D1 showed that mechanical properties according to the patent in suit could be obtained also for the alloy of D1, despite its lower Si content. Thus the problem solved starting from D1 was merely to provide an alternative process or at most to provide a microstructure more favourable for the castability.

D1 itself rendered the claimed solution obvious since it was obvious to solve the given problem by a slight variation in the content of the alloying elements.

Alternatively, the claimed solution was rendered obvious by the teaching of D2, which disclosed the advantages for the castability of Si contents according to the patent in suit. Since the problem to be solved concerned the castability, there was no need for the person skilled in the art to perform the interannealing

disclosed in D2, which affected only cold rolling, i.e. a subsequent process step.

Similar considerations applied in view of D3, which also disclosed Si contents according to the invention and their advantages.

Therefore, the subject-matter of claim 1 lacked inventive step starting from D1.

Since the product of claim 18 was the result of the method of claim 1 it could not involve an inventive step either.

*Inventive step starting from D2*

D2 disclosed a process which, but for the performance of interannealing, was the same as the process of claim 1. The effect of the omission of interannealing was to render the process more economical.

It was clear to the person skilled in the art that the omission of interannealing was the sole obvious possibility of rendering the process of D2 more economical. This possibility was also disclosed in D1. Hence, the process of claim 1 did not involve an inventive step starting from D2 either.

As a consequence, the product of claim 18 was also non-inventive, at least starting from D2.

VII. The respondent's arguments can be summarised as follows:



*Novelty*

D2 did not disclose a product with the combination of properties according to present claim 18. Claim 11 of D2 did not specify whether the UTS was measured in the L or T direction. The elongation values disclosed in Table 2 were for products with a thickness outside the claimed range. Most importantly, there was no disclosure at all of the yield stress values.

Nor could these properties be considered the inevitable result of the process of D2, which comprised interannealing. Example 2 of the patent in suit showed the effect of performing or omitting an interanneal step. The performance of interannealing resulted in lower values of yield stress. This applied in particular for a final anneal at 300° or 350°C, the sole one capable of providing a satisfactory elongation with the process of D2.

Also the possible uncertainty in respect of the geometries of the probe in the patent in suit could not establish a lack of novelty.

Thus, the subject-matter of claim 18 was novel.

*Inventive step starting from D1*

D1 related to a binary Al-Fe alloy and not to a ternary Al-Fe-Si alloy like that in the patent in suit. Si was an unwanted element in D1. Therefore, the person skilled in the art had no reason to increase its content above the limit stipulated in D1. The effect of the claimed composition in the patent in suit was not only to avoid blackening during deep drawing but also, as shown in Example 1, to allow the desired mechanical

properties to be achieved over a wider range of annealing conditions.

Neither D2 nor D3 could render the claimed solution obvious. They both related, contrary to D1, to ternary alloys, and their processes were different from that of D1. Thus, the person skilled in the art would not have consulted them. Moreover, even if he had, he would have chosen the processes described in said documents and so arrived at a method outside the scope of claim 1.

Thus, it was not obvious to arrive at the method of claim 1 starting from D1.

For the same reasons the product of claim 18 was not rendered obvious starting from D1.

*Inventive step starting from D2*

D2 disclosed a process of manufacturing an aluminium alloy product which comprised interannealing. This was an essential step for achieving the desired result, not a step that the person skilled in the art would simply omit in order to render the process more economical. As already explained, the omission of interannealing in the patent in suit provided improved mechanical properties. D1 merely stated that this step could be omitted when elongation was not critical. Hence, it did not render it obvious to omit the intermediate annealing to achieve the improved properties of the patent.

Thus, it was not obvious to arrive at the method of claim 1 starting from D2.

The same applied to the product of claim 18.

## Reasons for the Decision

### 1. Novelty

- 1.1 Claim 11 of D2 is directed to a foil with a composition according to present claim 18 and a UTS greater than 130 MPa. However, claim 11 does not disclose whether the UTS is measured in the L or T direction and is silent about elongation and yield stress. Indeed, while elongation values are disclosed in Table 2, albeit for products with a thickness outside the presently claimed range, D2 as a whole does not provide any information about the value of the yield stress. Thus, a product with the combination of properties of present claim 18 is not explicitly disclosed in D2.

The appellant did not dispute this but argued that the mechanical properties recited by present claim 18 would be obtained also in D2, since the same relevant process steps, namely continuous casting, cold rolling and soft annealing are performed on the same composition. However, contrary to the process of the patent in suit, the process of D2 comprises an interannealing step. Example 2 of the patent in suit, which explicitly refers to D2, investigates, for a given composition and remaining process steps, the effect of performing or omitting an interanneal step. Table 5 of Example 2 shows that the performance of interannealing results in lower values of yield stress. In particular, for a final anneal at 300° or 350°C, which is the sole one capable of providing an elongation according to claim 18, at least in the L direction (see Table 5 of the patent and Table 2 of D2), the yield stress is well below the claimed values. Hence, a product with the

combination of properties of claim 18 is not the inevitable result of the process of D2.

Contrary to the appellant's opinion, the fact that for the samples submitted to interannealing the values of UTS and elongation in Table 5 of the patent do not correspond to the values of Table 2 of D2 does not call into doubt the accuracy of the measurements of Example 2. Said differences may be caused by the different compositions tested in the patent and in D2 or other differences in the product preparation (e.g. the final anneal duration).

The appellant also argued that the use of different geometries of the sample may lead to different values of the mechanical properties. However, it is pointed out that the patent in suit specifies that the mechanical properties are measured according to DIN-EN-10002. Even if several possible geometries are allowed for in this norm, the appellant failed to show that the products of D2, measured according to any of those geometries, would exhibit the mechanical properties specified by claim 18.

Therefore, the subject-matter of claim 18 is novel.

1.2 This finding applies also to the subject-matter of claim 20, which is directed to a deep drawn container manufactured from an alloy product with the features of claim 18.

2. Inventive step

Lack of inventive step for both claims 1 and 18 has been argued starting from D1 or D2.

2.1 Starting from D1

2.1.1 D1 discloses on page 3, lines 5-10, a process of manufacturing an aluminium alloy product comprising continuous casting an aluminium alloy melt, cold rolling the cast product, and final annealing the cold rolled product. The obtained product has a gauge below 200 $\mu$ m (page 1, lines 7-10). The cold rolling step comprises an optional interanneal step (page 3, lines 7-8). Hence, D1 also discloses a process without an interanneal step.

However, the composition of the alloy is not the same as in present claim 1 (which stipulates a Si content of 0.4-0.8%), because in D1 the claimed Si content is <0.4% (the examples according to the invention of D1 comprise at most 0.18% Si).

2.1.2 The patent in suit is directed to an alloy which must comprise Fe and Si, whereas D1 is directed to an alloy which must comprise Fe and may tolerate a Si content of less than 0.4%.

According to paragraph [0026] of the patent in suit the presence of Si helps reduce the solid solution of Fe and Mn, enabling continuous recrystallization to start within a low-temperature annealing range. The addition of Si in combination with Fe helps promote the formation of cubic  $\alpha$ -Al(FeMn)Si phase and it has been found that a predominance of this phase instead of the Si-free Al(FeMn) or of the monoclinic  $\beta$ -form of AlFeSi helps avoid smut formation and blackening during deep drawing. It is true that Table 2 of D1 shows that mechanical properties according to the patent in suit could be obtained also for the alloy of D1. Indeed, this is even acknowledged by the patent in suit in

Example 1, wherein compositions according to the invention and a composition according to D1 are compared. However, the alloy of D1 is able to match the combination of UTS and elongation of the alloys of the patent only when it is annealed at high temperatures, while the claimed alloys provide those properties over a wider range of annealing conditions (paragraph [0047] and Tables 2-4).

Hence, the problem solved by the method of claim 1 starting from D1 is not merely to provide an alternative or to improve the castability. Rather, it is to be seen in the provision of a method that leads to a combination of good mechanical properties in terms of the balance between strength and elongation in both longitudinal and transverse directions and avoids the creation of blackening deposits during deep drawing operations in a wide range of processing windows (paragraph [0020]).

2.1.3 D1 itself does not provide any incentive to increase the Si content. On the contrary, the fact that no minimum amount and no advantageous effect of Si is indicated for this element, which is a ubiquitous impurity for commercial aluminum alloys, points to the fact that no advantage is aimed at by the Si, the content of which is merely to be controlled and kept below a given value.

It is true that D2 discloses that better casting is to be obtained by Si contents between 0.4 and 0.8% (page 6, lines 6-13). However, D2 does not address the problem solved by the claimed method. Hence, the person skilled in the art would not apply the teaching of D2 to solve it. Moreover, even applying the teaching of D2 would not lead to the claimed invention, because D2

teaches performing interannealing during the cold rolling step to achieve good mechanical properties (page 4, line 27, to page 5, line 10). Since intermediate annealing is also an optional feature of the process of D1, the person skilled in the art considering the combination of D1 and D2 would arrive at a process of manufacturing an Al alloy comprising cold rolling with intermediate annealing, contrary to what is required by claim 1.

D3 is even less relevant, since the advantages of an Si addition explained in this document (column 4, lines 14-18) do not relate to a continuous casting method, as in D1 and in the claimed method, but to casting in a mould (see claim 1 of D3). Thus, the person skilled in the art would not combine D1 and D3 and, even if he did, would not arrive at the claimed method because he would not perform continuous casting.

Therefore, it is not obvious to arrive at the method of claim 1.

2.1.4 For the same reasons the product of claim 18 is also not rendered obvious starting from D1.

2.2 Starting from D2

2.2.1 D2 discloses a process of manufacturing an aluminium alloy product comprising continuous casting of an aluminium alloy melt with a composition according to present claim 1, cold rolling of the cast product and final annealing of the cold rolled product (claim 1). The process of claim 1 of D2 is directed to the production of Al foils, wherein the thickness of the foils is not specified.

However, claim 1 of D2 clearly recites in step (d) an interannealing step. Hence, the process of D2 is not "without an interanneal step" as required by present claim 1.

2.2.2 As explained above, the omission of intermediate annealing does not merely render the process more economical but provides an improvement in yield stress.

2.2.3 Starting from D2, the prior art does not render it obvious to omit the intermediate annealing to achieve this result.

D2 itself presents interannealing as an essential step (claim 1) and does not render it obvious to omit it.

D1 merely states that this step may be omitted when elongation is not critical but does not disclose any advantages of said omission in terms of mechanical properties (page 4, lines 6-13). Thus it does not render it obvious to improve the mechanical properties by omitting an essential step of D2.

2.2.4 Hence, it is not obvious to arrive at the method of claim 1 starting from D2.

2.2.5 The same applies to the product of claim 18, since its combination of mechanical properties is the result of the non-obvious omission of the interannealing.

2.3 Therefore, the subject-matter of claims 1 and 18 (and 20, which, as explained above, comprises all the features of claim 18) involves an inventive step.



**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairwoman:



C. Moser

P. Acton

Decision electronically authenticated