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Datasheet for the decision of 8 April 2016

Case Number:	T 0261/14 - 3.3.09
Application Number:	04807409.0
Publication Number:	1702761
IPC:	B32B27/32, B41M5/40, C08J5/18
Language of the proceedings:	EN

Title of invention:
BIAXIALLY ORIENTED WHITE POLYPROPYLENE FILM FOR THERMAL TRANSFER RECORDING AND RECEIVING SHEET FOR THERMAL TRANSFER RECORDING THEREFROM

Patent Proprietor:
TORAY INDUSTRIES, INC.

Opponent:
Treofan Germany GmbH & Co. KG

Headword:

Relevant legal provisions:
RPBA Art. 12(4)
EPC Art. 54, 56, 83

Keyword:

Late-filed facts
Novelty - implicit disclosure of parameters
Inventive step
Sufficiency of disclosure

Decisions cited:

T 0231/01

Catchword:

Beschwerdekammern
Boards of Appeal
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Case Number: T 0261/14 - 3.3.09

D E C I S I O N
of Technical Board of Appeal 3.3.09
of 8 April 2016

Appellant: (Opponent)	Treofan Germany GmbH & Co. KG Bergstrasse 66539 Neunkirchen (DE)
Representative:	Mai, Dörr, Besier Patentanwälte Steuerberater/Wirtschaftsprüfer Kreuzberger Ring 64 DE-65205 Wiesbaden (DE)
Respondent: (Patent Proprietor)	TORAY INDUSTRIES, INC. 2-1, Nihonbashi Muromachi 2-chome, Chuo-ku Tokyo 103-8666 (JP)
Representative:	Kador & Partner Corneliusstraße 15 80469 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 7 January 2014 rejecting the opposition filed against European patent No. 1702761 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	W. Sieber
Members:	M. O. Müller
	E. Kossonakou

Summary of Facts and Submissions

I. This decision concerns the appeal filed by the opponent against the decision of the opposition division to reject the opposition against European patent No. 1 702 761.

II. With the notice of opposition, the opponent had requested revocation of the patent in its entirety on the grounds under Article 100(a) (lack of novelty and inventive step) and 100(b) EPC.

III. The following documents were filed with the notice of opposition:

D1: EP 0 865 909 A1;

D2: EP 0 865 913 A1;

D10: US 5,496,791 A; and

D11: US 5,496,790 A.

IV. The opposition division's decision was based on the claims as granted, which contained five independent claims that read as follows:

"1. A biaxially oriented white polypropylene film for thermal transfer recording characterized in that it is a film comprising of polypropylene resin of which β-crystal ratio is 30% or more and melting temperature is 140 to 172°C, which has substantially non-nucleus voids, a void ratio of 30 - 80% and a sum of strengths of longitudinal direction and of transverse direction of the film at 2% elongation (F2 value) being in the range of 10 to 70 MPa and a surface glossiness being in the range of 10 - 145% substantially non-nucleus voids having the definition given in the description."

"2. A biaxially oriented white polypropylene film for thermal transfer recording characterized in that a skin layer (B layer) of which surface glossiness is 10 - 145% is laminated to at least one side of a core layer (A layer) which consists of polypropylene resin of which β-crystal ratio is 30% or more, melting temperature is 140 to 172°C, which has substantially non-nucleus voids, a void ratio of 30 - 80% and a sum of strengths of longitudinal direction and of transverse direction of the film at 2% elongation (F2 value) being in the range of 10 to 70 MPa substantially non-nucleus voids having the definition given in the description."

"3. A biaxially oriented white polypropylene film for thermal transfer recording in which a skin layer (B layer) of which surface glossiness is 10 - 145% is laminated to at least one side of a core layer (A layer) characterized in that a sum of strengths of longitudinal direction and of transverse direction of the film at 2% elongation (F2 value) is in the range of 30 to 100 MPa and that the film has β-crystal activity substantially non-nucleus voids having the definition given in the description."

"8. A biaxially oriented white polypropylene film for thermal transfer recording which is a film in which a skin layer (B layer) having a half-crystallization time of 60 seconds or less and a surface glossiness of 30 to 145% is laminated to at least one side of a core layer (A layer) which consists of polypropylene resin having a substantially non-nucleus void, characterized in that it is a film of a specific gravity of 0.3 to 0.7 and has β-crystal activity substantially non-nucleus voids having the definition given in the description."

"16. A receiving sheet for thermal transfer recording in which a receiving layer is provided at least on one side of the biaxially oriented white polypropylene film for thermal transfer recording described in any one of claims 1 to 3 and 8 to 11."

V. In its decision, the opposition division essentially reasoned as follows:

The invention as defined in the claims was sufficiently disclosed.

The claimed subject-matter was novel over examples 1 to 4 of D1 and example 4 of D2. These examples in particular did not explicitly disclose the parameters required in the various independent claims, namely the β-crystal ratio, the void ratio, the F2 value, the surface glossiness, the half crystallisation time and the specific gravity. The films of these examples could furthermore not be assumed to inherently have these parameters, since the process disclosed in these examples was different from that suggested in the opposed patent for obtaining the claimed films.

The claimed subject-matter was also inventive. In view of the closest prior art D1, the technical problem was the provision of a biaxially oriented polypropylene film for thermal transfer recording having improved smoothness, dimensional stability, surface glossiness and flexibility. D1 did not disclose any motivation for the skilled person to change the properties of the films or the process by which these films were made.

Such a motivation was furthermore not present in any of the further cited prior-art documents.

Lastly, the opposition division decided not to admit

D13: Kunststoff-Taschenbuch, 26th edition, Munich, Vienna 1995, pages 98, 99, 370 and 371

into the proceedings.

VI. With the statement setting out the grounds of appeal filed on 16 May 2014, the opponent (hereinafter: the appellant) re-filed a copy of D13, as well as

D14: WO 03/091316 A1; and

D15: Experimental report concerning the reworking of example 1 of D14.

VII. The response of the proprietor (hereinafter: the respondent) contained an auxiliary request, the main request being that the appeal be dismissed.

VIII. Following the summons to oral proceedings, the appellant requested that Mr Schmitz be heard as a technical expert during the oral proceedings, if necessary.

IX. With its communication dated 29 October 2015, the board issued its preliminary opinion. The board indicated that during the oral proceedings it would be necessary to discuss whether the film obtained in examples 1 and 2 of D1 and example 4 of D2 could be assumed to inherently have the parameters defined in the claims and whether in view of D15 it could be assumed that example 1 of D14 was *prima facie* novelty-destroying for the claimed subject-matter, in which case D14 and D15 could be admitted.

X. In the further course of the proceedings, the appellant filed

D15a: Additional experimental report concerning the reworking of example 1 of D14;

D16: "Handbuch der Kunststoff-Extrusionstechnik", F. Hensen (ed.), volume 2, 1986, pages 243 to 270;

D17: Expert opinion of Mr Peiffer, signed on 17 November 2015 including a CV (D17a), a list of publications (D17b), and a list of patent applications (D17c);

D18: "Film Processing", T. Kanai et al. (ed.), chapter 6.1 "Biaxially Oriented Film", Carl Hanser Verlag, Munich, 2011, pages 244 to 280;

D19: Datasheet "Treofan CRYSTAL - GNR"; and

D20: Datasheet "Treofan IMPACT - STD";

and offered B. Schmitz as a witness to be heard on the test reports D15 and D15a and H. Peiffer as a technical expert or witness to be heard on the declaration D17.

XI. With its letter dated 7 March 2016, the respondent submitted first to fourth auxiliary requests replacing the previous auxiliary request and requested that D17 not be admitted into the proceedings.

XII. On 8 April, oral proceedings were held before the board. The parties maintained their requests made during the written proceedings, except that the respondent withdrew its request that D17 not be admitted into the proceedings.

XIII. So far as relevant to the present decision, the appellant's arguments can be summarised as follows:

The subject-matter of claim 1 of the main request (granted claims) lacked novelty over example 3 of D1.

In addition to the void ratio, the F2 value too could be calculated on the basis of Hooke's law using the density of the film given in the example of D1.

Furthermore, in view of the similarity between the process of example 3 of D1 and that recommended in the patent, the skilled person carrying out the process steps disclosed in this example would inevitably obtain a film exhibiting a β-crystal ratio, a surface glossiness and an F2 value as required by claim 1. Although β-crystals were no longer present in the stretched film due to their conversion to α-crystals during the stretching process, the appellant acknowledged that the β-crystal ratio in the stretched film could nevertheless be determined by the measurement method described in the patent due to re-conversion of α- to β-crystals during this measurement.

Lastly, the skilled person carrying out the process of this example would in fact supplement it by three further process steps, namely cooling the extruded film by air blowing and heat treatments before and after stretching. These three process steps were always carried out in the art of producing stretched films, as evidenced by D16 to D18.

Essentially the same arguments applied to example 4 of D2, which apart from a film with parameters as defined in claim 1 additionally disclosed the presence of a skin layer as required by claims 2, 3 and 8. Therefore the subject-matter of claims 1 to 3 and 8 lacked novelty over example 4 of D2.

Moreover, example 1 of D14 was also novelty-destroying to the subject-matter of claim 1. This example had been reworked in D15 and D15a by supplementing the process disclosed in this example with the additional three steps commonly applied in the art, namely by cooling the extruded film by air blowing and heat treatments before and after stretching. Thus by air blowing at 120°C all parameters within the ranges defined in claim 1 could be obtained.

The subject-matter of claims 1 to 3 and 8 was furthermore not inventive over D2 as the closest prior art. The comparative examples in the patent could not prove any technical effect since they were further away from the claimed subject-matter than example 4 of D2 Furthermore, they could not be reworked since information concerning the air blowing step was missing. The problem solved in view of this document was therefore the provision of a further polypropylene film. The solution was obvious. As evidenced by D16 and D17, cooling the extruded film by air blowing and heat treatments before and after stretching were common process steps for preparing stretched films. The skilled person carrying out example 4 of D2 would thus have applied these steps and would thereby have automatically obtained the parameters defined in claim 1.

For the same reasons, the claimed subject-matter was furthermore not inventive in view of D1 as the closest prior art.

Lastly the invention was insufficiently disclosed since the patent failed to give essential information about how to obtain the claimed parameters and in particular how to perform the air blowing step.

XIV. So far as relevant to the present decision, the respondent's arguments can be summarised as follows:

The subject-matter of the main request was novel. Example 3 of D1 and example 4 of D2 did not disclose the parameters defined in the independent claims. In this respect the appellant's assertion that the F2 value of the films obtained in these examples could be calculated on the basis of the film's density and Hooke's law was wrong. This assertion rested on the assumption that the mechanical strength of the film was equal in the extrusion and transverse direction, which was not correct. It could also not be assumed that the claimed parameters would be obtained by carrying out the process disclosed in these examples, since this process differed from that recommended in the patent; in particular, the extruded film was cooled by air blowing and heat treatments were carried out before and after stretching. These process differences resulted in differences as regards the β-crystal ratio, the surface glossiness and the F2 value. Furthermore, since the skin layer in example 4 of D2 did not contain any nucleating agent, its half crystallisation time could not be assumed to be as required by claim 8. Lastly, the appellant was wrong in asserting that the skilled person carrying out the process of example 3 of D1 or example 4 of D2 would supplement this process by the three process steps recommended in the patent. More specifically, the assumption was wrong that these process steps would always be carried out in the art of stretching polypropylene films.

The appellant's novelty attack based on example 1 of D14 lacked *prima facie* relevance and thus should not be admitted into the proceedings. In the same way as for D1 and D2, the appellant was wrong in assuming that the skilled person carrying out the process disclosed in this example would supplement it by the three process steps recommended in the patent. Hence, the appellant's reworking experiments applying these steps could not prove that the product obtained in example 1 of D14 had the claimed parameters.

The claimed subject-matter was also inventive. The problem to be solved over D2 was the provision of a film suitable for thermal transfer recording having improved sensitivity and crease resistance. A comparison of the examples according to the invention with in particular comparative examples 1, 2, 4, 6 and 10 of the patent showed that this problem was indeed solved. Neither D2 nor any of the other cited documents contained any indication that this problem could be solved by preparing a film with the claimed parameters. The same applied also when starting from D1 as the closest prior art.

Lastly, the claimed invention was also sufficiently disclosed. Contrary to the appellant's assertion, the patent provided details about the air blowing step such that the skilled person knew how to obtain films with the claimed parameters.

XV. The appellant requested that

- the decision under appeal be set aside and the patent be revoked; and

- D13 be admitted into the proceedings.

The appellant had also requested in writing that

- B. Schmitz be heard as a technical expert or witness at the oral proceedings on the test reports D15 and D15a; and

- H. Peiffer be heard as a technical expert or witness on declaration D17.

XVI. The respondent requested that the appeal be dismissed (i.e. that the patent be maintained as granted) or that the patent be maintained on the basis of the claims of one of the first to fourth auxiliary requests filed with letter dated 7 March 2016.

The respondent furthermore requested that D13, D14, D15, D15a, D16 and D18 to D20 not be admitted into the proceedings.

Reasons for the Decision

Main request (claims as granted)

1. Admission of D13, D16 and D18 to D20

1.1 After the decision of the opposition division not to admit D13 into the proceedings, the appellant re-filed this document with its statement of grounds of appeal. The respondent requested that D13 not be admitted into the proceedings.

Under Article 12(4) RPBA, the board has the discretion to admit a document filed with the statement of grounds of appeal and not admitted into the proceedings by the opposition division.

The appellant used D13, which is an excerpt from a standard textbook, as evidence that the density of polypropylene is 0.90 to 0.915 g/cm^3 and its elastic modulus E is 1300 to 1800 MPa. This information forms part of the skilled person's common general knowledge and was not contested by the respondent. The board therefore did not see any reason not to admit D13. This document was thus admitted into the proceedings.

1.2 With its statement of grounds of appeal, the appellant also filed excerpts of two further textbooks D16 and D18. The respondent requested that D16 and D18 not be admitted into the proceedings.

D16 and D18 were filed in order to show which process steps were commonly applied in the art of stretching polypropylene films. The appellant in this respect also filed declaration D17 which refers to and summarises the relevant content of D16 and D18. While the respondent contested the admission of D16 and D18 it withdrew its request not to admit D17. It would have been illogical not to admit D16 and D18 when D17, which summarises their content, forms part of the proceedings. The board therefore decided to admit D16 and D18.

1.3 With its statement of grounds of appeal, the appellant furthermore filed two product data sheets, D19 and D20. The respondent requested that they not be admitted into the proceedings.

The appellant filed D19 and D20 to show that the range of surface glossiness in the claims of the patent was very broad and covered matt and high-gloss films. This was not contested by the respondent. The board therefore did not see any reason not to admit these documents. They were consequently admitted into the proceedings.

2. Novelty over D1

2.1 The appellant attacked novelty of the subject-matter of claim 1 on the basis of example 3 of D1.

2.2 This example discloses a process for preparing a polypropylene film consisting of the following steps:

- a melt comprising a propylene homopolymer and 0.1 wt% of the β-nucleating agent NU-100 (back-reference to examples 1 and 2) is extruded through a slot die,

- one of the surfaces of the resulting film is cooled by contacting it with a chill roll having a surface temperature of 100°C,
- the other surface of the film (not in contact with the chill roll) is cooled "in the ambient air",
- the cooled film is then stretched at 80°C at a ratio of 3.5:1 in the extrusion direction, and
- the thus treated film is stretched at 153°C at a ratio of 6.0:1 in the transverse direction.

2.3 The polypropylene film of example 3 of D1 contains non-nucleus voids (page 2, lines 40 to 41 and page 4, lines 20 to 23 of D1), as required by claim 1.

The polypropylene film of example 3 of D1 furthermore has a melting point of 153°C (back-reference to examples 1 and 2), which is within the range specified in claim 1 (140 to 172°C).

Furthermore, the density of the film in example 3 of D1 is 0.59 g/cm^3 (table 1). From the ratio between this density and the density of polypropylene, which is 0.90 to 0.915 g/cm^3 (page 371 of D13), the void ratio of the film of example 3 of D1 can be calculated as 34.4 to 35.5%. This too is as required by claim 1.

The appellant argued during the oral proceedings that also the F2 value defined in claim 1 could be calculated from the data given in example 3 of D1. In its calculation, the appellant determined the mechanical strength F1 in one direction from Hooke's law (the appellant used an elastic modulus E weighed by the density of the film given in example 3 of D1 relative to the density of polypropylene as given in D13) and multiplied the resulting F1 value by the factor 2 to obtain the F2 value. The value so obtained was within the range defined for the F2 value in claim 1.

The F2 value is defined in claim 1 as the sum of the strengths in extrusion and transverse directions. The appellant's assumption that the F2 value is twice the strength F1 in one direction presupposes that the strengths in the two directions are identical. This assumption is however not justified, since stretching in extrusion and transverse directions is carried out in example 3 of D1 under different conditions and thus, if anything, can be assumed to lead to different rather than the same strengths. The appellant's calculation thus being ill-founded, the F2 value cannot be assumed to be derivable from the data given in example 3 of D1.

Furthermore, example 3 of D1 does not disclose or allow the calculation of the remaining parameters of claim 1, namely the β-crystal ratio and the surface glossiness.

2.4 In a first line of attack, the appellant argued that the process of example 3 of D1 was very similar to that recommended in the patent for obtaining films with parameters as defined in claim 1. The skilled person carrying out the process steps of example 3 of D1 would therefore inevitably obtain a β-crystal ratio, an F2 value and a surface glossiness as required by claim 1.

2.4.1 The board acknowledges that the process of example 3 of D1 is similar to that recommended in the patent:

The nucleating agent NU-100 applied in the process of example 3 of D1 is the preferred nucleating agent of the patent, namely N,N'-dicyclohexyl-2,6-naphthalene dicarboxyamide.

The amount of nucleating agent of 0.1 wt% applied in example 3 of D1 falls within the most preferred range specified in the patent (page 9, lines 3 and 4).

The polypropylene used in example 3 of D1 is used in most of the examples of the patent.

The temperature of 100°C of the chill roll for cooling one of the film surfaces in example 3 of D1 is within the range recommended for this step in the patent (90 to 130°C; page 20, lines 11 and 46 to 47).

The ratios and temperatures during stretching in the extrusion direction (3.5:1 at 80°C) and during stretching in the transverse direction (6.0:1 at 153°C) in example 3 of D1 are within the ranges recommended in the patent (3-7:1 at 80 to 150°C for stretching in the extrusion direction and 5-12:1 at 120 to 190°C (film temperature: 100 to 165°C) for stretching in the transverse direction; page 20, lines 16 to 21).

2.4.2 Nevertheless, the process disclosed in example 3 of D1 differs from the process recommended in the patent as follows:

(a) While in example 3 of D1 one surface of the film is cooled after extrusion "in the ambient air", cooling is recommended in the patent to be carried out by blowing air having a temperature of 10 to 130°C (page 20, lines 11 to 12).

(b) While in example 3 of D1 stretching is directly effected in the machine direction at 80°C without any preheating step, the patent recommends a preheating step at 70 to 160°C before stretching in the machine direction (page 20, lines 15 and 16).

(c) While in example 3 of D1 no heating step is carried out after stretching in the transverse direction, the patent recommends a heat treatment at 140 to 170°C for 1 to 30 seconds (page 20, lines 26 and 27).

2.4.3 As set out hereinafter, these process differences are such that contrary to the appellant's assertion it cannot be assumed that carrying out the process as disclosed in example 3 of D1 inevitably leads to a β-crystal ratio, surface glossiness and F2 value as required by claim 1:

- The film leaving the extruder will be at a temperature around 250°C and thus the surface of the film in contact with the air after extrusion will be considerably above 130°C. Therefore if the air is blown as recommended in the patent (process difference (a)), the heat will be carried away and thus cooling effectiveness will be high. In contrast, if this surface is just in contact with ambient air as disclosed in example 3 of D1, the air will be quickly heated up and thus lose its cooling effect. The cooling effectiveness in the process recommended in the patent can thus be assumed to be higher than that in example 3 of D1.

  As a result of the more effective cooling, the film leaving the extruder is cooled more quickly, thereby fixing the metastable β-crystals in the film such that a high ratio of β-crystals is obtained. In contrast, the less effective cooling in ambient air as disclosed in example 3 of D1 will result in slow cooling and in consequence in a low β-crystal ratio. The β-crystal ratio is thus a first distinguishing feature.

- The preheating step before stretching in the extrusion direction (process difference (b)) increases, together with the stretching, the surface glossiness (page 20, lines 15 to 16 of the patent). Since this preheating step is missing in example 3 of D1, surface glossiness of the film obtained in D1 cannot be assumed to be as required by claim 1.

  The appellant argued in this respect that a preheating step before stretching in the machine direction occurred automatically in D1, since the film was stretched at elevated temperatures. However, what the patent recommends is clearly different, namely a separate preheating step by introducing the film to a group of rolls or an oven heated to 70 to 160°C and a subsequent stretching step at a different temperature by passing the film through cooling rolls kept at 80 to 150°C and drawing it in the extrusion direction (page 20, lines 15 to 16).

  The appellant furthermore argued that the range of 10 to 145% defined in claim 1 for the surface glossiness was very broad, since a surface glossiness of 12% corresponded to a matt film, as evidenced by D19, and a surface glossiness of 65% corresponded to a high-gloss film, as evidenced by D20. The board acknowledges that the glossiness range defined in claim 1 is indeed broad and that it is therefore quite likely that the surface glossiness of the film obtained in example 3 of D1 is within this range. However, whether a claimed feature is disclosed in the prior art does not depend on likelihood, but on identity of technical information between the content of the prior art disclosure and the subject-matter claimed (T 231/01, point 5.6).

Therefore, the surface glossiness of 10 to 145% as required by claim 1 is a second distinguishing feature.

- The heat treatment conditions control also the F2 value (page 9, lines 14 to 21 of the patent). The heat treatment conditions in D1 being different from those recommended in the patent (process differences (b) and (c)), there is no reason to assume that the F2 value of the product obtained in example 3 of D1 is as required by claim 1.

  Therefore, the F2 value of 10 to 70 MPa as required by claim 1 constitutes a third distinguishing feature.

2.5 In a second line of attack, the appellant argued that if example 3 of D1 was not read literally but in the light of the skilled person's common general knowledge, the process disclosed therein was in fact not only similar but identical to that recommended in the patent. More specifically, the missing three process steps recommended in the patent (process differences (a) to (c)), i.e. the cooling of the extruded film by air blowing and the heat treatments before and after stretching, were steps the skilled person would always carry out when preparing stretched polypropylene films, as evidenced by D16 to D18. The skilled reader would therefore supplement the teaching of example 3 of D1 by these three steps. As a result, the process of this example would become identical to that recommended in the patent, and a product having a β-crystal ratio, surface glossiness and F2 value as required by claim 1 would result.

2.5.1 D16 and D18 are excerpts of textbooks about the preparation of stretched films. D17 is an expert opinion of a university professor explaining how according to D16 and D18 stretched films were prepared in the art.

2.5.2 The board acknowledges that the missing three process steps recommended in the patent are disclosed in at least D16 and discussed accordingly in D17.

However, the board does not agree with the appellant that these three steps would always be applied in the art of stretching polypropylene films. More specifically, rather than applying the step of cooling the extruded film by air blowing as disclosed in D16 (see the reference to "Luftstrahl" in the paragraph at the top of page 260), example 3 of D1, which is undoubtedly in the art of stretching polypropylene films, teaches cooling in ambient air. Hence, it is not true that in the art of stretching polypropylene films, these are always cooled by air blowing after extrusion.

Furthermore, the three steps are not disclosed or referred to as mandatory in D16 to D18. For instance, D17 refers to the air blowing technology ("Luftmessertechnologie", see the third paragraph on page 8) only as a preferred ("bevorzugte Mittel der Wahl") and hence not a mandatory technology. D16 (paragraph bridging pages 259 and 260) also refers to air blowing only as a means of getting a good contact between the film and the chill roll. This does not necessarily imply that without air blowing the process cannot be carried out.

Lastly, D16 to D18 refer to the preparation of stretched films in general rather than the preparation of specific stretched polypropylene films with non-nucleus voids as disclosed in example 3 of D1. Therefore, it cannot be assumed with certainty that the skilled person carrying out the process disclosed in this example of D1 would have supplemented it by any of the process steps referred to in D16 to D18.

2.6 The subject-matter of claim 1 must thus be assumed to differ from example 3 of D1 in terms of the β-crystal ratio, the surface glossiness and the F2 value. Novelty over D1 can hence be acknowledged.

3. Novelty over D2

3.1 The appellant contested novelty of the subject-matter of claims 1 to 3 and 8 on the basis of example 4 of D2.

3.2 In this example, a film is produced by a process comprising the following steps:

- 0.1 wt% of the β-nucleating agent NU-100 is mixed with a polypropylene homopolymer,
- the mixture is coextruded through a slot die together with a layer of a propylene/ethylene copolymer containing 4 wt% of ethylene,

- the polypropylene homopolymer surface of the resulting bilayer film is cooled at 100°C by contacting it with a chill roll,

- the other surface of the film (the copolymer surface) is cooled "in the ambient air",

- the cooled film is then stretched at 90°C at a ratio of 4.5:1 in the extrusion (machine) direction (MD) (table 1), and

- the film thus treated is stretched at 144°C at a ratio of 8:1 in the transverse direction (TD) (table 1).

3.3 Several parameters required by claims 1 to 3 and 8 are not disclosed in example 4 of D2, namely the β-crystal ratio (claims 1 and 2), the surface glossiness (claims 1 to 3 and 8), the F2 value (claims 1 to 3) and the half crystallisation time (claim 8).

3.4 In the same way as for example 3 of D1, the appellant argued in a first line of attack that the skilled person carrying out the process steps as disclosed in example 4 of D2 would inevitably obtain a product with the claimed properties.

3.5 The board acknowledges that, in the same way as for D1, the process of example 4 of D2 is similar to that recommended in the patent:

The nucleating agent NU-100 used in example 4 of D2 is the preferred nucleating agent of the patent, and its amount falls within the most preferred range specified in the patent (page 9, lines 3 and 4).

The polypropylene homopolymer used in example 4 of D2 for one of the layers is used in most of the examples of the patent.

The propylene/ethylene copolymer of the layer coextruded in example 4 of D2 with the polypropylene homopolymer layer corresponds to the polymer recommended in the patent for the skin layer of claims 2, 3 and 8 (page 20, lines 38 to 39).

The temperature of 100°C of the chill roll for cooling one of the surfaces of the coextruded film is within the range recommended for this step in the patent (90 to 130°C; page 20, lines 11 and 46 to 47).

The ratios and temperatures applied in example 4 of D2 during the stretching in the extrusion direction (4.5:1 at 90°C) and in the transverse direction (8.0:1 at 144°C) are within the ranges recommended in the patent (3-7:1 at 80 to 150°C for stretching in the extrusion direction and 5-12:1 at 120 to 190°C (film temperature: 100 to 165°C) for stretching in the transverse direction; page 20, lines 16 to 21).

3.6 However, the process disclosed in example 4 of D2 differs from that recommended in the patent by the same process differences (a) to (c) as identified above for D1. Therefore in the same way as for example 3 of D1, it cannot be assumed that the β-crystal ratio, surface glossiness and F2 value of the polypropylene film in example 4 of D2 are as required by claim 1.

By the same token, it cannot be assumed that the β-crystal ratio, surface glossiness and F2 value are as required by claim 2 and that the surface glossiness and F2 value are as required by claim 3.

Lastly, it cannot be assumed that the half crystallisation time of the propylene/ethylene copolymer layer in example 4 of D2 is as required for the skin layer in claim 8 (60 seconds or less). More specifically, the propylene/ethylene copolymer layer does not contain any α- or β-crystal nucleating agent which according to page 12, lines 38 to 40 of the patent has to be added to the skin layer to obtain a half crystallisation time as required by claim 8.

3.7 In the same way as for example 3 of D1, the appellant argued in a second line of attack that the skilled person carrying out the process of example 4 of D2 would automatically apply the missing three process steps recommended in the patent (process differences (a) to (c)), since these were always applied in the art of stretching polypropylene films. However, for the same reasons as given above with regard to D1, this argument is not convincing.

3.8 The subject-matter of claims 1 and 2 thus differs from example 4 of D2 in terms of the β-crystal ratio, surface glossiness and F2 value, that of claim 3 in terms of the surface glossiness and F2 value, and that of claim 8 in terms of the half crystallisation time. Novelty over D2 can hence be acknowledged.

4. Admission of D14, D15 and D15a

4.1 With its statement of grounds of appeal, the appellant filed D14 and argued that example 1 of D14 was novelty-destroying for the subject-matter of claim 1. This attack was supported by the experimental evidence D15 also filed with the statement of grounds of appeal and the further experimental evidence D15a filed with subsequent letter dated 7 March 2016. The respondent requested that D14, D15 and D15a not be admitted into the proceedings.

4.2 The arguments based on D14 and the supporting evidence D15 and D15a constitute a new novelty attack made for the first time in the appeal proceedings. The appellant argued that this attack should be admitted into the proceedings since it was *prima facie* relevant.

4.3 Example 1 of D14 discloses a process consisting of the following steps:

- 0.1 wt% of the β-nucleating agent Ca-Pimelate is mixed with 50 wt% of a polypropylene homopolymer, 49 wt% of a propylene-ethylene block copolymer, a stabiliser and a neutralisation agent,

- the mixture is extruded through a slot die,

- the polypropylene homopolymer surface of the resulting bilayer film is cooled at 125°C by contacting it with a chill roll,

- the cooled film is then stretched at 90°C at a ratio of 4:1 in the extrusion (machine) direction, and

- the thus treated film is stretched at 145°C at a ratio of 4:1 in the transverse direction.

The resulting film has a void ratio (porosity) of 56% (page 17, lines 2 to 3).

4.4 Apart from the void ratio, example 1 of D14 does not disclose the parameters defined in claim 1.

Furthermore, the process disclosed in this example differs from that recommended in the patent by the same process differences (a) to (c) as example 3 of D1 and example 4 of D2. In particular, example 1 of D14 does not disclose any cooling of the extruded film by air blowing.

4.4.1 The appellant argued during the oral proceedings that the skilled person reworking example 1 of D14 would have cooled the extruded film by air blowing and would have applied a heat treatment before and after stretching, as recommended in the patent, since these steps were always applied in the art of preparing stretched films, as evidenced by D16 to D18. By varying the air temperature in the air blowing step until a void ratio as disclosed in example 1 of D14 was obtained, the skilled person would have arrived at a film with the parameters of claim 1, as evidenced by D15 and D15a.

4.4.2 While it is debatable whether these air blowing and heat treatment steps have been applied in D15 - this experimental report does not cite any such steps at all - the appellant stated during the oral proceedings that such steps had been applied and the reworking experiment D15-1 in D15a indisputably cites at least the cooling by air blowing ("air knife") at an air temperature of 120°C. The resulting product had all the parameters as required by claim 1, namely a β-crystal content of 54% (claim 1: 30% or more), a melting point of 162°C (claim 1: 140 to 172°C), a void ratio of 56% (claim 1: 30 to 80%), an F2 value of 18 MPa (claim 1: 10 to 70MPa) and a surface glossiness of 24% (claim 1: 10 to 145%).

It thus appears to be credible that if example 1 of D14 is reworked and, in addition to what is disclosed in this example, the extruded film is cooled by air blowing with an air temperature of 120°C and heat treated as recommended in the patent, a film is obtained with parameters as defined in claim 1.

4.4.3 However, novelty over example 1 of D14 hinges on the same issues as discussed above for novelty over D1 and D2. More specifically, in the same way as for D1 and D2, it is not a valid assumption that the skilled person reworking example 1 of D14 would have supplemented this process by air blowing and heat treatment steps, let alone an air blowing step at the specific temperature of 120°C as asserted by the appellant. Thus, the appellant's novelty attack on the basis of example 1 of D14 is at the very least not *prima facie* relevant.

4.5 The board therefore decided not to admit D14, D15 and D15a and the related novelty attack into the proceedings.

5. Inventive step

5.1 The invention relates to stretched, white, i.e. voids-containing, polypropylene films for thermal transfer recording (page 2, lines 5 to 7).

5.2 Like the patent, D2 concerns stretched, void-containing polypropylene films (page 2, lines 32 to 35 of D2). Therefore, the board considers D2 to represent the closest prior art.

5.3 According to the respondent, the problem solved in view of D2 was the provision of a film suitable for thermal transfer recording having improved sensitivity and crease resistance.

5.4 As a solution to this problem the patent proposes the biaxially oriented polypropylene films defined in claims 1 to 3 and 8, characterised in that they have

- a ß-crystal ratio of 30% or more and an F2 value of 10 to 70 MPa (claims 1 and 2)

- an F2 value of 30 to 100 MPa (claim 3) and

- a skin layer with a half crystallisation time of 60 seconds or less (claim 8).

As set out above, none of these three characteristics - ß-crystal ratio, F2 value and half crystallisation time - is disclosed in D2.

5.5 It needs to be examined whether the problem of providing a film suitable for thermal transfer recording having improved sensitivity and crease resistance has been credibly solved.

5.5.1 The films of comparative examples 1 and 2 of the patent have β-crystal ratios of 25% and 12% (table 1) and F2 values of 92 MPa and 87 MPa (table 2), all outside the ranges defined in claims 1 and 2. These films have a sensitivity which is significantly inferior to that of examples 1 to 8, which are examples according to the invention with β-crystal ratios and F2 values inside the ranges defined in claims 1 and 2 (table 3).

The films of comparative examples 4 and 6 of the patent have F2 values of 7 MPa and 8 MPa (table 2), which are both outside the range defined in claims 1 to 3. These films have a crease resistance (comparative example 4) and/or sensitivity (comparative examples 4 and 6) significantly inferior to that of examples 1 to 8.

The film of comparative example 10 of the patent has a half crystallisation time of 122 seconds (table 8), which is outside the range defined in claim 8. This film has a sensitivity which is significantly inferior to that of the examples according to the invention, which all have a half crystallisation time within the range defined in claim 8 (tables 3, 7 and 11).

A comparison of the comparative examples discussed above with the examples according to the invention thus shows that the ß-crystal ratio, the F2 value and the half crystallisation time are critical for obtaining increased sensitivity and crease resistance.

5.5.2 The appellant argued that the comparative examples did not correspond to the teaching of D2 but, in terms of the preparation process, were further away from the claimed subject-matter than the teaching of this document. For example unlike the film disclosed in D2, the film of comparative examples 1 and 2 was prepared with a nucleating agent different from that applied in the examples according to the invention.

This argument is not convincing. The claimed subject-matter relates to products rather than a process of preparation, and the above-discussed comparative examples differ from the claimed products by the very same product parameters as the teaching of D2. Contrary to the appellant's assertion, the comparative examples therefore do represent the teaching of D2. They thus show that the features distinguishing the claimed subject-matter from D2 are critical in solving the problem of providing a film suitable for thermal transfer recording having improved sensitivity and crease resistance.

5.5.3 The appellant further argued that no details were given in the examples and comparative examples of the patent as regards the air blowing step, and the skilled person would therefore not be able to rework them. In particular, there was no information about the flow rate and/or heat transfer. The examples could therefore not prove any effect obtained over D2.

The board does not agree with this argument either. It is specified in the above-cited examples and comparative examples that the air blowing step is carried out by blasting 30°C, 60°C or 90°C cold air from the non-drum side (see e.g. page 32, line 34, page 35, line 11 and page 43, line 11 of the patent). In the absence of any proof to the contrary, it must be assumed that this information is enough for the skilled person to carry out the air blowing step and rework the above-cited examples and comparative examples. Furthermore, the assertion that without any information about the flow rate the skilled person could not rework the examples is contradicted by the appellant's own evidence D16 to D18, which, when discussing the air blowing step, does not specify any flow rate either.

5.5.4 Therefore, the above problem of providing a film suitable for thermal transfer recording having improved sensitivity and crease resistance has been credibly solved.

5.6 D2 does not relate to any films for thermal transfer recording, let alone address the problem of improving sensitivity and crease resistance of such films. The skilled person confronted with this problem would thus not have been motivated by this document to adapt the preparation process disclosed therein so as to obtain a film with a ß-crystal ratio, F2 value or half crystallisation time as claimed.

The appellant argued that according to D16, the process steps recommended in the patent and lacking in D2 were usual in the art. The skilled person would thus apply these process steps when carrying out the teaching of D2 and would thereby inevitably obtain an improved sensitivity and crease resistance.

This argument is however not convincing. D16 is a general textbook on extrusion technology for stretched films and does not relate to thermal transfer recording. There is in particular no indication at all in D16 that by applying the process steps referred to by the appellant, sensitivity and crease resistance in thermal transfer recording could be improved. The skilled person aiming at improved sensitivity and crease resistance would thus have had no reason to apply, in the process of D2, any of the steps disclosed in D16.

The claimed solution is thus not obvious in view of D2, taken alone or in combination with the other cited documents.

5.7 Apart from attacking inventive step on the basis of D2 as the closest prior art, during the oral proceedings the appellant mentioned in passing that D1 would also constitute a good starting point for inventive step. However, in view of the similarity of the disclosures of D1 and D2, the above reasoning also applies for D1 as the closest prior art, so the claimed solution is not obvious in view of this closest prior-art disclosure either.

6. Sufficiency of disclosure (Article 100(b) EPC)

6.1 The appellant argued in writing that the manufacturing method disclosed in D1 and D2 corresponded to that recommended in the patent. Therefore, the product obtained in D1 and D2 had to have the features defined in the claims of the patent. If this were not the case, the patent would lack essential information about how to obtain the claimed parameters with the process recommended therein and disclosed in D1 and D2.

However, as set out above when discussing novelty, the processes disclosed in D1 and D2 are not identical to that recommended in the patent but differ from it in terms of three process steps. The appellant's argument must thus fail.

6.2 During the oral proceedings, the appellant furthermore argued that the information given in the patent as regards the air blowing step was insufficient. In order to distinguish air blowing from normal air circulation, details about the flow rate and/or heat transfer would be necessary.

As set out above when discussing inventive step, this is contradicted by the appellant's own evidence D16 to D18, which, when discussing the air blowing step, do not specify any flow rate. This underlines the fact that no information about the flow rate is needed for the skilled person to carry out the air blowing step.

6.3 The appellant's arguments thus do not prejudice sufficiency of disclosure.

7. Requests to hear experts or witnesses

The appellant requested in writing that B. Schmitz and H. Peiffer be heard as technical experts or witnesses during the oral proceedings, if necessary. At the beginning of the oral proceedings, the appellant indicated that it would make such a request at the appropriate time. No such request having been made during the oral proceedings (actually the contents of D15, D15a and D17 were not contested), the board did not need to decide on this issue.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

Beschwerdekammern des Europäischen Patentamts
Boards of Appeal of the European Patent Office
Chambres de recours de l'Office européen des brevets

G. Rauh W. Sieber

Decision electronically authenticated