

Internal distribution code:

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

D E C I S I O N
of 16 October 2002

Case Number: T 0745/00 - 3.3.3

Application Number: 91107600.8

Publication Number: 0458147

IPC: C08J 7/04

Language of the proceedings: EN

Title of invention:

Polymeric film coated in-line with polyethyleneimine

Patentee:

HOECHST CELANESE CORPORATION

Opponent:

E.I. Du Pont de Nemours & Company, Inc.

Headword:

-

Relevant legal provisions:

EPC Art. 56, 114(2)

Keyword:

"Inventive step (yes) - non-obvious solution"
"Admission of late filed document (no)"

Decisions cited:

G 0002/88, T 0021/81, T 0506/92, T 0939/92, T 1002/92

Catchword:

-



Case Number: T 0745/00 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 16 October 2002

Appellant: E.I. Du Pont de Nemours & Company, Inc.
(Opponent) 1007 Market Street
Wilmington, Delaware 19898 (US)

Representative: Jones, Alan John (GB)
Carpmaels & Ransford
43 Bloomsbury Square
London WC1A 2RA (GB)

Respondent: HOECHST CELANESE CORPORATION
(Proprietor of the patent) Route 202-206 North
Somerville, N.J. 08876 (US)

Representative: Zounek, Nikolai, Dipl.-Ing.
Patentanwaltskanzlei Zounek
Industriepark Kalle Albert
Gebäude H391
Rheingaustrasse 190-196
D-65174 Wiesbaden (DE)

Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 9 May 2000
rejecting the opposition filed against European
patent No. 0 458 147 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: R. J. Young
Members: P. Kitzmantel
J. H. Van Moer

Summary of Facts and Submissions

I. Mention of the grant of European patent No. 0 458 147 in respect of European patent application No. 91 107 600.8 in the name of HOECHST CELANESE CORPORATION, which had been filed on 10 May 1991 claiming a US priority of 18 May 1990, was announced on 21 August 1996 on the basis of 12 claims, independent Claims 1 and 5 reading as follows:

"1. An oriented polymeric film having a coating composition on at least one side thereof, said coated, oriented polymeric film comprising:
a) oriented polymeric film; and
b) polyethylene imine coating applied in-line, present on a dry-weight basis of 4.9×10^{-2} to 98 mg/m² of film surface, said polyethylene imine coating sufficient to adhere a direct extrusion-coated polymer to said polymeric film and to prevent delamination between said film and extrusion coated polymer after 2 hours in water at 121°C at 0.1 N/mm²."

"5. A process for making oriented polymeric film in-line coated with polyethylene imine according to one of the claims 1 to 4 comprising:
a) forming a polymeric film;
b) corona treating said polymeric film sufficient to activate the surface of the film;
c) coating said activated surface of said film in-line with an effective amount of polyethylene imine coating, sufficient to adhere an extrusion-coated polymer to said film;
d) orienting said film in at least one direction by stretching said film; and

e) heat-setting said film."

Claims 2 to 4 are dependent on Claim 1; Claims 6 to 12 are dependent on Claim 5.

II. Notice of Opposition requesting revocation of the patent in its entirety on the grounds of Article 100(a) EPC was filed by Imperial Chemical Industries Plc (opposition later transferred to E.I. Du Pont de Nemours and Company) on 21 May 1997.

The opposition was i.a. based on documents

D1: GB-A-913 289,

D2: Encyclopedia of Polymer Science and Engineering, second Edition, vol. 12, pages 205, 207, 209 and 210,

D3: GB-A-1 169 806,

D4: US-A-4 571 363,

D5: US-A-3 322 553,

D6: GB-A-1 411 564, and

D7: US-A-3 297 476.

III. By its decision issued in writing on 9 May 2000 the Opposition Division rejected the opposition.

That decision held that the claimed subject-matter was novel over the cited prior art because D1 failed to disclose an oriented polymeric film having an in-line

applied polyethylene imine (PEI) coating and because the PEI coatings of D3 were much thicker than the ones according to present Claim 1.

The claimed subject-matter was also non-obvious because neither was there a suggestion in the prior art that the evidenced superior adhesion and humid delamination properties would be achieved by the choice of PEI as material of in-line applied coatings, a technology disclosed in D4, D5 and D6, nor by the replacement of the off-line applied PEI coatings of D1 by in-line applied PEI coatings.

- IV. On 19 July 2000 the Opponent (Appellant) lodged an appeal against the decision of the Opposition Division and paid the appeal fee on the same day. The Statement of Grounds of Appeal was submitted on 15 September 2000. A further written submission dates from 16 September 2002 including the newly cited document D8 (US-A-4 897 235).
- V. The arguments presented by the Appellants in their written submissions and at the oral proceedings held on 16 October 2002 may be summarized as follows:
- (i) Document D8 was more relevant to the subject-matter of Claim 1 than the further citations on file, especially more relevant than document D2, *inter alia* because D8 disclosed that by in-line coating (i.e. coating of a base film before the last stretching operation) a better adhesion between the base film and a primer coating, PEI inclusive, could be achieved than by off-line coating. This teaching was highly relevant to the present case because the problem underlying the claimed subject-matter comprised the prevention of an

adhesion failure between the base film and the PEI primer. In the Appellant's view, the relevance of D8 was not affected by narrowing the general object of the attacked patent of an improved laminate adhesion to the more specific problem of improved delamination resistance after humid aging, because the solution of the latter problem aspect was an automatic consequence of the solution of the former problem. Thus, D8 should be admitted.

- (ii) Claim 1 failed to satisfy the criteria of Article 56 EPC as set out in T 939/92 (OJ EPO 1966, 309), since it did not solve the problem of increased adhesion over its whole scope. This followed from the fact that Claim 1 was *inter alia* characterised by the humid delamination resistance of a PEI-primed base film carrying an extrusion coated surface film but was not restricted to such laminates: laminates whose surface films had not been applied by extrusion coating were also covered by the wording of Claim 1.
- (iii) The Appellant furthermore contended that the feature in Claim 1 specifying the humid delamination resistance with regard to any extrusion coated polymer was inadequate to characterise the claimed subject-matter because it necessarily comprised extrusion coated polymers which by their very nature could not fulfil this requirement.
- (iv) Since the skilled person was aware of the fact that the off-line coating technique was less economical and efficient than the in-line coating method, the change to this technique was an obvious process improvement and any possible adhesion improvement resulting therefrom could only be regarded, in the light of

T 21/81 (OJ EPO 1983, 15) and T 506/92 (not published in the OJ EPO), as an inevitable and hence non-inventive "bonus" effect.

(v) The claimed subject-matter was furthermore obvious over a combination of D1 with D2 which disclosed that in-line coating of a polyethylene terephthalate film was the most effective adhesion-improving treatment. No inventive effort was therefore required to replace the off-line coated PEI-primer of D1 by an in-line coated PEI primer.

(vi) Similarly, it was obvious to the skilled person starting from the in-line coating technology of D4, D5 and D6 to apply this technique to PEI coating materials because it was known from D7 that "unmodified polyalkyleneimines have proven to be among the most effective resins for bonding polymer to cellophane" and because D7 recommended these compounds also for bonding polyolefins and polyesters. The blocking problems referred to in D7 would not have militated against this alternative because these could be prevented by the use of surfactants whose addition was also contemplated by the opposed patent.

VI. The Respondents (Proprietors of the patent) presented their counterstatements in written submissions dated 30 March 2001 and at the oral proceedings. They can be summarized as follows:

(i) D8 should not be admitted into the appeal proceedings because it was submitted more than five years after the end of the opposition period and was not more relevant than the other citations on file.

While it was true that D8 disclosed that the adhesion between a base film and a PEI primer coating was higher for an in-line coated than for an off-line coated primer, this property was unrelated to the problem underlying the present subject-matter as set out in the patent specification, i.e. the provision of an oriented polymeric film which can be directly extrusion coated with other polymers and can withstand prolonged humid conditions. Since the possibility for the improvement of this desired property was also not foreshadowed in the closest prior art document D1, a combination of D1 with D8 was not more relevant to the claimed subject-matter than a combination of D1 with D2.

- (ii) The Appellant's criticism of an undue width of the subject-matter of Claim 1 covering non-inventive embodiments was unfounded, since it was admissible under the EPC to characterise a product by a property exhibited only under the conditions of its use.

- (iii) The Appellant's opinion concerning the inadequacy of the definition of the humid delamination resistance because of its reliance on any extrusion coated polymer was unfounded. Firstly, because it was unsubstantiated and secondly because the credibility of the scope of this definition was supported by the evidence in the patent in suit which included examples of a typical hydrophobic polymer (LDPE) as well as of a typical hydrophilic polymer (Surlyn^(R) ionomer resin).

- (iv) The humid delamination resistance encountered when laminates are subjected to a sterilization treatment was a property separate from "ordinary" adhesion and its improvement could not be regarded therefore as a mere "bonus" effect resulting as an automatic

- consequence from adhesion improving measures.
- (v) The Appellant's obviousness objection on the basis of a combination of documents D1 and D2 was inconclusive. Firstly, there was no incentive in D1 for a further improvement of the adhesive properties offered by an off-line coated PEI primer and secondly D2 failed to suggest that the change from the off-line to the in-line coating technique would be able to improve the adhesion towards subsequently applied layers and reduce the problem of delamination under humid conditions.
- (vi) Nor was the use of PEI obvious as material for the in-line coating technique known from D4, D5 and D6 because the disclosure of D7 would not suggest the superior humid delamination resistance of so applied PEI coatings as compared with off-line applied PEI coatings.
- VII. The Appellants requested that the decision under appeal be set aside and that the European patent No. 0 458 147 be revoked.

The Respondent requested that the appeal be dismissed and that the patent be maintained as granted (main request) or, in the alternative, on the basis of the first or second auxiliary requests filed by fax with the letter dated 15 October 2002.

Reasons for the Decision

1. The appeal is admissible.

2. *Admission of document D8 (Article 114 (2) EPC)*

After extensive discussion at the oral proceedings the Board decides that D8 is not admitted into the proceedings because its relevance is not such as to justify its admission at this late stage. In particular, D8 does not comprise any information related to the specific problem to be solved by the claimed subject-matter, nor to its solution (cf. T 1002/92, OJ EPO 1995, 605).

3. *Citations*

3.1 Document D1

Claim 1 of this document relates to a process for the production of laminated structures which contain a thermoplastic polymeric substrate (e.g. polyethylene terephthalate: Claim 5; Example 1) to at least one side of which is intimately joined a layer of a non-aromatic hydrocarbon polymer over a thin adhesion promoting intermediary layer of a polyalkylene imine, in which process the polyolefin is deposited onto the polyalkylene imine modified surface of the pre-formed thermoplastic polymeric substrate in the form of an extruded molten layer or film.

According to Figure 4 the thermoplastic polymeric substrate 11 is supplied on a roll 32 and coated with polyalkylene imine via a gravure roll 36 which is immersed in a solution of the polyalkylene imine (page 7, left column, lines 68 to 100).

3.2 Document D2

Pages 209 to 210 of this textbook reference relate to "Auxiliary Treatments" of polyester films including in-line and off-line coating. The paragraph bridging pages 209 and 210 states *inter alia*: "The most effective adhesion-promoting treatments use coating processes incorporated in the manufacturing process. As a consequence of a draw stage following the coating step, extremely thin primer coatings can be obtained ... Coatings may be formulated to be compatible with subsequent coating applied for a specific end use. Coatings include those enhancing the adhesion to printing inks ...".

3.3 Document D3

Claim 1 of this document relates to a process of producing a thermosealable olefin polymer film which comprises applying to a stretched or unstretched olefin polymer film an intermediate layer of a polymerized or non-polymerized amino compound having the general formula $\text{NH}_2-(\text{CHR}-\text{CH}_2-\text{NH})_n-\text{H}$ in which R is hydrogen atom or a methyl group and n is an integer from 1 to 116, and a second layer of a mixture of an epoxy resin with a vinyl or vinylidene polymer or copolymer and a polyalkylacrylate, a polyalkylmethacrylate, a copolymer of different alkyl methacrylates with each other or a copolymer of an alkylmethacrylate with an alkyl acrylate containing at least 70% by weight of alkyl methacrylate, the alkyl groups of the esters in the polymers or copolymers having from 1 to 6 carbon atoms.

The total thickness of the coating is generally from 1 to 20 μm (page 2, lines 39 to 40).

3.4 Document D4

This document relates to an oriented polyester film material having a primer coating which may be applied to the polyester film before or during the stretching operations (cf. Abstract).

The gist of this invention is the provision of a crosslinked acrylic copolymer primer coating which allows the recycling of scrap material without giving rise to hardly any appreciable discoloration or degradation of the film (cf. column 1, line 41 to column 2, line 37).

3.5 Document D5

Claim 1 of this document relates to a process which comprises coating of a thermoplastic polyester film with at least one vinylidene halide copolymer and heating the coated film to a temperature in the range of 150 to 220°C to thereby anchor the coating to the film and to heat-set the film. Preferably the coating is applied to the stretched film before heat setting (cf. column 2, lines 21 to 50).

3.6 Document D6

Claim 1 of this document relates to the production of a primer coated biaxially oriented linear polyester film, which comprises melt extruding a substantially amorphous polyester film and thereafter biaxially orienting the film by stretching in mutually perpendicular directions, said process including a step for coating the film with a primer composition which includes a cross-linkable (meth)acrylic (co)polymer and a condensation product of an amine with formaldehyde and which is applied to the film before stretching is commenced.

3.7 Document D7

Claim 1 of this document relates to a process for rendering base sheets adherable to other materials and for rendering said base sheet non-blocking comprising applying to a base sheet a solution consisting essentially of polyalkylenimine and a surface-active agent and thereafter drying said base sheet to remove solvent.

According to column 1, lines 47 to 50 polyalkylenimines have been proven to be among the most effective anchorage resins for bonding polymer coating to cellophane.

4. *Novelty*

Novelty was not an issue in the appeal proceedings and there is no reason for the Board to investigate that matter.

5. *Closest prior art, problem and solution*

5.1 In accordance with the parties, the Board identifies D1 as the closest prior art because it discloses a 3-layer laminate comprising an adhesion-promoting intermediate layer made of PEI. The difference between this disclosure and the claimed subject-matter essentially resides in the manner of application of the PEI coating. According to D1 it is applied off-line, i.e. on the stretched and heat set base film, according to present Claim 1 it is applied in-line, i.e. before heat setting.

5.2 The problem to be solved is identified in the patent

specification as the provision of an oriented polymeric film which can be directly adhesion coated with other polymers, without the need for an additional primer coating or additional corona treatment, and can withstand prolonged humid conditions.

5.2.1 In view of the prior art in the proceedings and of the evidence set out in the patent specification, the Board is satisfied that this is indeed the objective problem underlying the present subject-matter (cf. "Case Law of the Boards of Appeal of the EPO" 4th edition 2001, page 107, paragraph 4.3).

5.2.2 It is important to emphasize that the resistance to delamination under humid conditions is a property to be distinguished from "ordinary" adhesion strength (or bond strength). While the latter property depends on the physical strength of the strained bond the former property responds to the chemical resistance of the bond, i.e. the resistance against hydrolytic degeneration at the material interfaces and/or within the primer material.

5.3 This problem is to be solved, according to present Claim 1, by in-line coating of the base film with a PEI primer.

5.4 Examples 1 and 2 of the patent specification (page 5, line 42 to page 6, line 27) show that by changing from an off-line to an in-line coating technique it is possible to increase the bond strength and the humid delamination resistance of laminates comprising a polyethylene terephthalate base film, a PEI primer layer (applied interdraw after corona treatment) and a surface layer of LDPE (low density polyethylene)

(Example 1) or Surlyn^(R) (ionomer resin) (Example 2).

5.5 In the circumstances, the Board is convinced that the existing objective problem has effectively been solved by the subject-matter of Claim 1.

6. *Obviousness*

6.1 The Appellant's contention that Claim 1 contravened the requirement of Article 56 EPC because it comprised subject-matter which did not solve the existing technical problem (cf. T 939/92) is unfounded. The fact that Claim 1 is directed to an "intermediate" product (i.e. the primer coated base film) which is characterised by a property exhibited only in relation to a possible "end-product" (here humid delamination resistance of a laminate of said "intermediate" product with an extrusion-coated surface layer) is fully in line with the common EPO practice that properties of a product may be used for its characterisation even if these properties "appear" only at a specific use (e.g. mechanical, optical properties of a composition which only "appear" on the article made therefrom). This practice derives its legitimacy from the principle underlying the EPC that a patent which claims a physical entity *per se* confers absolute protection upon such physical entity; that is wherever it exists and whatever its context (and therefore for all uses of such physical entity) (cf. Reasons 5 of G 2/88, OJ EPO 1990, 93).

6.2 Nor is the Appellant's contention convincing that Claim 1 was non-inventive because it covered embodiments which did not solve the existing technical problem. The Appellant based this assertion on the

hypothesis that the requirement for the humid delamination resistance set out in Claim 1 could not be met by any extrusion-coated polymer. The Appellant did not, however, present any evidence in support of this allegation and did not therefore discharge the burden of proof resting on him as opponent. Moreover, the evidence in Examples 1 and 2 of the patent specification which exemplify the use of two extrusion-coated polymers having very different polar and therefore adhesive character does not support the Appellant's contention (cf. Section VI (iii) supra).

- 6.3 In the Board's judgment, also the Appellant's further argument cannot succeed, namely that Claim 1 lacked an inventive step because, in the light of the foreseeable process benefits of the in-line coating method, any possible enhancement of the adhesion between the layers of the laminate should be considered as a non-inventive "bonus" effect (cf. T 21/81 and T 506/92).

Apart from any other considerations, this reasoning could only be successful if the Appellant had provided evidence to show that there was a one-way street development leading from off-line to in-line coating. However, the Appellant has not provided such evidence.

Furthermore, D2 (page 209, first paragraph of the Section "Auxiliary Treatments"; published 1988, i.e. 26 years after D1) explicitly discloses that in-line and off-line coating are separate alternatives.

The mere fact that D2 points to some advantages of the in-line coating method (*inter alia* increased economical efficiency by application of the primer coating between the orientation steps; possibility of extremely thin

primer coatings) cannot establish a one-way street situation, since the choice of the coating method is also influenced by several other factors, including e.g. market strategies and availability of manufacturing equipment.

Moreover, these advantages are not even generally enjoyed by the in-line coating process of the claimed invention which comprises coating after both stretching operations (cf. Claim 11 of patent in suit). In this event the benefits to be gained by a subsequent stretching operation - the possibility of a small width and greater thickness of the applied coating layer which is widened and reduced in thickness thereafter by transversal stretching of the coated film - cannot be realised.

The Appellant's contention that the solution of the existing technical problem (cf. paragraph 5.2 supra) should be discarded as mere "bonus" effect is therefore at variance with the facts.

- 6.4 The subject-matter of Claim 1 is also not obvious with regard to the disclosure of D1 or its combination with D2.

Firstly, there is no hint in D1 at any adhesion deficiency of off-line PEI-primed laminates but even if one assumed that the skilled person had discovered any such deficiencies, the prior art which is in the proceedings had not provided any clue for a possible improvement of the adhesion, even less of the resistance to delamination after humid aging, by changing the manner of application of the PEI primer from off-line to in-line.

6.4.1 This conclusion is also valid with respect to the statement in D2: "The most effective adhesion-promoting treatments use coating processes incorporated in the manufacturing process" (page 209, lines 3 to 4 from bottom) because the word "effective" in this statement does not relate to better adhesion. This follows from the sentence bridging pages 209 and 210: "As a consequence of a draw stage following the coating step, extremely thin primer coatings can be obtained, which may be fixed or cured at high temperatures ..." and is additionally underscored by the lack of any reference to "better adhesion" in the following sentence "Coatings may be formulated to be compatible with subsequent coatings applied for a specific and use."

Even less is there any suggestion in D2 that the in-line coating technique provides an improved humid delamination resistance.

6.4.2 There is also nothing in documents D4 to D6, which relate to in-line coated primers from materials other than PEI (cf. paragraphs 3.4 to 3.6), from which the skilled person could infer any benefits especially with regard to humid delamination resistance.

6.4.3 The same conclusion applies for the same reasons to D3 which is closer to the claimed subject-matter than D4 to D6 because its disclosure encompasses base films having in-line applied PEI primer coatings of undisclosed layer thickness in combination with a second layer from a mixture of epoxy resin/polyvinyl(idene)/poly(meth)acrylate. The missing recognition of a possible advantage of the in-line over the off-line technique is conspicuous by the reference in Claim 1 of D3 to "stretched or

unstretched" olefin base films.

- 6.5 The Appellant's contention of lack of inventive step on the basis of a combination of D4, D5 and/or D6 with D7 (cf. paragraph V(vi) supra; uncommented at the oral proceedings) is likewise unsuccessful *inter alia* because the mere statement in D7 that "unmodified polyalkyleneimines have proven to be among the most effective resins for bonding polymer to cellophane" (column 1, left hand column, lines 46 to 50) does not suggest that in-line coated PEI primers may provide an improved delamination resistance after prolonged humid aging.
- 6.6 The subject-matter of product Claim 1 is therefore inventive over the cited prior art.
- 6.7 *A fortiori* the same conclusion holds true for the subject-matter of independent Claim 5 which relates to a process for making an oriented polymeric film according to Claim 1 and for the subject-matter of the dependent Claims 2 to 4 and 6 to 12.
7. The grounds of opposition do not, therefore, prejudice the maintenance of the patent as granted.
8. In the circumstances, there is no need to deal with the two auxiliary requests filed one day before the oral proceedings.

Order

For these reasons it is decided:

The appeal is dismissed.

The Registrar

The Chairman:

E. Görgmaier

R. Young