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**Datasheet for the decision
of 5 October 2007**

Case Number: T 0665/06 - 3.3.09

Application Number: 01915160.4

Publication Number: 1268192

IPC: B32B 15/08

Language of the proceedings: EN

Title of invention:

Laminate and process for producing a laminate of this type

Applicant:

Corus Staal BV

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 113(1), 56

Keyword:

"Substantial procedural violation - No"
"Inventive step - No, all requests"

Decisions cited:

-

Catchword:

-



Case Number: T 0665/06 - 3.3.09

D E C I S I O N
of the Technical Board of Appeal 3.3.09
of 5 October 2007

Appellant:

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Representative:

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Decision under appeal:

**Decision of the Examining Division of the
European Patent Office posted 30 November 2005
refusing European application No. 01915160.4
pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: J. Jardón Álvarez
Members: W. Ehrenreich
W. Sekretaruk

Summary of Facts and Submissions

- I. This appeal lies from the decision of the Examining Division, announced orally on 18 November 2005 and issued in writing on 30 November 2005, refusing European patent application No. 01 915 160.4 in the name of CORUS STAAL BV, published as WO - A - 01/53072.

The decision was based on the set of claims as originally filed (main request) and on three sets of claims for auxiliary requests I to III, filed with letter dated 15 November 2005.

Claim 1 of the main request read as follows:

"1. Metal-plastic-metal laminate, comprising a core layer which contains a thermoplastic, which core layer is situated between two substantially parallel metal skins and is joined thereto, characterized in that the core layer furthermore comprises a solvent and a hardener, the thermoplastic being dissolved in the solvent, and the hardener being capable of reaction with the solvent."

- II. The Examining Division refused the application because in its opinion the subject-matter of the claims of all the requests lacked inventive step (Article 56 EPC).

The following documents were mentioned in the appealed decision:

D1: WO - A - 93/22135

D2: R. W. Venderbosch *et al.* "Processing of intractable polymers using reactive solvents: 2. Poly(2,6-dimethyl-1,4-phenylene ether) as a matrix material for high performance composites", *Polymer* Vol. 36 (6), 1995, pages 1167 - 1178.

D3: EP - A - 0 598 428 and

D4: EP - A - 0 312 150.

The Examining Division considered the metal-propylene-metal laminates, suitable for cold-forming followed by treatment at a temperature of at least 135°C disclosed in D3 as the closest prior art. The Examining Division saw the objective technical problem to be solved by the application in the provision of a laminate having a better dimensional and thermal stability. The solution to this problem according to the application, namely the use of a more heat stable thermoplastic material, was in its opinion obvious for the skilled person having regard to the teaching of documents D4 and D2.

In the Examining Division's opinion it was obvious to choose a more heat stable thermoplastic, such as polyphenylene ether described in D4, in order to improve the heat stability of the laminate. Moreover, D2 indicated to the skilled person how to apply a plastic material which itself was difficult to process. Consequently, it was obvious for the skilled person, starting from D3, to process the polymers indicated in D2 or D4 to solve the problem of the application.

III. On 23 January 2006 the Appellant (Applicant) filed a Notice of Appeal against the above decision and paid the appeal fee on the same day. The Statement setting out the Grounds of Appeal was filed on 7 April 2006.

The Appellant requested in its Statement setting out the Grounds of Appeal that the decision of the Examining Division be set aside and the case be remitted to the first instance in view of the procedural violations committed by the Examining Division. The Appellant requested auxiliarily that a patent be granted on the basis of the claims of the application as filed as International application PCT/EP01/00813 (WO - 01/53072), European application 01 915 160.4.

IV. On 15 May 2007 the Board dispatched the summons to attend oral proceedings. In a communication dated 20 July 2007, the Board noted that in its preliminary opinion no procedural violation had been committed by the Examining Division and pointed out that it was to be decided during the oral proceedings if the claimed subject-matter involved an inventive step.

V. During the oral proceedings held on 5 October 2007, the Appellant filed two sets of amended claims as a first and a second auxiliary request. Claims 1 of these requests read as follows:

Auxiliary request 1:

"1. Metal-plastic-metal laminate, comprising a core layer which contains a thermoplastic, which core layer is situated between two substantially parallel metal

skins and is joined thereto, characterized in that the core layer furthermore comprises a solvent and a hardener, the thermoplastic being dissolved in the solvent, and the hardener being capable of reaction with the solvent, in which the plastic is selected from the group of poly(phenylene ethers), the solvent is selected from the group of epoxy resins, and the hardener is selected from the group consisting of amines, amides and anhydrides."

Auxiliary request 2:

"1. Metal-plastic-metal laminate, comprising a core layer which contains a thermoplastic, which core layer is situated between two substantially parallel metal skins and is joined thereto, characterized in that the core layer furthermore comprises a solvent and a hardener, the thermoplastic being dissolved in the solvent, and the hardener being capable of reaction with the solvent, in which the plastic is selected from the group of poly(phenylene ethers), the solvent is selected from the group of epoxy resins, and the hardener is selected from the group consisting of amines, amides and anhydrides, and without an adhesion layer between the core layer and the metal skin."

VI. The arguments presented by the Appellant in its written submissions and at the oral proceedings may be summarized as follows:

- The Appellant regarded the conduct of the Examining Division during the oral proceedings incorrect which resulted in a substantial procedural violation. In particular, the Appellant disagreed with the change

of the closest prior art document during the oral proceedings. D1 was considered as the closest prior art in the communication of the Examining Division attached to the summons to the oral proceedings, whereas at the opening of the proceedings the Appellant was informed that D3 had to be taken as the closest prior art document. The Appellant noted that it had prepared its defence in view of the summons to the oral proceedings and was surprised by this change of mind of the Examining Division. In addition the Appellant objected to the introduction of D4 by the Examining Division into the proceedings during the oral hearing.

Additionally, the combination of three documents to raise an obviousness objection as made by the Examining Division in the decision under appeal was considered inadmissible by the Appellant.

- Concerning inventive step, the Appellant agreed with the decision under appeal that D3 represented the closest prior art document. The laminates of D3 showed shape stability up to temperatures of about 140 to 145°C. The Appellant saw the problem underlying the application as to provide improved laminates having a better dimensional stability, a better thermal stability (up to a temperature of at least 180°C), and at the same time a good cold-workability during production of parts from the laminate. The solution to this problem, namely the claimed laminates including a core layer presenting two different states, a first state comprising a thermoplastic, a solvent and a hardener, the thermoplastic being dissolved in the solvent, and

the hardener being capable of reaction with the solvent, which can be cold-worked and subsequently be hardened to obtain a laminate in a second state which is dimensionally stable, could not be derived from the available prior art.

In its opinion, the skilled person trying to improve the laminates of D3 could perhaps modify the polypropylene core layer disclosed therein by adding a hardener, but would not use the polymers of D2. D2 was clearly directed to the application of poly(phenylene) ether as a matrix material for carbon fibre reinforced composites. In any case, there was no hint in D2 to its use in a laminate that could be used to form parts, such as parts for automotive purposes. Also a combination with D4 was not appropriate because D4 did not indicate how to produce parts from the laminate having a good dimensional stability.

- Concerning the auxiliary requests, the Appellant pointed out that they were filed in response to the doubts expressed by the Board in its preliminary opinion as to whether the problem had been solved within the whole scope claimed. Thus Claim 1 of the auxiliary request 1 was directed to the preferred system used in the application and Claim 1 of auxiliary request 2 specified a further preferred embodiment without using an adhesion layer. The arguments in relation to inventive step for the first auxiliary request were the same as for the main request, while the second auxiliary request was further limited by the absence of an adhesion layer that was an essential element of the laminates of D3.

VII. The Appellant requested that the decision under appeal be set aside and the case be remitted to the first instance in view of a procedural violation, or that a patent be granted in the version as originally filed (main request) or on the basis of one of the auxiliary requests 1 or 2, both filed during the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

2. *Procedural matters*

2.1 A substantial procedural violation has been alleged by the Appellant on the grounds that it had not been warned before the oral proceedings (i) of the change of mind of the Examining Division concerning the closest prior art document and (ii) of the intention of the Examining Division of introducing document D4 into the proceedings, and that as a result thereof it was taken by surprise.

2.1.1 Concerning the first objection, it is noted by the Board that while it is correct that in the summons to attend the oral proceedings dated 29 April 2005, the Examining Division started from D1 as the closest prior art, the Appellant itself in its submission dated 18 October 2005 in preparation for the oral proceedings has referred to D3 as the best starting point for assessing inventive step (see point 3). It is therefore clear that the Appellant was familiar with D3, which is acknowledged in the application as the closest prior

art document, and was in a position to deal with it at the oral proceedings. Moreover, the Examining Division's acceptance of the position of the Appellant, namely that D3 represented the closest prior art, cannot be considered a "surprise".

2.1.2 Concerning the introduction of D4, which is already cited in the Search Report, during the oral proceedings, the Board notes that although it would have been preferable if this document had been introduced earlier into the proceedings, the introduction at such a late stage of the proceedings does not *per se* contravene the requirements of Article 113(1) EPC. This introduction could have led to a substantial procedural violation only if no fair opportunity had been given to the Appellant to consider this document. The Appellant, however, has not disputed that it was given the opportunity to comment, and, consequently the introduction of D4 into the proceedings does not lead to a procedural violation.

2.2 A further procedural violation has been alleged by the Appellant because of the "inadmissible combination of three documents to raise an obvious(ness) objection" and because of the way of reasoning of the Examining Division in relation to the assessment of inventive step.

2.2.1 The Board notes that this is a matter of judgment and appreciation and that the Appellant may disagree with the conclusions of the Examining Division, but an interpretation of the prior art - even if it were wrong - cannot amount to a procedural violation.

- 2.3 Thus, the Board finds for the reasons indicated above that the alleged substantial procedural violation has not been established. The request of the Appellant to remit the case to the first instance is rejected.

Main Request

3. *Inventive step (Article 56 EPC)*

3.1 Closest prior art

- 3.1.1 The Board agrees with the Appellant and with the finding in the appealed decision that document D3 represents the closest prior art.

D3 discloses in Claim 1 metal-propylene-metal laminates suitable for cold-working followed by treatment at a temperature of at least 135°C, comprising two metal sheets made from aluminium or steel, between which there is a core layer of polypropylene and a layer of adhesive. The laminates are said to have high shape stability at high temperature in the heat treatment step when used for making shaped sheet articles (see Claim 10; see also Table 1).

3.2 The problem and its solution

- 3.2.1 According to the introductory section of the present application (see page 1, lines 16 to 37), the processing of laminates comprising a thermoplastic containing layer to form usable products such as bodywork parts, structural sheets and structural sections for walls and roofs and other objects, generally comprises cold-working followed by coating of

the components, wherein the coating treatment of automobile bodies and components usually takes place at temperatures up to 200°C. One drawback of the laminates of D3 is that they are insufficiently dimensionally stable at temperatures over 145°C (see also D3, page 3, lines 1 to 3). Moreover an additional adhesion layer is always required between the core layer and the metal skins.

- 3.2.2 The technical problem to be solved by the application can thus be formulated as to provide an improved laminate which is also suitable for cold-working but being dimensionally stable at a temperature of at least 180°C (see page 2, lines 1 to 7 of the specification).
- 3.2.3 This problem is said to be solved by the laminates according to Claim 1, wherein the core layer contains a thermoplastic and further a solvent and a hardener, the thermoplastic being dissolved in the solvent, and the hardener being capable of reacting with the solvent.
- 3.2.4 Although the present application does not include any working example, the Board acknowledges that, at least for the preferred embodiments using as thermoplastic a polyphenylene ether and as the solvent an epoxy resin, the above mentioned problem can be regarded as solved. As pointed out by the Appellant during the oral proceedings, the processing of thermoplastic polymers such as polyphenylene ether using reactive solvents was already known in the art (see paragraph bridging pages 9 and 10 of the description), the skilled person would assume that they result in stable laminates when used to form the claimed metal-plastic-metal laminates.

3.3 Obviousness

3.3.1 It remains to be decided whether the claimed subject-matter was obvious having regard to the available prior art.

3.3.2 According to the teaching of D2 poly(2,6-dimethyl-1,4-phenylene ether) (PPE) is an amorphous thermoplastic with a high glass transition temperature (i.e. with a high dimensional stability) of about 220°C and with excellent mechanical properties, e.g. in terms of toughness (see page 1167, left column, lines 12 to 17).

3.3.3 In the light of this teaching, the skilled person would not hesitate in using it as a replacement for the polypropylene core layer used in D3 when laminates with improved dimensional stability at higher temperatures were required.

3.3.4 Moreover, D2 further teaches that as a result of its limited thermal and oxidative stability, PPE cannot be melt processed (page 1167, left column, lines 18 to 22) and that this drawback of PPE can be avoided by using a reactive solvent (page 1167, right column, lines 21 to 22). The use of an epoxy resin results in enhanced flow and reduced processing temperatures. Solvent recovery is not necessary because during curing the epoxy resin is converted into a non-solvent and phase separation is initiated (see paragraph bridging pages 1167 and 1168). The mechanical and thermal properties of the polymer/epoxy resin blends are dominated by the PPE and materials that combine a high transition glass temperature with excellent toughness are obtained. The blends exhibit a high tensile strength, which is

indicative of a sufficient level of adhesion between the two phases (see page 1170 first full paragraph and Table I).

- 3.3.5 This teaching provides a clear incentive to use the PPE/epoxy system with the aim of obtaining laminates with improved dimensional and thermal stability.
- 3.3.6 The Appellant does not dispute that the processing of thermoplastic polymers using reactive solvents was already known, but argues that D2 is related to the application of PPE as a matrix material for continuous carbon fibres reinforced composites and that the skilled person would not find any indication for the use of PPE in a laminate as now claimed.
- 3.3.7 The Board finds this argument unconvincing. Although it is correct that D2 relates to the application of PPE as a matrix material for high performance composites, D2 is also directed to the preparation of the matrix materials (page 1168 left column under "Experimental" to right column, line 18) and studies its morphology and properties (see page 1169 right column under "Results and discussion" to page 1170 right column, line 13). In any case, D2 clearly teaches that as a result of the PPE being dissolved in a solvent, the viscosity was lowered and the processing temperatures of the thermoplastic material were reduced (see page 1168, left column, lines 2 to 5 and page 1170, right column, last line - left column, line 5).

The skilled person is taught by D2 of the advantageous properties of the PPE/epoxy resin system and he would

use them when looking for a replacement material for the polypropylene layer of the laminates of D3.

3.3.8 Insofar as the Appellant relied on the fact that the claimed laminates presented a core layer having two different states, said core-layer being first cold-worked and then cured to obtain a "hard" laminate having better dimensional stability which is therefore useful for producing bodywork parts, the Board notes that these features are not reflected in the wording of the claims which are directed to the laminates *per se* and therefore cannot justify the presence of an inventive step.

3.4 In view of the above findings, the subject-matter of Claim 1 of the main request lacks an inventive step.

Auxiliary Requests 1 and 2

4. *Inventive step (Article 56 EPC)*

4.1 In Claim 1 of the auxiliary request 1 the thermoplastic has been limited to poly(phenylene ethers), the solvent has been limited to epoxy resins and the hardener has been limited to the group consisting of amines, amides and anhydrides.

4.2 These are exactly the materials used in D2 (see page 1168, under "Experimental, Matrix materials"). Under these circumstances, the reasoning in relation to the main request applies *mutatis mutandis* to the subject-matter of Claim 1 of the auxiliary request 1, which therefore does not involve an inventive step.

4.3 Claim 1 of the auxiliary request 2 further specifies that no adhesion layer is present between the core layer and the metal skin.

This feature, however, cannot justify the presence of an inventive step either. D2 teaches that the epoxy/PPE system possessed excellent adhesion to steel and aluminium after curing in a mould, which had to be treated with a release agent (see page 1168, right column, lines 4 to 12). It was therefore clear to a skilled person from this passage that, by omitting the release agent, the system would adhere to metals when used for the preparation of metal-plastic-metal laminates and that no additional adhesion layer would be necessary.

For this reason the subject-matter of Claim 1 of the auxiliary request 2 lacks an inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

G. Röhn

J. Jardón Álvarez