Internal distribution code:

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

Datasheet for the decision of 13 April 2016

Case Number: T 2419/13 - 3.3.06

Application Number: 02762126.7

Publication Number: 1395705

IPC: D21H23/48, D21H19/82, G03C1/74

Language of the proceedings: EN

Title of invention:
Process for making multilayer coated paper or paperboard

Patent Proprietor:
Dow Global Technologies LLC

Opponent:
Andritz Küsters GmbH

Headword:
Multilayer curtain coating / DOW

Relevant legal provisions:
EPC Art. 52(1), 54, 56

Keyword:
Novelty (yes)
Inventive step (yes)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern
Boards of Appeal
Chambres de recours

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 2419/13 - 3.3.06

D E C I S I O N
of Technical Board of Appeal 3.3.06
of 13 April 2016

Appellant: (Opponent)	Andritz Küsters GmbH Eduard-Küsters-Strasse 1 47805 Krefeld (DE)
Representative:	Henseler, Daniela Sparing Röhl Henseler Patentanwälte Rethelstrasse 123 40237 Düsseldorf (DE)
Respondent: (Patent Proprietor)	Dow Global Technologies LLC 2040 Dow Center Midland, MI 48674 (US)
Representative:	f & e patent Fleischer, Engels & Partner mbB, Patentanwälte Braunsberger Feld 29 51429 Bergisch Gladbach (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 5 November 2013 rejecting the opposition filed against European patent No. 1395705 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	B. Czech
Members:	L. Li Voti
	S. Fernández de Córdoba

Summary of Facts and Submissions

I. The present appeal is from the decision of the Opposition Division to reject the opposition against European patent No. 1 395 705.

II. Claim 1 of the patent as granted reads as follows:

"*1. A process comprising forming a composite, multilayer free flowing curtain, the curtain having a solids content of at least 45 weight percent, and contacting the curtain with a continuous web substrate of basepaper or baseboard.*"

Dependent claims 2 to 41 concern specific embodiments of the process according to claim 1.

III. The opposition had been filed on the ground of Article 100(a) EPC (lack of novelty and lack of inventive step).

The items of evidence cited include

D3: EP 0 517 223 A1;
D4: US 3,508,947 A;
D5: Dr. P. M. Schweizer, "Vorhanggiessverfahren"; Coating 6/2000; pages 227 to 230;
D6: Dr. P. M. Schweizer, "Vordosierte Beschichtungsverfahren: Vorzüge und Anwendungen"; Coating 12/98; pages 462 to 465; and
D7: W.W.Pulkrabek et al., "Single-pass Curtain Coating"; Materials & Manufacturing Processes, 8(3), 1993; pages 341 to 352.

IV. The Opposition Division found in its decision that the subject-matter of the granted claims was novel over D5

and D7 and also inventive. In particular, as regards inventive step, it came to the following conclusions:

- Document D3 represented the closest prior art.

- Table 4 of the patent in suit showed convincingly that a coating process according to claim 1 using a multilayer curtain (**simultaneous multilayer curtain coating** hereinafter), as illustrated by example 1, resulted in a coated paper having improved printability as compared to a similar paper obtained by a process using a single layer curtain, as illustrated by comparative example "Comp. B", reflecting the coating process disclosed in document D3.

- None of documents D5 to D7 suggested that such a technical effect was to be expected when applying a coating process making use of a multilayer curtain instead of a single layer curtain.

- The claimed subject-matter thus involved an inventive step.

V. In its statement of grounds of appeal of 27 December 2013 the Appellant (Opponent) maintained that the subject-matter of claim 1 lacked novelty over D5 and D7. In this connection, it referred to D3 as evidence for common general knowledge. It also maintained inventive step objections against claim 1 as granted, based on a combination of D3 with D4, D5, D6 or D7. It cited also a further document supposed to illustrate common general knowledge, namely

D11: Papermaking Science and Technology, Book 11, "Pigment Coating and Surface Sizing of Paper;

TAPPI 2000, pages 566 to 575.

VI. In its reply of 22 May 2014, the Respondent (Patent Proprietor) rebutted all the Appellant's objections. Nevertheless, it upheld, subsidiarily, the auxiliary claims requests 1 to 3 filed in the course of the opposition proceedings by letter of 3 September 2013. It also argued that document D11 should not be admitted into the proceedings in view of its late filing, lack of relevance and missing proof of its publication date.

VII. In its further letter of 30 December 2014, the Appellant maintained all its objections against the main request and extended these objections to the auxiliary requests. It also filed additional (cover) pages belonging to D11.

VIII. Oral proceedings were held on 13 April 2016.
The debate first focused on the novelty objections based on D5 and D7. As regards the alleged lack of inventive step, the Appellant then relied only on combinations of D3 with D5, D6 or D7.

IX. Requests

The Appellant requested that the decision under appeal be set aside and the patent be revoked.

The Respondent requested that the appeal be dismissed or, in the alternative, that the patent be maintained on the basis of one of the sets of claims filed as auxiliary requests 1 to 3 with letter of 3 September 2013.

X. The Appellant's arguments of relevance here, i.e. regarding the Respondent's Main Request, can be

summarised as follows:

Novelty - Claim 1

- Each of documents D5 and D7 disclosed a process with all the features of claim 1 at issue and was thus novelty-destroying.

Inventive step - Claim 1

- Document D3 represented the closest prior art.

- The comparative data reported in table 4 of the patent in suit (example 1 vs. Comp. B) did not convincingly show any improvement in the printability of the coated paper attributable to the only technical difference between the process of claim 1 at issue and the process disclosed in document D3, i.e. to the use of simultaneous multilayer curtain coating instead of single layer curtain coating.

- In fact, the properties, in terms of printability, measured and reported in table 4 for both coated papers were very similar. It could not be established that the small improvements, if any, achieved according to example 1, were actually due to the different curtain coating technique used, rather than to the presence, in the coated paper of example 1, of an undercoat layer, which was absent according to example Comp. B. Moreover, the total coat weight according to example 1 was slightly higher (20.2 g/m^2) than that according to Comp. B (19.9 g/m^2).
- Table 4 showed that the coated paper according to example 1 had better printability properties than

that according to Comp. A, differing from the former in that the bottom and top layers had been coated sequentially in two distinct single layer curtain coating steps, and not in a single pass using simultaneous multilayer curtain coating. However, such improvements were apparently due to the fact that in Comp. A the bottom layer was dried before the application of the top layer, with a resulting partial loss of the known benefits in terms of coating regularity (see, for example, paragraph [0006] of the patent in suit) provided by curtain coating.

- Therefore, the only technical problem actually solved with respect to the process of document D3 consisted in the provision of a more economical coating process. In fact, the claimed process allowed to coat a paper or paperboard in a more efficient way with a greater amount of coating material.

- However, as apparent from the cited prior art, a simultaneous multilayer curtain coating process provided economical advantages over single layer curtain coating. The skilled person would thus obviously have chosen the former rather than the latter when seeking to solve the technical problem posed.

- Moreover, even if table 4 of the patent in suit were to be considered to show an improvement of the printability of the coated paper attributable to the curtain coating process of claim 1 at issue, such effect was to be expected in the light of the respective teaching of each of documents D5, D6 and D7. In fact, these documents already suggested that

simultaneous multilayer curtain coating was also applicable to the coating of paper and paperboard substrates and led to more regularly coated layers with less or no defects, i.e. better printability.

- Therefore, it was obvious for the skilled person, starting from the teaching of document D3, to replace single layer curtain coating as disclosed therein by simultaneous multilayer curtain coating, also when seeking to improve the printing properties of the coated paper.

- The claimed subject-matter thus did not involve an inventive step.

XI. The relevant counter-arguments of the Respondent can be summarised as follow:

Novelty

- Neither D5 nor D7 disclosed a process with all the combined features of claim 1 at issue. Therefore, the claimed subject-matter was novel.

Inventive step

- The data presented in table 4 of the patent in suit clearly showed that simultaneous multilayer curtain coating with a curtain having a solids content of at least 45 weight percent surprisingly led to an improvement of the printability of the coated paper or paperboard, as compared to a single layer curtain coating process as disclosed in D3, representing the closest prior art.

- The Appellant did not provide evidence disproving

the effect shown in table 4 or showing that this effect would not be obtained throughout the ambit of claim 1 at issue.

- Therefore, even though it was known from the prior art that a curtain coating process could be used for providing a coated paper or paperboard with good printability, and that multilayer curtain coating presented economical advantages, the skilled person would not have found in the prior art any suggestion that the replacement of a single layer curtain coating process according to the closest prior art D3, wherein the curtain had a solids content of at least 45 weight percent, with a simultaneous multilayer curtain coating process could lead to an improvement in printability of the paper or paperboard coated in this manner.

- The claimed subject-matter thus involved an inventive step.

Reasons for the Decision

Respondent's main request (patent as granted)

1. Novelty - claim 1

1.1 According to the Appellant, the process of claim 1 (wording under II, *supra*) lacks novelty over both D5 and D7.

1.2 Document D5

1.2.1 D5 concerns curtain coating processes (see title "Vorhanggiessverfahren" on page 227). In the section

concerning the description of such a process (under the heading "Verfahrensbeschreibung" on page 227, left-hand column, last paragraph, and right-hand column, first full paragraph) it is explained that manifolds used in curtain coating can be designed such as to provide a single layer or a multilayer curtain, which upon exiting the manifold falls freely onto the continuous substrate to be coated. Figures 1a and 1b on page 228 illustrate, for example, manifolds providing a composite, multilayer free flowing curtain. This document thus definitely discloses generally also a process comprising forming a composite, multilayer free flowing curtain wherein the curtain is contacted with a continuous substrate.

1.2.2 In the section concerning the operational limitations of the curtain coating process (pages 228 and 229 under the heading "Anwendungsgrenzen") it is disclosed (page 229, left-hand column, lines 5 to 11) that, taking into account formula

$$H_{nass} = H_{trocken} / c \quad (2),$$

expressing the wet film thickness H_{nass} as the ratio of dry film thickness $H_{trocken}$ to solids content c, for a dry film thickness of 5µm and a solids content of **50%** (i.e. a solids content within the range specified in claim 1 at issue), the formation of a stable curtain requires a substrate velocity of greater than 600 m/min.

However, even accepting *arguendo* that these numerical values are apparently derived from the graph shown in figure 3 (page 229) of D5, and that these values were determined experimentally, neither the section "Anwendungsgrenzen" nor the subsequent section on page

229 under the heading "Betriebsfenster und Verfahrensoptimierung" reveals the type of substrate to which a curtain coating with the features mentioned above (substrate velocity, solids content of curtain) was applied.

Moreover, it is also not unambiguously revealed in D5 that the reported figures were determined using a multilayer curtain rather than a single layer curtain in the experimental set-up.

1.2.3 Moreover, for the Board, D5 essentially describes curtain coating processes in general.

This emanates clearly not only from the (general) title of the article ("Vorhanggiessverfahren", i.e. "Curtain Coating Process) but also from the fact that only a few specific passages of D5
- actually address explicitly and differentiate between specific aspects of a coating process using single or multilayer curtains (page 227, left-hand column, last paragraph; page 230, left-hand column, lines 6 to 9), or
- relate to some specific features of relevance with regard to coating with multilayer curtains only, such as the number of layers which can be coated in a single pass (page 228, table 1; page 230, right-hand column, line 14 below the heading "Ausblick").
The remainder of the description of D5 is instead more generic and does not address a specific type of curtain coating process.
Therefore, in the Board's view, also the text passages of D5 referred to *supra* cannot be considered to unambiguously relate to the coating of a paper or paperboard substrate using simultaneous multilayer curtain coating.

1.2.4 Furthermore, the reference to "graphic paper" as suitable substrate for the process (page 230, right column, line 6 below the heading "Ausblick"), has to be read in the context of the entire paragraph, which relates generically to the application of the curtain coating process in the last 30 years (lines 1 to 4 below the heading "Ausblick") without any specific reference to a specific (sub-)type of curtain coating process.

1.2.5 Therefore, in the Board's judgement document, D5 does not directly and unambiguously disclose a process with all the features of claim 1 at issue in combination.

1.3 Document D7

1.3.1 D7 concerns "single-pass curtain coating" (see title on page 341). This document discloses (see abstract on page 341, lines 2 to 4; figures 1 and 2 on page 342) that such a process may be used to apply a single layer or multiple layers in a single coating pass. In the section with the heading "Curtain Coating Fundamentals" it is disclosed (page 341, lines 1 to 4 below the heading) that "*Curtain coating is the process of depositing a thin liquid film on a surface by passing that surface through a falling curtain of the liquid as shown in Fig.1. The surface being coated is usually a continuous web (**paper**, polyester, etc.), but may be a discrete object ...*" (emphasis added by the Board). Figure 1 (page 342) referred to in the quoted sentence illustrates however a single layer curtain coating.

Moreover, the section "Curtain Coating Fundamentals" of D7 does not relate explicitly to simultaneous (single-pass) multilayer curtain coating, let alone of paper or paperboard substrates.

1.3.2 On page 343 (third full paragraph), the "dry-down ratio" is defined as "*The ratio of wet coating thickness to the dried coating thickness*". In the section bearing the heading "Curtain Coating Fluids" it is stated (page 343, last two lines) that "*[d]ry-down ratios can range from one for epoxy fluids to over 100 for low-pigment, high-solvent fluids.*"

Therefore, a dry-down ratio of one could, in theory, also correspond to a very high solids content of the curtain contacting the substrate.

However, the section "Curtain Coating Fluids" does also not relate explicitly to coating using a multilayer curtain or to the coating of paper or paperboard.

1.3.3 Simultaneous **multilayer** curtain coating is **specifically** addressed in the section with the heading "Multilayer Coatings", where it is stated (page 345, first full paragraph below the heading) that "*[w]hen desired, two or more wet layers of coating can be applied in a single pass through a curtain coater*".

This section is, however, silent on the type of substrate to be coated by this specific process and on the solids content of the liquid curtain. Moreover, there is no direct and unambiguous indication in this section that the teachings of the preceding parts of documents D7, concerning substrates that may be coated or suitable solids contents of the curtain coating fluids (see points 1.3.1 and 1.3.2, *supra*), would be generally applicable to such a simultaneous multilayer curtain coating process.

1.3.4 Therefore, in the Board's judgement, this document does also not directly and unambiguously disclose a process

with all the features of claim 1 at issue in combination.

1.4 The Board thus concludes that the subject-matter of claim 1 and claims 2 to 41 dependent thereon is novel over the prior art invoked by the Appellant (Articles 52(1) and 54 EPC).

2. Inventive step

2.1 The invention

2.1.1 The invention (see paragraph [0001] and claim 1 of the patent in suit) relates to curtain coating of paper and paperboard.

2.1.2 As explained in paragraph [0008] of the patent in suit, "*The use of a curtain coating method to apply a single layer of pigmented coating to the surface of a moving web of paper, as disclosed in the above discussed prior art* [which includes D3] *is stated to offer the opportunity to produce a superior quality coated paper surface compared to that coated by conventional means.*"

It is also acknowledged (paragraph [0009]) that "*[t]he curtain coating method for simultaneous coating of multiple layers is well known ...*"

However, it is also indicated (paragraph [0012]) that "*[a]lthough some improvements could be achieved by sequential coating steps using conventional coating techniques and/or curtain coating methods as discussed above, there is still a desire for further improvements with respect to printing quality of the resulting coated paper or paperboard and economics of the coating process.*"

2.2 Closest prior art

2.2.1 Both parties agreed that document D3 represents the closest prior art. In fact, D3 concerns (see page 2, lines 5 to 7, and page 3, lines 2 to 13) a method of manufacturing a coated paper for printing having superior surface characteristics and, hence, printability, by applying a curtain coating technique.

Considering the similarities between the patent in suit and D3 in terms of technical issues addressed and the features of the processes disclosed, the Board has no reason to take another stance.

2.2.2 More particularly, the method disclosed on page 3, lines 36 to 43 of D3, i.e. "*a method of manufacturing a coated paper to be used for a usual printing... characterized in that a coating liquid including at least one pigment and at least one binder and having a concentration of between 50% by weight and 70% by weight and a viscosity of between 700 cps and 4000 cps is deaerated ..., the coating liquid is formed as a free-falling curtain in a vertical direction and a printing base paper is coated with the deaerated coating liquid so that the free-falling curtain of the coating liquid collides with the coating base paper running continuously in a direction crossing the free-falling curtain*", represents the most appropriate starting point for the evaluation of inventive step according to the problem-solution approach.

2.3 Technical problem

The Respondent submitted that in the light of the closest prior art the technical problem solved consisted, as indicated in the patent in suit (see

point 2.1, *supra*), in the provision of a further, economical method of manufacturing a coated paper or paperboard which provided improved printability to the resulting coated paper or paperboard.

2.4 The solution

As the solution to this technical problem the patent in suit proposes the process according to claim 1 as granted, which is characterised in particular in that (emphasis added) a "*composite, **multilayer free flowing curtain** ... having a **solids content of at least 45 weight percent***" is formed and contacted "*with a continuous web substrate of **basepaper** or **baseboard***".

2.5 The success of the solution

2.5.1 The parties disagreed as regards the question whether or not the comparative experimental data contained in the patent in suit showed that the claimed process resulted in coated paper(board) with an improved printability.

2.5.2 In respect of these data, the following is stated in the patent in suit:

"*To compare simultaneous multilayer curtain coating versus single-layer curtain coating, a woodfree basepaper (87 g/m^2, PPS roughness = 5.6 µm) was coated at 900 m/min in three experiments in which the same total coat weight was applied in each of three ways, namely, consecutive single-layer coatings, simultaneous multi-layer coating, and one single-layer coating application*." (paragraph [0064])

and

"*Coating formulations were deaerated prior to use to remove air bubbles.*" (page 18, lines 6 to 7)

2.5.3 According to **example 1** (paragraph [0066]), illustrating the simultaneous multilayer curtain coating according to claim 1 at issue, the basepaper was coated so that each layer had a coat weight of 10±0.2 g/m^2. In particular, as reported in table 4, the basepaper was coated with 10.2 g/m^2 of an undercoat of formulation 1, which had a 72.7% solids content (see table 1 on page 12), and with 10.0 g/m^2 of a topcoat of formulation 18 having a solids content of 67.3% (see table 2 on page 14).

According to **Comparative experiment A** (paragraph [0065]; referred to in table 4 and hereinafter as **Comp. A**), illustrating the application of two consecutive single-layer curtain coatings, the basepaper is coated with the same two formulations 1 and 18, so that each layer had a coat weight of 10±0.2 g/m^2. As reported in table 4, the basepaper was coated with 9.9 g/m^2 of an undercoat of formulation 1 and with 10.0 g/m^2 of a topcoat of formulation 18 in two consecutive curtain coating steps.

According to **Comparative experiment B** (paragraph [0067]; referred to in table 4 and hereinafter as **Comp. B**), illustrating a single-layer curtain coating, the basepaper was coated only with topcoat formulation 18 to achieve a coat weight of 20±0.2 g/m^2. As reported in table 4, the basepaper was coated with 19.9 g/m^2 of this topcoat.

Comp. B, as agreed by all parties, is thus representative of a method of manufacture according to D3, which differs from that of claim 1 at issue only

insofar as single layer curtain coating is used instead of simultaneous multilayer curtain coating.

Comp. A also reflects prior art, as acknowledged in the patent in suit (page 2, paragraph [0007], lines 54 to 56).

2.5.4 Table 4 of the patent in suit (paragraph [0068]) reports the values measured for several properties of the basepapers coated as indicated above.

These values are reported below in the following order: **Example 1** / Comp. A / Comp. B.

Paper Gloss (%)	:	**66** / 53 / 67
Ink Gloss - 0.8g/m^2 ink (%)	:	**89** / 73 / 85
Ink Gloss - 1.6g/m^2 ink (%)	:	**94** / 75 / 90
Roughness (µm)	:	**1.7** / 4.4 / 2.0
IGT Dry Pick (cm/s)	:	**95** / 91 / 80
Ink Piling (No. of Passes)	:	**5** / 3 / 4
Ink Mottling (Mottle Value)	:	**6.4** / 7.8 / 6.5

2.5.5 As explained in paragraph [0069] "*[t]he results in Table 4 show that the simultaneous multilayer coated paper* [**example 1**] *had superior paper gloss, ink gloss, roughness, dry pick resistance, ink piling and ink mottling compared to the paper that received consecutive single-layer curtain applications of undercoat and topcoat* [**Comp. A**]. *Moreover, the simultaneous multilayer coated paper* [**example 1**] *was superior in ink gloss, roughness, and dry pick resistance compared to the paper that received a single-layer curtain coating of 20g/m^2 of the relatively more expensive topcoat* [**Comp. B**]. *The same advantages would be expected for coating paperboard.*"

These comparative tests thus appear to show, as accepted by the Opposition Division (see point IV, *supra*), that the method according to claim 1 at issue effectively solves the technical problem identified above (2.3, *supra*).

2.5.6 In the Appellant's view (see VIII, *supra*), the comparison of the method according to claim 1 at issue (**example 1)** with that according to the closest prior art D3, represented by **Comp. B**, does not show the alleged improvement of the printing properties since the measured values are very similar and it was not established that the small improvements shown for the coated paper of **example 1**, if any, were due to the different curtain coating process used and not to the different overall coating formulation. In fact, **example 1** required the presence of an undercoat layer of formulation 1 which was absent in **Comp. B** and the total coat weight for **example 1** was also slightly higher (20.2 g/m^2) than that for **Comp. B** (19.9 g/m^2).

As regards the better printability, shown in table 4, of the coated paper according to **example 1** as compared to that according to **Comp. A**,, the Appellant argued that the improvements were apparently due to the fact that in **Comp. A** the bottom layer had been dried before the application of the top layer, with the consequential partial loss of the known benefits in terms of coating regularity provided by the curtain coating process.

2.5.7 These arguments do not convince the Board for the following reasons.

i) Firstly, the Board has no reason to call into question the correctness of the results reported in

table 4. These show, in particular, that the coated paper according to **example 1** has an overall better printability, as expressed by the measured values for some of its properties, than the coated paper of **Comp. B** (see points 2.5.4 and 2.5.5, *supra*).

In this respect, the Appellant, despite the fact that these comparative tests had already been considered convincing by the Opposition Division, did not submit any counter-evidence (e.g. further experimental data) conclusively showing that such an effect would not be achieved at all or not throughout the whole ambit of claim 1 at issue.

Therefore, the Board has no reason to accept the mere assertion that the improvements shown were due
- to the additional layer of formulation 1 present in **example 1** and which is absent in **Comp. B** or
- to the slight difference in the individual "coat weight" values reported for these two examples, all coat weight values falling anyway within the limits given for the individual (10±0.2 g/m^2) and the total 20±0.2 g/m^2 coat weight values indicated in paragraphs [0066] and [0067].

ii) Secondly, table 4 shows clearly (point 2.5.4, *supra*) that the printability of the coated paper of **Comp. A**, coated with the same layers as the paper of **example 1**, but in two single-layer curtain coating steps, are worse overall than those of the paper of **Comp. B**, representing D3, coated in a single step with a single layer of formulation 18.

Considering that the addition of the undercoat layer of formulation 1, absent in **Comp. B**, by the same single layer curtain coating step leads to a clear worsening

of the overall printability with respect to **Comp. B**, it is indeed surprising that by applying these two layers simultaneously as in **example 1** the overall printability, as expressed by the measured properties, are not only restored to the level of **Comp. B**, but improved beyond that level.

The Appellant's argument that the properties of **Comp. A** were worse because the bottom layer was dried before applying the top layer is, for the Board, purely speculative and not supported by any evidence. In fact, the process used in **Comp. A** also reflects a prior art process which is acknowledged in the patent in suit (page 2, lines 54 to 56), like the process of **Comp. B** (page 2, lines 45 to 46), which processes are both apparently considered to provide similar benefits in terms of quality of the coated paper surface (see also the following paragraph [0008] of the patent in suit).

2.6 In the light of the above considerations, the Board has no reason to overrule the finding of the Opposition Division that the tests of table 4 convincingly show that the technical problem posed (2.3, *supra*) is successfully solved across the breadth of claim 1 at issue.

3. (Non)obviousness of the solution

3.1 Therefore, it remains to be decided whether starting from the closest prior art process disclosed in D3, the claimed process was obvious to the person skilled in the art having regard to common general knowledge and the state of the art.

3.2 At the oral proceedings the Appellant maintained that each of documents D5, D6 and D7 suggested that applying

multilayer curtain coating to paper or paperboard would lead to a more regularly coated substrate with less or no defects, hence having better printability.
The Board does not accept this argument for the following reasons.

3.3 Document D5

3.3.1 Document D5 concerns curtain coating in general (1.2 *et seq., supra*). Therefore, the Board holds that even though this document describes *inter alia* a simultaneous multilayer curtain coating process, as well as the applicability of the curtain coating process in general to paper and paperboard, the advantages of a more regularly coated substrate presenting no or less defects addressed in this document (see, for example, page 230, left column, first full paragraph; page 230, paragraph bridging left and right columns; page 230, right column, second full paragraph; page 230, right column, lines 17 to 21 below the heading "Ausblick") are attributed to curtain coating in general.

Such benefit of curtain coating is, in fact, acknowledged in the patent in suit as being known from prior art. More particularly, it is indicated in paragraph [0008] of the patent that "*[t]he use of a* ***curtain coating*** *method to apply a* ***single layer*** *of pigmented coating to the surface of a moving web of paper, as disclosed in the above discussed prior art* [which includes D3], *is stated to offer the opportunity to produce a superior quality coated paper surface compared to that coated by conventional means.*"

3.3.2 Document D5, however, contains no indication that by using a simultaneous multilayer curtain coating process

instead of a single layer curtain coating process (single- or multi-pass) in a method including the formation of a curtain having a solids content of at least 45% by weight, as disclosed in document D3, a further improvement in printability, as shown in table 4 of the patent in suit, could have been expected.

3.3.3 Document D6

Document D6 concerns premetered coating processes, *inter alia* both single layer curtain coating and simultaneous multilayer curtain coating, but also including other coating processes not involving the formation of a curtain (see page 462, right column, lines 1 to 8 and Figures 1a) to 1d); page 464, figure 2 and table 1).

This document explicitly suggests that a premetered simultaneous multilayer coating process (in general, i.e. not specifically with respect to curtain coating) presents economical advantages (page 463, second full paragraph below the heading "3. Eigenschaften und Vorzüge"). Moreover, it is indicated therein (page 463, fourth full paragraph below the heading "3. Eigenschaften und Vorzüge") that, according to relationship

$$H\infty = Q/U \quad (1)$$

the values of Q (volumetric flow/width) and U (line speed) can be controlled in order to obtain variations in the deposited film thickness of less than 1%, i.e. in order to obtain a very regular coating (H∞ referring to the wet film thickness "Nassfilmdicke").

The Board holds that this disclosure appears to concern

all premetered coating processes previously addressed in this document and it expresses no preference for the simultaneous multilayer coating process, let alone as regards the printability of paper or baseboard coated in this manner.

As pointed out by the Appellant in this connection, D6 suggests (page 464, left-hand column, first paragraph) that premetered coating processes, *inter alia* curtain coating, can lead to a very regular coating free of defects (as acknowledged in the patent in suit, paragraph [0008]). However, D6, like D5, does not suggest that by using a simultaneous multilayer curtain coating step with a curtain solids content of at least 45 weight percent instead of one (or sequential) single layer curtain coating step(s) further improvements of the printing qualities of the coated paper or paperboard could be expected.

In particular, even though the passage on page 465, left-hand column, second full paragraph, indicates that multilayer coating in one pass appears to be preferable for coating substrates like *inter alia* ink jet paper, D6 does not suggest that any of the premetered coating processes disclosed therein, let alone simultaneous multilayer curtain coating with a curtain solids content of at least 45 weight percent, will, when applied in the coating of paper or baseboard, necessarily lead to products improved in printability as compared to those resulting from single layer curtain coating as disclosed in the closest prior art document D3.

3.4 Document D7

3.4.1 As explained above (1.3 *et seq., supra*), document D7

concerns single-pass curtain coating in general and relates to a process which may be used to apply a single or multiple layers in a single coating pass on a great variety of substrates, *inter alia* on paper.

Simultaneous multilayer coating is addressed on page 345 (first full paragraph below the heading "Multilayer Coatings"), where it is stated that such a "*process is attractive when it is necessary to produce different physical properties at various depths of the coating, ie. improved wear characteristics, different colors, high surface gloss...*".

3.4.2 However, for the Board, there is no suggestion in this part of document D7 that further improved printability can be achieved using a multilayer instead of single layer curtains to coat paper or paperboard at solids contents of the curtain of at least 45%.

3.5 Other evidence cited

For the sake of completeness, the Board also remarks that even the other documents (i.e. D4 and D11, if the latter were considered admissible) cited in the Appellant's writs but not invoked during oral proceedings, do also not suggest that an improvement in the printability of coated paper or paperboard could be achieved by using a multilayer curtain coating instead of single layer curtain coating, at a curtain solid contents of 45 weight percent or more.

3.6 In summary, the Board is convinced that even though the prior art (e.g. D6) already suggested that a multilayer coating in one pass presents economical advantages over coating processes with single layer curtains, the person skilled in the art had no reason to expect, in

the light of the teachings of the prior art invoked, that the printability of coated paper or paperboard could be further improved by replacing the single layer curtain coating process of the closest prior art D3 with the simultaneous multilayer curtain coating process as claimed.

4. In the Board's judgement the subject-matter of claim 1 at issue and, consequently, also the subject-matters of dependent claims 2 to 41, involve thus an inventive step (Articles 52(1) and 56 EPC).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

D. Magliano B. Czech

Decision electronically authenticated