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**D E C I S I O N**  
**of 24 June 2003**

**Case Number:** T 0686/00 - 3.3.6

**Application Number:** 94109849.3

**Publication Number:** 0631013

**IPC:** D21H 19/38

**Language of the proceedings:** EN

**Title of invention:**

Coated paper and processes for its production

**Patentee:**

ASAHI GLASS COMPANY LTD.

**Opponent:**

CANON INC.

**Headword:**

Coated paper/ASAHI

**Relevant legal provisions:**

EPC Art. 123(2), 84, 56

**Keyword:**

"Main request: Inventive step - no; obvious optimization of process parameters"

"Auxiliary request: Inventive step - yes; effect of a feature (here water content of a coating layer) not to be foreseen"

**Decisions cited:**

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**Catchword:**

-



Case Number: T 0686/00 - 3.3.6

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.6  
of 24 June 2003

**Appellant:** ASAHI GLASS COMPANY LTD.  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 10 May 2000  
revoking European patent No. 0631013 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** P. Krasa  
**Members:** G. Dischinger-Höppler  
U. J. Tronser

## Summary of Facts and Submissions

- I. This appeal is from the decision of the Opposition Division to revoke European patent No. 0 631 013 relating to coated paper and processes for its production. The decision was based on three amended sets of claims designated "first main request", "amended main request" and "auxiliary request", respectively.
- II. A notice of opposition had been filed against the granted patent wherein the Respondent (Opponent) sought revocation of the patent on the grounds of Article 100(a) EPC, i.e. for lack of novelty (Article 54 EPC) and for lack of inventive step (Article 56 EPC).

The opposition was based inter alia on the following documents:

D1 US-A-5 104 730 and

D5a English Translation, pages 1 to 7, of: "Recent Paper Processing Handbook, ed. Tech Times Corp., Tokyo, 20 August 1988, pages 648 to 655".

Further, the Opposition Division, during oral proceedings before it, introduced document

- (9) J.P. Casey, "Pulp and Paper Chemistry and Technology", third edition, volume III, pages 1822 to 1828.

III. In its decision, the Opposition Division held that the "first main request" was not admissible since its Claims 1, 3 and 5 did not meet the requirements of Articles 84 and 123(2) EPC and that the subject-matter of product Claim 1 and product Claims 1 and 3, respectively, of both the "amended main request" and the "auxiliary request" was not inventive over D1 and D5a. The subject-matter of the independent process Claims 3 and 5 and Claims 5 and 7, respectively, of the "amended main request" and of the "auxiliary request" was held to be not inventive either since they related to coating processes well-known in the art which, although applied with a different, but known coating composition, led to a non-inventive product.

IV. The Appellant (Proprietor) having appealed this decision filed additional experiments 1 and 2 under cover of a letter dated 27 December 2001.

V. Oral proceedings were held before the Board of Appeal on 24 June 2003, in the course of which the Appellant filed a set of four amended claims in a new main request and a set of two amended claims in an auxiliary request. Independent claims 1 and 3 of the main request read:

"1. A process for producing a coated paper comprising a paper substrate and a pseudo-boehmite layer containing a binder formed on the substrate, wherein the process comprises

(i) coating on a smooth die surface an aqueous coating solution of pseudo-boehmite containing a binder, wherein the binder is contained in an amount of

from 5 to 50 parts by weight per 100 parts by weight of the solid content of pseudo-boehmite and wherein the total solid concentration is from 5-30 wt%,

- (ii) adjusting the water content of the coated film (water/solid content) to a level of from 200 to 400 percent,
- (iii) closely contacting a paper substrate thereon, followed by
- (iv) drying to form a pseudo-boehmite layer, and then when the water content in the pseudo-boehmite layer becomes not more than 5 wt%,
- (v) peeling off the paper substrate from the die so that the pseudo-boehmite layer is transferred onto the paper substrate.

3. A process for producing a coated paper comprising a paper substrate and a pseudo-boehmite layer containing a binder formed on the substrate, whereby the process comprises

- (i) coating on a paper substrate a coating solution of pseudo-boehmite containing a binder, wherein the binder is contained in an amount of from 5 to 50 parts by weight per 100 parts by weight of the solid content of pseudo-boehmite and wherein the total solid concentration is from 5-30 wt%, to form a pseudo-boehmite layer,

(ii) pressing a smooth die heated to a temperature of from 50 to 150°C to the pseudo-boehmite layer to smooth the surface, wherein at the time of pressing the die, the amount of solvent is from 30 to 200 wt% relative to the solid content of the coated layer."

Dependent Claims 2 and 4 relate to specific embodiments of the claimed processes.

The auxiliary request differs from the main request only in that Claims 3 and 4 have been omitted.

VI. The Appellant's arguments, in writing and at the oral proceedings, can be summarised as follows:

- The claimed subject-matter was inventive over D1 as the closest prior art which did not disclose a technically useful coated paper of high ink absorptivity and with a pseudo-boehmite layer having a specular glossiness at 60° of at least 30% as indicated in the patent in suit.
- The criticality of the process steps according to the independent Claims 1 and 3 on the effect provided by the claimed subject-matter, in particular of the solvent content in steps (ii) of the independent claims on the glossiness of the surface layer, was demonstrated in the additional experiments.
- D5a did not refer to a pseudo-boehmite coating layer but to a specific type of organic coating material. In particular, D5a did not contain any

hint that glossiness could be improved by adapting the solvent content in the process of Claim 1 before the coating is contacted with a paper substrate or at the time of pressing a die to the coated layer in accordance with the process of Claim 3.

VII. The arguments of the Respondent were in essence as follows:

- The amendments made to the claims were open to objection under Articles 84 and 123(2) EPC.
- The only differences between the subject-matter of Claim 1 and the prior art disclosed in D1 were conventional in the art as was apparent from D1 and D5a, namely the adjustment of a particular water-solid content in the coated layer and the application of a pre-cast coating method.
- Likewise, the subject-matter of Claim 3 was obvious since its differences in view of the process disclosed in D1, namely to adjust a particular amount of solvent and to use a heated die, were known from D5a. Further, it was generally known in the art that, in order to be smoothed, the coating layer must exhibit some plasticity.
- The Appellant's additional experiments did not credibly show that a particular effect was obtained by the claimed processes in view of the disclosure of D1 and D5a.

VIII. The Appellant requested that the decision under appeal be set aside and that the patent be maintained in amended form on the basis of Claims 1 to 4 according to the main request or on the basis of Claims 1 and 2 according to the auxiliary request, both requests submitted at the oral proceedings.

The Respondent requested that the appeal be dismissed.

## Reasons for the Decision

### *Main request*

#### 1. *Independent Claim 1*

##### 1.1 Amendments

1.1.1 The Board is satisfied that the amended Claim 1 complies with the requirements of Article 123 EPC. This has not been contested by the Respondent so that no further comment on this matter is necessary.

1.1.2 However, the Respondent raised an objection under Article 84 EPC concerning the feature "wherein the total solid concentration is from 5-30 wt%". Since the percentage was not related to a particular frame of reference, the feature was unclear as to its precise meaning.

1.1.3 The Board does not agree since the feature in question directly refers back to the coating solution mentioned in step (i) of Claim 1 which reads:



"coating on a smooth die surface **an aqueous coating solution** of pseudo-boehmite containing a binder, **wherein** the binder is contained in an amount of from 5 to 50 parts by weight per 100 parts by weight of the solid content of pseudo-boehmite **and wherein** the total solid concentration is from 5-30 wt%, to form a pseudo-boehmite layer".

1.1.4 It is, therefore, clear that the total solid concentration or content of from 5 to 30 wt% is relative to the weight of the coating solution.

1.1.5 The Board, therefore, concludes that Claim 1 meets the requirements of Article 84 EPC too.

1.2 Inventive step

1.2.1 The patent in suit is concerned with the general technical problem in the field of manufacturing recording sheets for use in an ink jet printer to provide a coated paper having an excellent ink-absorbing property, a high colour reproduction property and an excellent surface gloss (column 1, lines 23 to 25 and 41 to 44). In particular, it is intended to provide a process for producing a coated paper having a specular glossiness at 60° of at least 30%, preferably at least 40%, as measured in accordance with JIS Z8741 (column 1, lines 45 to 50 and column 2, lines 9 to 13).

1.2.2 The parties agreed on the issue that D1 should be considered as the closest prior art. This document is also concerned with ink-jet recording media having a good ink absorptivity, full colour development and gloss (column 1, lines 27 to 33 and lines 41 to 50).

The Board, therefore, agrees that document (1) qualifies as a suitable starting point for assessing inventive step.

1.2.3 In order to produce an ink-jet recording medium with the above properties, D1 suggests two different embodiments of a process, namely the one which is relevant with respect to the process of Claim 1 wherein an aqueous mixture of pseudo-boehmite and binder is coated as an ink absorbing layer onto a smooth die surface such as a transparent sheet made of plastic and another embodiment wherein the coating mixture is applied onto a paper sheet (column 2, lines 1 to 10 and column 3, lines 17 to 28). In the coating mixture of both embodiments the binder is contained in an amount of from 10 to 50% by weight of the pseudo-boehmite (column 4, lines 6 to 11). According to the examples, the total solid concentration in the coating mixture can be about 10 wt% (Example 1).

1.2.4 D1 does not suggest any adjusting of the water content of the coated film other than by drying in order to obtain the recording sheet (column 3, lines 59 to 64 and Examples). Thus, it does not disclose feature (ii) of Claim 1. Further, it does not suggest any transfer of the coating layer from a die, e.g. from the plastic sheet, onto a paper sheet as required by features (iii) to (v) of Claim 1 in order to obtain a coated paper. Instead it discloses for this purpose to directly coat a paper sheet (Example 6). Moreover, D1 is silent about any particular value of the surface gloss which may be obtained by the disclosed processes.

1.2.5 In Examples 1 and 2 of the patent in suit it is shown that a process in accordance with the subject-matter of Claim 1 can provide an ink jet printing paper having a surface gloss as defined above (1.2.1) of more than 40%. In the Appellant's additional experiment 1, it is further shown that a specular glossiness of the final coated ink jet printing paper of more than 40% can only be obtained if the water content in the coating layer before contacting it with a paper substrate is regulated within the claimed range of 200 to 400% based on the solid content, whilst outside that range lower values for the gloss are obtained.

1.2.6 Therefore, the technical problem to be solved in view of document (1) may be seen in providing a method of producing a coated paper sheet having the high ink absorption and colour reproduction properties necessary for being useful in an ink-jet printer, and having a surface gloss at 60° of at least 40% as measured in accordance with JIS Z8741.

1.2.7 The Respondent objected that the additional experiment 1 was not according to the process defined in Claim 1 since it did not contain a drying step down to a water content of no more than 5 wt% in the pseudo-boehmite layer before peeling off the paper substrate from the die. In the description of the experiment it is merely said that there was a lapse of 3 minutes between the initiation of contact of the coating layer on the die with the paper substrate and the peeling step. However, it was not credible that waiting for three minutes would be sufficient to dry the layer from a water content of e.g. 350% based on the solid content down to a level 5 wt%. Moreover, the experimental data did not

provide sufficient basis to conclude that any effect was actually due to the claimed range of between 200 and 400% of the water content defined in step (ii) of Claim 1.

1.2.8 It is the established Case Law of the Boards of Appeal (see 4th edition 2001, chapter VI.J.6.2) that if one party has furnished convincing proof of the fact it has alleged, the burden of proof for the other party's contrary assertion is shifted to the latter. In the present case, the Appellant has explained that the drying to a level of 5 %wt of water was obtained within a time limit of only three minutes since the water rapidly vaporizes through the thin paper sheet once it has been brought into contact with the coating layer. The Respondent has not provided any evidence to the contrary. Concerning the claimed range of 200 to 400% for the water content in the coating layer, the experiments have, after all, been carried out with three values within the claimed range (263%, 300% and 355%) and four values outside (86%, 156%, 418% and 432%). Again the Respondent did not show that there existed values within the claimed range which would not provide the desired glossiness in the final product or that this glossiness could also be obtained with a water content outside said range.

1.2.9 In the absence of further information on this issue, the Board has no reasons to doubt the Appellant's experimental data and arguments. Therefore, the above defined technical problem is deemed to be actually solved by the process of Claim 1.

1.2.10 It remains to be decided whether, in view of the cited prior art documents, it was obvious for someone skilled in the art to solve this technical problem by the above means. In view of D1 these means consist in features (ii) to (v) of Claim 1.

1.2.11 According to the Respondent, features (iii) to (v) were generally known in the art as "pre-cast coating method". This was evident from D5a (page 4, third paragraph). A skilled person would, therefore, know that a coating layer applied on the surface of a plastic die as in Example 1 of D1 can be transferred to a paper sheet by applying the latter onto the coating layer and then peeling it off, together with the coating layer, from the die. The remaining feature (ii), namely to adjust the water content of the coating to a level of from 200 to 400% based on the solid content, was merely a routine optimization for those skilled in the art since a skilled person knew that the coating must not be too dry in order to adhere to the paper sheet.

1.2.12 In fact, D5a which is a handbook concerning paper processes and, therefore, representative for the general knowledge of those skilled in the art, relates to various cast coating methods for finishing paper and providing high levels of smoothness and glossiness of the surface of the coated paper (page 2, first paragraph). The "pre-cast" coating method is described as a special cast coating method where the coating material is first coated onto a heated cast drum surface and dried. Then the coated layer is adhered to a base paper which is coated with dextrin and, thereafter, the product paper is peeled off from the cast drum (page 4, third paragraph).

1.2.13 However, the Respondent's latter argument concerning the water content in step (ii) of the claimed process is not convincing since according to D5a the drying of the coated layer on the cast drum is finished before it is adhered to the base paper. Instead, the paper sheet to be used is itself coated with dextrin (D5a loc. cit.) and any adhesion between the paper and the coated layer, thus, cannot be due to the water content but may be due to the presence of dextrin. Therefore, the skilled person is not given any incentive to envisage a particular water content in the range of 200 to 400% in the layer on the die to achieve adhesion on the paper sheet.

1.2.14 Moreover, neither D1 nor D5a nor any other prior art document cited in the present case gives any hint that the water content in the coating layer on the die at the time when it is contacted with the paper sheet has any influence on the glossiness of the final coated paper after drying and peeling off from the die.

1.2.15 The Board therefore concludes that, whilst the coating transfer from the die to the paper sheet was in principle known from D5a as the pre-cast coating method and could have been combined by those skilled in the art with the process conditions for coating a plastic sheet disclosed in D1, it was not obvious in view of the prior art documents whether considered individually or in combination, to adjust the water content in the coating on the die to the particular level of from 200 to 400% in order to provide an ink-jet printer paper having a high surface gloss at 60° of at least 40%.

1.2.16 The Board therefore holds that the process of Claim 1 is based on an inventive step as required by Article 56 EPC.

2. *Independent Claim 3*

2.1 Amendments

Several objections under Article 84 and 123(2) EPC have been made to the amendments made to Claim 3. The Board, however, is satisfied that Claim 3 in the amended version complies with the requirements of Articles 84 and 123(2) EPC. Since, however, the subject-matter of Claim 3 is found to lack an inventive step it is not necessary to give details in this respect.

2.2 Inventive step

2.2.1 Concerning the technical background of the claimed subject-matter and the closest prior art, the same considerations apply as stated above in paragraphs 1.2.1 to 1.2.3, the only difference being that the relevant prior art in D1 is the embodiment where the coating mixture is directly applied to the paper sheet (see 1.2.3 above).

2.2.2 In contrast to the claimed process, D1 does not suggest that the coated paper is pressed against a die heated to a temperature of from 50 to 150°C and that the amount of solvent in the coated layer is - at the time of the pressing - from 30 to 200 wt% relative to the solid content of the coated layer. However, the pressing of the coated layer against a suitable means such as a roll press or a flat plate press in order to

impart smoothness to the ink absorbing layer is disclosed in D1 for those cases where during drying the surface becomes irregular and rough. A linear pressure of between 10 and 40 kg/cm is said to be usual for this purpose since too low a pressure would not give a smooth surface whereas at too high pressures the pores in the absorbing layer may be destroyed (closed) (column 4, lines 12 to 42). The difference between the claimed process and the relevant disclosure of D1 is, therefore, that at the time of pressing, the die is heated to a temperature of 50 to 150°C and the amount of solvent in the coated layer is 30 to 200 wt%.

2.2.3 According to the Appellant, the technical problem solved by this difference in view of the teaching of D1 consists in providing a method of producing a coated paper having the properties necessary for being industrially applicable and having a surface gloss at 60° of at least 30% as measured in accordance with JIS Z8741.

2.2.4 Example 3 of the patent in suit, whilst intended to be representative for the claimed process, does not indicate the amount of solvent at the time of pressing. This is due to the fact that it is not indicated how much of the solvent is left after the drying step before the 100 %wt of water based on the solid content was added. The Appellant's additional experiment 2 is clear in this respect and representative for the claimed process. It is shown that a specular glossiness of more than 30% at 60° can be obtained if the water content at the time of pressing at 90°C is 190 or 198% as compared with a glossiness of only 11.3% at 60° at a water content of 25%. However, the experiment 2 does



not allow any comparison with the paper coating embodiment in D1, which is specifically described in Example 6, if this process is combined with the preferred smoothing step disclosed in column 4 of D1.

- 2.2.5 Different to the situation with regard to Claim 1, the process disclosed in D1 which is relevant with regard to Claim 3, suggests means for achieving surface smoothness which are comparable to the distinguishing features in the sense that they define particular conditions for a pressing step. In D1 these conditions are pressing at a linear pressure of 10 to 40 kg/cm of the ink absorbing layer after or immediately before drying the layer (column 4, lines 30 to 42) whereas in the patent in suit the conditions are that the die is heated to a temperature of 50 to 150°C and the amount of solvent in the coated layer is from 30 to 200 wt%.
- 2.2.6 Therefore, the above additional experiment 2 cannot be accepted as evidence for an improvement of the glossiness over the relevant process of D1 which is said to impart surface smoothness which in turn has an impact on gloss (see also point 2.2.11). It follows that the technical problem credibly solved by the claimed process can only be seen in providing an alternative process for producing a coated paper having the properties necessary for being industrially applicable and having a high surface gloss.
- 2.2.7 Thus it has to be assessed whether it was obvious for those skilled in the art to solve this problem by applying heat instead of pressure and at the particular solvent content during the pressing step.

- 2.2.8 The Appellant argued that the heating was necessary since otherwise the smoothing would take too much time or the ink-absorbing pseudo-boehmite layer would tend to break (column 3, lines 50 to 53 of the patent in suit).
- 2.2.9 According to the general technical knowledge in the art of cast coating, it is , however, usual to smooth the coated layer by pressing it against a heated die such as a cast drum, which is usually controlled to be around 90°C (D5a, page 2, last paragraph to page 3, line 6 and page 3, line 31 to 33).
- 2.2.10 The Appellant further argued that surface smoothness and surface gloss were not necessarily linked to each other as was apparent from D9 (page 1826, lines 16 to 19).
- 2.2.11 This argument is not convincing since it is known from the same document that surface smoothness and surface gloss are interrelated in the sense that the surface must be "optically flat" to obtain high gloss. This is also corroborated in the patent in suit where it is said that rough surfaces are likely to have poor gloss (column 2, lines 24 to 26). According to D9 "optical flatness" means that irregularities in the reflecting surface should not exceed one-sixteenth of the wavelength of the incident light and that this condition will not exist unless the coated paper is dried against a polished surface or the paper is calendered (see page 1823, last line to page 1824, line 6).

2.2.12 Concerning the water content of the coated layer during pressing, the Appellant did not provide any particular arguments except those concerning the effect shown in additional experiment 2.

2.2.13 As is apparent from the above quotation from D9 (paragraph 2.2.11: "is dried against") the layer at the time of pressing should still contain solvent. This is corroborated by D5a where it is said that the coated film is contacted and pressed with and on a non-sticky mirror finished surface while it is still in a moist state and has plasticity, thereby forming - after drying and peeling off - a replica of the mirror finished surface on the coated film (page 2, third paragraph). The Board, therefore, holds that the skilled person from its general technical knowledge would keep the coating layer at the time of pressing in the process of D1 plastic and optimize the solvent content accordingly, in order not to destroy the pores if the coating was too dry, in particular if the pressing was applied after drying the coated layer as taught in D1 (column 4, lines 30 to 42). He would, therefore, arrive at the claimed solvent content by routine optimization of the plasticity of the coated layer at the time of pressing.

2.2.14 The Board, therefore, concludes that, for the purpose of providing an alternative method to the paper coating process disclosed in D1 providing high surface smoothness and surface gloss, the skilled person would, with a reasonable expectation of success, have tried to perform the process with a die heated to a temperature between 50 and 150°C and with a solvent content of

between 30 and 200 wt% in order to provide plasticity of the layer to an optimal extent.

Consequently, the Appellant's main request must fail since the subject-matter of Claim 3 lacks an inventive step and does not meet the requirements of Article 56 EPC.

*Auxiliary request*

3. In the auxiliary request, the claims have been restricted to Claims 1 and 2 of the main request. Having been found to be based on an inventive step (see paragraph 1.2.16 above), the subject-matter of independent Claim 1 meets the requirements of Article 56 EPC. Dependent Claim 2, which refers to a preferred embodiment of Claim 1, is based on the same inventive concept and derives its patentability from that of Claim 1.

**Order**

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

1. The decision under appeal is set aside.
  
2. The case is remitted to the first instance with the order to maintain the patent in amended form on the basis of Claims 1 and 2 according to the auxiliary request submitted at the oral proceedings and a description to be adapted thereto.

The Registrar:

The Chairman:

G. Rauh

P. Krasa