

Internal distribution code:

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

D E C I S I O N
of 2 August 2001

Case Number: T 0944/97 - 3.2.2

Application Number: 91117216.1

Publication Number: 0480402

IPC: C22F 1/043

Language of the proceedings: EN

Title of invention:

Process for manufacturing aluminium alloy material with excellent formability, shape fixability and bake hardenability

Patentee:

SUMITOMO LIGHT METAL INDUSTRIES LIMITED

Opponent:

Alusuisse Technology & Management AG

Headword:

-

Relevant legal provisions:

EPC Art. 52(1), 56

Keyword:

"Inventive step (no)"

Decisions cited:

-

Catchword:

-



Case Number: T 0944/97 - 3.2.2

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 2 August 2001

Appellant: SUMITOMO LIGHT METAL INDUSTRIES LIMITED
(Proprietor of the patent) 11-3, Shinbashi 5 chome
Minato-ku
Tokyo (JP)

Representative: Schwabe, Sandmair, Marx
Stuntzstrasse 16
D-81677 München (DE)

Respondent: Alusuisse Teschnology & Management AG
(Opponent) Badische Bahnhofstrasse 16
CH-8212 Neuhausen am Rheinfall (CH)

Representative: Wiedmer, Edwin, Dr.
Patentanwälte
Breiter + Wiedmer AG
Postfach 366
CH-8413 Neftenbach-Zürich (CH)

Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 25 July 1997
revoking European patent No. 0 480 402 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: W. D. Weiß
Members: S. S. Chowdhury
J. C. M. De Preter

Summary of Facts and Submissions

I. The appellant (patent proprietor: Sumitomo Light Metal Industries Ltd.) lodged an appeal against the decision of the opposition division to revoke European patent No. 0 480 402. The decision was dispatched on 25 July 1997.

The appeal and the fee for the appeal were received on 5 September 1997. The statement setting out the grounds of appeal were received on 25 November 1997.

The opposition was filed against the whole patent and was based on Article 100(a) EPC (lack of inventive step).

The opposition division had found that, starting from the document (4), EP-A-0 259 232, the subject-matter of claims 1 to 4 did not involve an inventive step having regard to the general knowledge of the skilled practitioner as set out in document

(2): Aluminium Taschenbuch 14. Edition, (1983),
pages 142, 143, and 1043

In addition, the board has considered the document

(7): Altenpohl: Aluminium und Al-Legierungen 1965,
pages 762 to 766.

This document was filed after the nine month opposition period, and was not admitted into the opposition procedure since the opposition division considered that its disclosure did not go beyond the contents of the other documents and disregarded it under Article 114(2) EPC.

II. Requests

At the end of the oral proceedings on 2 August 2001 the appellant requested that the decision under appeal be set aside and that the patent be maintained as granted, or in the alternative, on the basis of claim 1 in which the minimum hold time at room temperature is 5 minutes.

The respondent (opponent: Alusuisse Technology & Management AG) requested that the appeal be dismissed.

III. Claim 1 as granted reads as follows:

"A process for manufacturing an aluminum alloy material with excellent formability, shape fixability and bake hardenability, the process comprising the steps of:

conducting semicontinuous casting of an alloy comprising, in weight percentage, from 0.4% to less than 1.5% of Si, from 0.3% to less than 0.5% of Mg with the balance consisting of Al and unavoidable impurities to prepare an ingot;

rolling the ingot to a final sheet thickness according to the conventional technique;

conducting solution heat treatment by heating the sheet at a heating rate of 100° C/min or above to 450 °C or above but below 580 °C and holding the sheet in this temperature range for a period of from 10 seconds to less than 10 minutes;

cooling the sheet to 150 °C or below at a cooling rate of 100 °C/min or above;

allowing the sheet to hold still at room temperature for a period of less than 60 minutes; and

holding the sheet at a temperature of from 50 °C to 150 °C for a period of from 10 minutes to 500 minutes."

Dependent claims 2 to 4 specify that Cu, Mn, Cr, V may be added to the alloy as further additives.

IV. The appellant presented the following arguments:

Document (7) was late-filed and should not be admitted into the procedure since it was not prima facie relevant in that it dealt with an alloy having a different composition. A person skilled in the art would know that the teaching of this document, in which the Mg content was 0.6%, would not be applicable to the patent in suit, in which the Mg content was less than 0.5%. Moreover, this document did not refer to a paint baking step, and had different objects to the patent in suit.

The document (2) gave at least three different ways of treating aluminium alloys and made no mention of the problems of the patent in suit, nor did it recommend any one of these particular treatments in order to produce an alloy that could be baked under mild conditions. Neither of the documents (2) or (4) mentioned paint baking under mild conditions, and there was also no link between these documents, so that their combination involved the use of hindsight. Moreover, document (4) stressed that the operations must be carried out under narrow conditions, so that the person skilled in the art would not add further steps to those already described therein.

The patent in suit taught the combination of both room temperature aging and artificial aging, which combination was not in the prior art.

V. The respondent presented the following arguments:

Document (7) was a basic text book in the art and it had been cited to clarify the teaching of document (2), which the appellant had attacked as being unclear. Its teaching related to AlMgSi type alloys in general and not just to those with a Mg content of 0.6%. Also, this document should be considered since it was very relevant.

The feature in claim 1, that the sheet is held still at room temperature for a period of less than 60 minutes, was to be interpreted bearing in mind the statement in the description explaining that this time should be "as short as possible". This meant that this step was the same as in the prior art, according to which the artificial aging should occur directly after the quenching step. Moreover, the minimum time of 5 minutes, given in the examples of the patent in suit, may be considered to be "as short as possible" in an industrial plant having regard to the time required to transfer the sheets to the next station.

The prior art document (7) also gave the artificial aging conditions, which differed slightly from the claimed conditions, but the exact conditions used would depend on the alloy composition. Therefore, the last two steps of claim 1, which were the only steps not disclosed in document (4), were not inventive.

Reasons for the Decision

1. The appeal is admissible.

2. *Admissibility of document (7)*

This document is from a well known reference work in the art, representing the general knowledge in the field of aluminium technology. It complements and clarifies the teaching of document (2), whose disclosure was considered by the appellant to be obscure. It is, therefore, not considered by the board as a late filed document and admitted into the procedure, accordingly.

3. *Novelty*

This has not been contested by the opponent and the board see no reason for doubting the novelty of the claimed process.

4. *Inventive step*

4.1. The present patent relates to a process for manufacturing an Al-Mg-Si alloy material for use in automobiles, with excellent formability, shape fixability and bake hardenability. In particular, it is stressed in the opening passages of the patent (page 2, lines 30 to 32 and 47 to 50) that the bake hardenability must be achievable under relatively mild baking conditions of 170° C for 30 minutes, which is prescribed by Japanese law which strives at reducing energy consumption during every production process.

Since it normally takes a considerable time to transport the aluminium alloy sheet from the sheet manufacturer to the car manufacturer, where it is brought into its final shape before being bake-hardened to assume its final mechanical properties, it is further required that room temperature hardening hardly occurs for at least one month, so that the material still has a yield strength of 13.5 kgf/mm² or less, an elongation of 28% or more and an Erichsen value of 9.5 mm or more, and is capable of exhibiting a yield strength increase of 5 kgf/mm² or more after having been bake-hardened at 170 °C for 30 minutes.

Numerous examples and comparative examples are given in Tables 1 to 9 that indicate that the above parameters are achieved in those examples which fall within the scope of claim 1, whereas the comparative examples, wherein either the alloy composition or at least one of the process parameters does not fall within the scope of claim 1, do not attain all the above parameters.

4.2 Closest prior art

The closest prior art is considered by the board to be example 1 of document (4) since this example, like the opposed patent, deals with manufacturing an Al-Mg-Si alloy material for use in automobiles and having a composition falling within the terms of claim 1 of the patent in suit. Moreover, this aluminium alloy is subjected to the process steps of semicontinuous casting, homogenisation, hot rolling, solution treatment by heating the sheet at a rate of 25°C per second to 560° C and holding it there for about a minute, and rapidly cooling the sheet.

Consequently, this document discloses all the features of claim 1 except for the final two process steps of

(g) allowing the sheet to hold still at room temperature for a period of less than 60 minutes; and

(h) holding the sheet at a temperature of from 50°C to 150°C for a period of from 10 minutes to 500 minutes.

The above analysis was not challenged by the appellant's representative at the oral proceedings.

- 4.3. The feature (g), however, does not constitute a meaningful difference from the prior art since the lower limit of the range "a period of less than 60 minutes" is not clearly defined. According to the description of the patent in suit, see page 4, lines 5 and 6, "Preferably, the holding time of the sheet at room temperature should be as short as possible.", and the examples given in tables 2, 5, and 8 disclose various holding times in the penultimate columns, of which the minimum time is 5 minutes. According to the inventor, Mr. Uchida, at the oral proceedings, however, a dwell time of two minutes, for example, could also be feasible

On the other hand, according to the standard treatment of AlMgSi-type alloys, after the solution treatment step the sheet alloy is rapidly cooled down to room temperature, and in order to attain best mechanical properties, the dwell time at this temperature should also be as short as possible before starting an artificial aging step. This is clearly stated in document (2) (page 143, first paragraph) and in

document (7) (the sentence linking pages 763 and 765 and the sentence linking pages 765 and 766), where it is recommended that a short artificial aging step be carried out **directly** after the quenching step.

Since the effect of a minimum holding time is not given in the patent specification, it must be assumed that it is the same as in the prior art. That is, this time should be as short as possible within the practical constraints of an industrial plant where some finite time is necessary for transferring and loading the sheets into an oven for carrying out the next step (h). The feature (g), is, therefore, not distinguishable from the prior art step of performing a moderate artificial aging directly after the quenching step.

Claim 1 of the alternative request includes a lower time limit of 5 minutes for the hold time at room temperature, in an attempt to provide a distinction from the prior art. However, the patent specification gives no technical reason for this lower limit, nor is there any technical effect demarcated by the time of 5 minutes. This is supported by the inventor's statement that a dwell time of two minutes might also provide the necessary result.

Therefore, no difference is seen between the step g) of claim 1 and the corresponding step in the prior art of artificially aging the alloy **directly** after the quenching step.

- 4.4 Document (7) also gives details of step (h). On page 766, first paragraph, it is stated that the heat treatment should be carried out between 50 and 160°C, and that a time of 5 minutes at 50°C is already sufficient to stabilise the material so that it may be stored at room temperature for as long as necessary

before being artificially age hardened to assume its optimum strength values. It is clear to the skilled reader that document (7) describes the typical behaviour of AlMgSi-type alloys, which is only exemplified by the AlMgSi 1 alloy.

In practice the actual time and temperature for this step would be optimised for any given aluminium alloy composition of this type, so that the ranges of 50°C to 150°C for a period of from 10 minutes to 500 minutes in claim 1 would be attained by routine tests upon applying the teaching of documents (2) and (7) to the alloy of document (4).

Upon stabilising the sheets of document (4) using the steps recommended by document (7), the said manufacturer would be carrying out the process of claim 1. The resulting sheets would automatically possess all the desirable properties set out in the patent in suit. In particular, the material would have a yield strength of 13.5 kgf/mm² or less after the one-month room temperature age hardening so that it has an excellent shape fixability, an elongation of 28% or more and an Erichsen value of 9.5 mm or more so that it has an excellent formability, and a yield strength increase of 5 kgf/mm² or more after a heat treatment at 170°C for 30 minutes subsequent to the one-month room temperature age hardening, so that it has an excellent bake hardenability, and would comply with Japanese law in this respect.

Consequently, if the European manufacturer of aluminium sheets who is the author of document (4) would be asked by a Japanese car manufacturer to supply aluminium sheets which meet the specifications set by Japanese law when arriving at the car factory after the journey,

he would only use his general knowledge to inhibit room temperature hardening by the application of steps (g) and (h) to make the material according to example 1 of document (4) fit for their final use.

It is also noted that the setting out of the objective of a lower paint bake temperature of 170°C for 30 minutes is not of itself inventive since this is a constraint imposed by the law in Japan and not one thought up by the inventors of the patent in suit.


- 4.5. For the above reasons the process of claim 1, both as granted and in its alternative version, lacks an inventive step.

Order

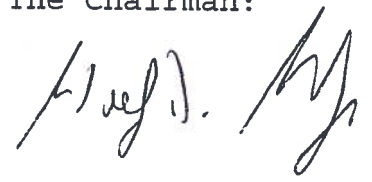
For these reasons it is decided that:

The appeal is dismissed.

The Registrar:


V. Commare

The Chairman:


W. D. Weiß