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**Datasheet for the decision
of 14 December 2017**

Case Number: T 0828/13 - 3.2.03

Application Number: 02777929.7

Publication Number: 1439240

IPC: C23C2/06, C23C2/28, C25D9/10,
C25D11/34, C23C22/53, C21D8/00

Language of the proceedings: EN

Title of invention:
METHOD FOR HOT-PRESS FORMING A PLATED STEEL PRODUCT

Patent Proprietor:
Nippon Steel & Sumitomo Metal Corporation

Opponent:
Benteler Automobiltechnik GmbH

Headword:

Relevant legal provisions:
EPC Art. 54, 56, 111(1)
RPBA Art. 12(4), 13(3)

Keyword:

Novelty - implicit disclosure (no)

Inventive step - (yes)

Late-filed evidence - submitted with the statement of grounds
of appeal - submitted shortly before oral proceedings

Remittal to the department of first instance - (no)

Decisions cited:

Catchword:



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Case Number: T 0828/13 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 14 December 2017

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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
8 February 2013 concerning maintenance of the
European Patent No. 1439240 in amended form.**

Composition of the Board:

Chairman G. Ashley
Members: B. Miller
E. Kossonakou

Summary of Facts and Submissions

- I. European patent No. 1 439 240 relates to a process for hot-press forming a plated steel product.
- II. An opposition was filed against the patent, based on Article 100(a) together with Articles 54 and 56 EPC. The opposition division decided that the main request filed during the opposition proceedings fulfilled the requirements of the EPC.
- III. The opponent (appellant) filed an appeal against this decision and requested that it be set aside and that the patent be revoked.
- IV. With a letter dated 15 August 2013 third party observations were initially filed anonymously and then re-submitted with letter dated 15 November 2013 by Mr Markus Reinhardt, European patent attorney.
- V. The respondent (proprietor) requested that the appeal be dismissed. Alternatively it requested that the patent be maintained on the basis of one of the six auxiliary requests submitted with the response to the grounds of appeal. Moreover, it requested not to admit into the proceedings
 - the third party observations and documents D26 to D30 annexed thereto,
 - D25 submitted by the appellant with the grounds of appeal and
 - D25a submitted by the appellant with the letter dated 14 November 2017.Should the third party observations and documents D25 and D26 to D30 be admitted into the proceedings, the respondent requested an apportionment of costs and that

the case be remitted to the opposition division.
Furthermore, it requested the case be remitted to the opposition division, should the main request not be accepted by the Board.

- VI. Independent claim 1 according to the main request, including the feature numbering used by the parties, reads as follows:
- a) "A process for hot-press forming a base steel material
 - b) wherein the steel material has a zinc- or zinc-alloy plated layer formed on the surface of the base steel material
 - c) and the base steel material with zinc- or zinc-alloy plated layer is heated to a temperature of 700- 1000 °C and
 - d) is subjected to hot-press forming while in the heated state,
 - e) characterized in that the plated layer has an oxide layer composed mainly of zinc oxide on the surface thereof prior to said base steel material with zinc- or zinc-alloy plated layer being heated to prevent evaporation of zinc upon being heated,
 - f) and in that the oxide layer has a weight of at least 10mg/m² as Zn."

Claims 2 to 5 of the main request relate to preferred embodiments of the process according to claim 1.

VII. State of the art

The following documents of the opposition proceedings were cited in the appeal proceedings:

D11: EP-A-1 143 029
D14: JP-A-2000 054 161
D20: EP-A1-0 744 475

The following documents were submitted by the appellant for the first time in appeal:

D25: Declaration from Prof. Dr.-Ing. Grundmeier dated 5 June 2013, submitted with the statement setting out the grounds of appeal
D25a: Declaration from Prof. Dr.-Ing. Grundmeier dated 14 November 2017, submitted with the letter dated 14 November 2017

The following documents were cited in the third party observations:

D26: EP-A1-0 700 735
D27: JP-A1-02 037975
D28: JP-A1-02 263 970
D29: Article from Galvatec, ISIJ, Chiba, pages 780 to 781
D30: JP-A1-02 263 967

VIII. With the summons to oral proceedings, the Board sent a communication pursuant to Articles 15(1) and 17(2) of the Rules of Procedure of the Boards of Appeal (RPBA) indicating to the parties its preliminary, non-binding opinion of the case.

IX. Oral proceedings were held on 14 December 2017 during which the respondent withdrew its request for apportionment of costs.

X. The appellant's arguments can be summarised as follows.

D11 disclosed a method of hot-press forming. Features e) and f) were implicitly disclosed in D11, because zinc inevitably oxidizes in air. Therefore the presence of a zinc oxide (ZnO) layer as defined in claim 1 of the main request was an inevitable result of any manufacturing process wherein a zinc- or zinc-alloy layer is coated on steel and is in contact with the atmosphere. The statements of Prof. Grundmeier (D25 and D25a) confirmed the technical understanding of the skilled person that the surface of zinc in D11 was inevitably oxidised to ZnO.

Starting from D11 as the closest prior art the subject-matter of claim 1 was obvious. Zinc-coated sheet steel having a ZnO layer on the surface were commercially available. Using this material in the process according to D11 did not require any inventive skills, but could be done by the skilled person relying on general knowledge.

Furthermore, the beneficial properties of a ZnO layer on zinc-coated steel sheets were known from D20. The use of such a material in a hot-press forming process as described in D11 did not require any inventive skills.

XI. The respondent's arguments can be summarised as follows.

D11 did not disclose or suggest that ZnO was present on the zinc coated steel strip used for the hot-press

forming process of D11. Neither D25 nor D25a demonstrated that the zinc-coated metal strip used in D11 comprised a ZnO layer in the amount required by claim 1 of the main request.

Starting from D11 as the closest prior art the subject-matter of claim 1 of the main request was not obvious, since none of the further cited documents referred to a hot-press forming process and therefore none of these documents would be considered by the skilled person when aiming at improving the hot-press forming process disclosed by D11.

Reasons for the Decision

1. Admissibility of D25

Together with the statement setting out the grounds of appeal, the appellant submitted document D25, the admission of which is governed by Article 12(4) RPBA.

As is evident from the grounds of appeal (point 1, in particular page 4, third complete paragraph), the appellant submitted the declaration of Prof. Grundmeier (D25) in order to address the reasoning of the appealed decision concerning the implicit disclosure of D11, and to supplement the arguments presented in opposition proceedings.

A filing made with the statement of grounds of appeal is not to be considered inadmissible, if it is an appropriate and immediate reaction to developments in the previous proceedings (cf. cases cited in Case Law

of the Boards of Appeal of the European Patent Office, 8th Edition, 2016, IV.C.1.3.6).

In light of the above, the Board concluded that document D25 is to be admitted into the proceedings under Article 12(4) RPBA.

2. Admissibility of document D25a

In response to the communication of the Board pursuant to Article 15(1) RPBA accompanying the summons to oral proceedings, the appellant filed document D25a. Its admission is therefore governed by Articles 12(4) and 13(3) RPBA.

D25a is a further declaration of Prof. Grundmeier, supplementing his first one (D25), and did not make an adjournment of the oral proceedings necessary.

Exercising its discretion under Articles 12(4) and 13(3) RPBA, the Board decided to admit document D25a into the proceedings.

3. Request for remittal

According to Article 111(1) EPC the Board has the discretion to decide on the remittal of a case to the department whose decision is appealed.

Documents D25 and D25a both provide a technical opinion on the implicit disclosure of D11, which is also discussed in points 5.2 to 5.4 of the contested decision. Therefore D25 and D25a relate to exactly the same point of discussion as addressed already in the opposition proceedings.

Hence, the admittance of D25 and D25a into the proceedings does not change the case to an extent which would justify remittal.

The Board therefore decided not to remit the case to the opposition division in line with established case law (see cases cited in Case Law of the Boards of Appeal, 8th edition, 2016, Chapter IV, E. 7.2.1).

4. Main request - Novelty (Article 54 EPC)

4.1 D11 discloses a process for hot-press forming a base steel material, wherein the steel material has a zinc- or zinc-alloy plated layer formed on the surface of the base steel material. The base steel material with the zinc- or zinc-alloy plated layer is heated to a temperature above 700°C and is subjected to hot-press forming while in the heated state (claims 1 to 7, examples).

It is undisputed that D11 does not explicitly disclose that a zinc oxide layer is present on the surface of the zinc- or zinc-alloy layer.

4.2 According to the appellant, features e) and f) of claim 1 are implicitly disclosed in D11, because zinc inevitably oxidizes in the presence of atmospheric oxygen. Therefore the presence of a zinc oxide layer, as defined in claim 1 of the main request, is an inevitable result of any manufacturing process wherein a zinc- or zinc-alloy layer is coated on steel and is in contact with the atmosphere.

4.3 However, the Board observes that example runs 2 to 4 in table 5 of the contested patent have a coating layer with less than 10mg/m² of zinc. This demonstrates that

not every manufacturing process providing a zinc- or zinc-alloy layer on steel inevitably leads to the formation of a ZnO layer on a Zn-based coating in the amount as defined in claim 1.

4.4 In order to demonstrate that the experimental evidence in the contested patent is questionable and that the skilled person reading D11 would understand that a ZnO layer with a coating weight of at least 10 mg/m^2 Zn is inevitably formed when reworking D11, the appellant referred to the statements of Prof. Grundmeier (D25 and D25a).

4.4.1 It is observed by the Board that the technical opinion presented in D25 addresses zinc surface coatings in general. A detailed experimental analysis of the composition of the surface layer of the zinc-coated metal plates resulting from the method of D11 or described in the examples of the contested patent has not been presented.

4.4.2 D25 furthermore confirms that the surface layer of zinc is not only composed of zinc oxide but also of zinc carbonate, zinc hydroxide, etc. (see page 3, third paragraph), and that the argumentation of the appellant is based on the simplified assumption that the formation of hydroxides and carbonates does not play a role during the formation of the surface layer (second last paragraph on page 3).
Moreover, D25 furthermore confirms that coated sheets are in most cases corrosion-protected by an oil film or a passivation layer (page 2, first paragraph).

Therefore in the absence of any detailed information in D11 concerning the coating conditions and the subsequent storage conditions (relative humidity,

duration, use of anti-corrosion oils, etc.) it cannot be concluded from the statements in D25 that the zinc-coated steel sheet used in the process of D11 even comprises an oxide layer mainly composed of ZnO.

- 4.4.3 Concerning the coating weight defined in claim 1, the appellant referred to figure 1 of D25. Figure 1 is cited from a scientific article which has not been submitted itself. It shows a graph wherein the y-axis relates to the amount of ZnO formed on zinc when storing the zinc in an atmosphere having a relative humidity of 90%.

The first two paragraphs on page 5 of D25, where the results shown in figure 1 are discussed, explain that during exposure to atmospheric conditions the formation of surface zinc carbonates becomes more and more significant, since zinc hydroxide in the surface layer reacts to zinc hydroxycarbonates. Thus, D25 confirms that the surface layer discussed with respect to figure 1 not only contains zinc oxide but also zinc hydroxide, zinc hydroxycarbonates and zinc carbonate.

Therefore D25 itself explains that figure 1 has to be interpreted as referring to the equivalent mass of ZnO and not only to the mass of ZnO itself.

Moreover, it is not apparent that figure 1 of D25 relates to the disclosure or D11, as the latter does not teach that the coated sheets are stored at a relative humidity of 90%. Therefore it is further doubtful that figure 1 can provide any clear guidance concerning the implicit disclosure of D11.

- 4.4.4 This analysis of the discussion relating to figure 1 of D25 is in line with the statements presented in point 4

(conclusions) and the first paragraph on page 6 of D25, where Prof. Grundmeier expresses his opinion that it is likely that surface films in general (but not specifically zinc oxide) are formed on the surface in an amount as defined in claim 1 within several hours to a few days.

- 4.4.5 D25 therefore does not demonstrate that an oxide layer mainly composed of ZnO in the amount as defined in claim 1 is inevitably present on the zinc-coated steel strip used in the hot-press forming process of D11.

- 4.5 The appellant further argued that D25a explained by reference to a scientific article that a ZnO layer having a thickness of at least 3 nm is inevitably present on any zinc surface.
 - 4.5.1 The statement in the technical opinion D25a is based on XPS spectra discussed in a scientific article which itself has not been submitted. D25a does not provide any specific technical details concerning the XPS spectra, such as the information whether the conclusion presented in D25a with reference to the XPS spectra is based on an evaluation of the O 1s peak of ZnO only and whether further peaks relating to zinc hydroxide and zinc carbonate were detected too.
In the absence of any experimental evidence on file, the statement in D25a has to be considered as a mere supposition.

 - 4.5.2 The Board further observes that the calculation of the hypothetical minimum thickness of the zinc oxide layer of 2.4 nm from the coating weight defined in claim 1 of the main request presented on page 3 of D25 is based on the simplified assumption that the zinc surface layer does not comprise zinc hydroxide and zinc carbonate.

Taking into account that in reality the zinc surface layer comprises zinc hydroxide and zinc carbonate as discussed above in point 4.4.2, the zinc surface layer comprising zinc oxide would have to be thicker than 2.4 nm in order to achieve the coating weight required by claim 1 of the main request.

Therefore it cannot be concluded that zinc inevitably comprises an oxide layer mainly composed of zinc oxide having the coating weight as defined in claim 1, even if it is accepted that the O 1s peak of ZnO is detectable up to a depth of 3nm as postulated in D25a.

- 4.6 In summary, neither D25 nor D25a demonstrates that an oxide layer mainly composed of ZnO having a coating weight of at least 10 mg/m² Zn is inherently and inevitably present in the zinc-coated steel sheet used in the hot-press forming method described in D11.

Therefore, the Board concludes that the subject-matter of claim 1 of the main request fulfils the requirements of Article 54 EPC.

5. **Main Request - Inventive step** (Article 56 EPC)

- 5.1 Both parties consider D11 to represent the closest prior art in line with the reasoning in the contested decision.

The Board sees no reason to deviate from this assessment.

- 5.2 As indicated above, D11 discloses a process for hot-press forming a base steel material, wherein the steel material has a zinc-plated layer formed on the surface of the base steel material. The base steel material

with the zinc-plated layer is heated to a temperature above 700°C and is subjected to hot-press forming while in the heated state (example 1).

- 5.3 The subject-matter of claim 1 of the main request differs from the process disclosed in D11 in that the plated layer has an oxide layer composed mainly of zinc oxide on the surface thereof prior to the heating to prevent evaporation of zinc upon being heated, and in that the oxide layer has a coating weight of at least 10mg/m² as Zn.
- 5.4 The presence of ZnO in the plated layer prevents evaporation of zinc upon being heated (claim 1, paragraphs [0019] and [0020] of the contested patent). A minimum coating weight of at least 10mg/m² of Zn present as ZnO is required to achieve the desired barrier function, as demonstrated by comparison of runs No. 2 to No. 4 with runs No.5 to No. 18 in table 5 of the contested patent.
- 5.5 The objective technical problem can therefore be regarded as achieving a hot-press forming process which does not lead to an evaporation of zinc.
- 5.6 None of the further documents cited by the appellant refers to a hot-press forming process. Therefore, none of the documents provides any motivation to provide a ZnO surface layer in order to avoid evaporation of zinc during a hot-press forming process.
- 5.7 The appellant argued that this motivation was provided already from general knowledge.

The Board notes that D11 does not give any hint that evaporation of Zn might still be a problem during the

hot-press forming process. On the contrary, D11 teaches that the zinc coating forms a layer alloying with the steel of the strip which then provides a mechanical resistance such that the coating material is prevented from melting (paragraph [0015]).

Therefore the skilled person does not get any motivation from D11 on its own to use a zinc-coated steel strip comprising a ZnO layer in order to reduce evaporation of zinc, despite the fact that this material might be commercially available as postulated by the appellant in point 2 of the grounds of appeal.

5.8 The appellant further argued that the skilled person was aware that zinc-coated metal strips comprising a ZnO outer layer had beneficial properties concerning formability, weldability, surface appearance and friction as taught by D20 (page 2, lines 51 to 57, table C). Since all these properties are important in any press-forming process, the skilled person would consider the teaching of D20 when trying to improve the method described in D11.

5.8.1 However, the process conditions and the requirements from a material are fundamentally different in a cold- and hot-press forming process. An evaporation of a coating material, such as for example zinc does not exist in a cold-press forming process. Friction problems addressed in table C of D20 on the other side do not play a role in a hot-press forming process.

In view of the difference in the requirements of a material, the skilled person would not use materials which are suitable for cold-press forming in a hot-press forming process, with the expectation that they work in the same or even in a better way.

5.8.2 D11 does not indicate that any problems might occur with respect to formability, surface appearance and weldability when following its teaching. Thus, even when disregarding the underlying objective technical problem concerning the evaporation of zinc, the skilled person has no reason to turn to the teaching of D20 addressing these properties in the context of cold-press forming when considering the hot-press forming process described in D11.

5.9 The appellant in addition argued in the last paragraph of page 9 of the grounds of appeal, that the skilled person was aware of the fact that zinc and zinc oxide had a melting point of 419.5 °C and 1975°C respectively.

However, the mere knowledge of the corresponding melting points is not a clear hint to the skilled person that the evaporation of zinc during a hot-press forming process as described in D11 can be effectively reduced by providing a ZnO layer having a coating weight of at least 10 mg/m² of Zn.

5.10 In summary, the Board concludes that the subject-matter of claim 1 is not obvious when starting from D11 as the closest prior art and therefore fulfils the requirements of Article 56 EPC.

6. Admissibility of documents D26 to D30

A third party within the meaning of Article 115 EPC is not a party to the proceedings. The admission into the appeal proceedings of third-party observations filed in the course of these proceedings is at the Board's discretion.

The appellant has not relied upon the third party observations or any of the documents D26 to D30 cited therein in the appeal proceedings.

As set out in the preliminary opinion, the Board considers that the observations and the thereto annexed documents merely supplement the appellant's case without however contributing anything new or fundamentally different requiring further consideration and/or evaluation.

Therefore the Board sees no reason to deal with the issue of admissibility of these documents as requested by the respondent.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



C. Spira

G. Ashley

Decision electronically authenticated