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Datasheet for the decision of 20 May 2014

Case Number:	T 0303/11 - 3.3.03
Application Number:	03250892.1
Publication Number:	1336641
IPC:	C08L23/10, C08L23/16, C08L23/04, C08J5/18, B32B27/32
Language of the proceedings:	EN

Title of invention:
Polyolefin resin composition and shrink film made from the same

Patent Proprietor:
Mitsui Chemicals, Inc.

Opponent:
Treofan Germany GmbH & Co. KG

Headword:

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
Novelty - main request (yes)
Inventive step - main request (yes)

Decisions cited:

Catchword:

Case Number: T 0303/11 - 3.3.03

DECISION
of Technical Board of Appeal 3.3.03
of 20 May 2014

Appellant: (Opponent)	Treofan Germany GmbH & Co. KG Bergstrasse 66539 Neunkirchen (DE)
Representative:	Mai, Dörr, Besier Patentanwälte Steuerberater/Wirtschaftsprüfer Kreuzberger Ring 64 65205 Wiesbaden (DE)
Respondent: (Patent Proprietor)	Mitsui Chemicals, Inc. 5-2, Higashi-Shimbashi 1-Chome Minato-ku Tokyo (JP)
Representative:	Raynor, Stuart Andrew J A Kemp 14 South Square Gray's Inn London WC1R 5JJ (GB)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 22 November 2010 rejecting the opposition filed against European patent No. 1336641 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	M. C. Gordon
Members:	O. Dury
	R. Cramer

Summary of Facts and Submissions

I. The appeal by the opponent lies against the decision of the opposition division posted on 22 November 2010 rejecting the opposition filed against European patent No. 1 336 641.

II. The granted patent was based on 4 claims reading as follows:

"1. A polyolefin resin composition comprising:
(A) 10 to 70 wt% based on the total amount of components (A) and (B) of a propylene/α-olefin random copolymer obtained by random copolymerization of propylene and a C_2 to C_{20} α-olefin other that propylene, and having a melting point as measured by differential scanning calorimeter (DSC) of 40 to 115°C and an α-olefin content of 5 to 50 mol%;
(B) 30 to 90 wt% based on the total amount of components (A) and (B) of a random propylene resin having a melting point as measured by DSC of 120 to 150°C; and
(C) an alicyclic saturated hydrocarbon resin having a glass transition point of 20 to 100°C and a number average molecular weight of 1200 or less, the component (C) being used in an amount of 5 to 100 weight parts per 100 weight parts of the total amount of the components (A) and (B)."

"2. A single-layer or multilayer film having a thickness of 50 to 500 µm and at least one layer formed from the resin composition according to Claim 1."

"3. A laminated film having a thickness of 50 to 500 µm, wherein at least one film selected from among polyolefin films, polystyrene films, polyester films, polyamide films, and laminates of a gas barrier resin and an adhesive polyolefin is laminated on one or both sides of a film formed from the resin composition according to Claim 1."

"4. A shrink film obtained by uniaxially or biaxially stretching the single-layer or multilayer film according to Claim 2 or the laminated film according to Claim 3 to a draw ratio of at least 3 times."

III. An opposition against the patent was filed, in which it was requested that the patent be revoked on the grounds of Art. 100 (a) EPC (lack of novelty and lack of inventive step).

IV. The following documents have been *inter alia* cited in the course of the opposition proceedings:

D1: US 5 372 882
D2: Arakawa Technical Data, Application of Arkon to Polypropylene film (20 pages), 1993
D3: EP-A-0 400 456
D4: Hochschrumpfende Folien aus Polypropylen, H. Peiffer and G. Schlögl, Kunststoffe 82, 1992
D6: EP-A-0 282 282
D8: Product Data Sheet of PP 1304E1, ExxonMobil Chemical, 2001 (designated "D7" in the Minutes and Decision of the opposition division, assigned the number "D8" by the appellant subsequently (see section VI below).

V. According to the decision of the opposition division, novelty over D1 and D6 was given because neither of those documents disclosed the specific combination of features specified in the granted claims. An inventive step was further acknowledged starting from D6 as closest prior art and considering that there was no hint in the cited prior art to improve the shrinkage factor of polyolefin compositions by adding a hydrocarbon resin according to component (C) of granted claim 1 to a polymer mixture comprising a lower melting propylene resin and a higher melting propylene resin according to components (A) and (B) of granted claim 1.

The opposition division further decided not to admit D8 to the proceedings because it was late-filed and *prima facie* not highly relevant.

VI. On 27 January 2011 the opponent (appellant) lodged an appeal against the above decision and requested that the decision of the opposition division be set aside and the patent be revoked in its entirety. Together with the statement of grounds of appeal filed on 1 April 2011, D8 and the following document were submitted:

D7: Product Data Sheet of Arkon P-140, P-125, P-115 and P-100, Arakawa Europe, 2000

VII. By letter dated 15 August 2011 the patent proprietor (respondent) requested that the appeal be dismissed.

VIII. In a communication accompanying the summons to oral proceedings issued on 29 October 2013 the Board set out its preliminary view of the case.

The Board referred to the additional technical information, filed by the then applicant in the form of two experimental reports during the proceedings before the examining division, to which reference was made on the first page of the patent specification. These experimental reports were assigned the numbers D9a (report filed with letter of 16 January 2007 and D9b (report filed with letter of 1 October 2007).

With respect to inventive step the Board indicated, *inter alia*, that it considered D6, example 7 to represent the closest prior art. However it might be necessary to consider whether other documents invoked by the respondent, namely D3 and D5 might be more relevant.

IX. Together with its rejoinder dated 18 March 2014, the appellant submitted

D10: Römpp-Lexikon Chemie, 9th Ed., 1997, "Erweichungspunkt"
D11: Römpp-Lexikon Chemie, 9th Ed., 1999, "Schmelzpunkt"
D12a-c: Saechtling Kunststoff-Taschenbuch, 26th Ed., 1995, pages 354, 355, 364, 365, 370, 371, 374 and 375
D13: J-L. Costa, Molecular structure: characterisation and related properties of homo- and copolymers, in Polypropylene: an A-Z reference, 1999, 2 pages

Regarding D13 the document first submitted was not legible, as the appellant was informed by the EPO in a telephone call of 7 May 2014. By letter of 9 May 2014 the appellant submitted a “complete and better legible” version of D13 (pages 503-510).

X. By letter dated 19 March 2014, the respondent submitted as further requests that the patent be maintained on the basis of any of auxiliary requests 1-6 filed therewith, which are, however, not relevant for the present decision.

XI. During the oral proceedings held on 20 May 2014 in the presence of both parties the respondent did not object to the admission to the proceedings of D13 as filed by letter of 9 May 2014.

XII. The appellant's arguments as relevant for the main request may be summarised as follows:

Novelty

a) D1 disclosed biaxially oriented, multilayer polyolefin shrink films, the base layer of which comprised a homo-, co- or terpolymer of olefins with 2 to 8 C-atoms or mixtures thereof. Those co- and terpolymers had a melting point of 100-150°C. Preferred were polypropylene copolymers and ethylene-propylene-butylene-terpolymers with an ethylene content of 1-7 wt.%, a butylene content of 4-10 wt.% and a propylene content of 83-95 wt. %, the latter essentially having a melting point of 40 to 115°C. Mixtures of two or more of the ethylene propylene copolymers and propylene terpolymers were preferred. The base layer also preferably contained a low molecular weight resin, saturated (hydrogenated) products such as cyclopentadiene resins being preferred. The latter corresponded to the Arakawa's compounds specified in paragraph [0027] of the patent in suit and therefore had to have a glass transition point and a molecular weight according to granted claim 1, the latter being explicitly confirmed by D2.

Therefore, D1 anticipated granted claim 1.

b) D6 disclosed a multilayer shrink film comprising an interlayer comprising a flexible propylene resin having a Vicat softening point of 115°C or less, optionally as blend with a hydrocarbon resin, sandwiched between outermost layers comprising a propylene resin having a Vicat softening point higher than that of the flexible propylene resin of the interlayer and within the range of 80-150°C. Copolymers of propylene according to granted claim 1 were disclosed in the description of D6. The sole hydrocarbon resin illustrated in D6 was Arakawa's Arkon P-115 which, according to the data of D2 and D7, corresponded to component (C) of granted claim 1.

Example 8 of D6 disclosed a film comprising two identical outermost layers and two different interlayers. Although none of those layer comprised the combination of components (A), (B) and (C), it could be derived that the outermost layers comprised components (A) and (B) and that the first interlayer comprised components (A) and (C) according to granted claim 1. In that respect, the melting point of the polymers could be derived from the value of the Vicat softening points disclosed in D6. Besides, since the polymers used were similar to those specified in paragraphs [0025] and [0026] of the patent in suit, they had to exhibit similar melting points, in particular considering that, according to D13, the melting point was primarily a function of the comonomer content. Finally, the respective amounts of each polymer could be derived from the values of the thickness of each layer disclosed in D6, by taking into account that the outermost layers and the first interlayer had similar densities as was derivable from Table 4.7 of D12. Therefore, the multilayer film prepared in example 8 of D6 constituted, as a whole, a composition according to granted claim 1.

c) Following receipt of the Board's communication, the appellant did not further pursue, either in writing or at the oral proceedings, its objection raised in the statement of grounds of appeal (section 2) that was based on a combination of various passages of D6.

Inventive step

d) Example 7 of D6, which exhibited better stretching properties at low temperature than example 8 of D6, represented the closest prior art.

The subject-matter of claim 1 differed from the composition of the interlayer of example 7 of D6, in that it comprised a mixture of two polymers (A) and (B) according to granted claim 1, whereas a single one of those polymers was used in said example 7.

For the following reasons, the technical problem to be solved resided in the provision of further compositions for shrink films in alternative to those of D6:

- There was no fair comparison on file with the closest prior art;
- There was no evidence that any technical effect arose over the whole scope of the claims, in particular for copolymers (A) comprising either a comonomer different from butene or amounts of comonomer smaller than 26 mol.% or larger than

43.3 mol.%, for compositions comprising more (B) than (A), or for compositions comprising more than 30 pbw of resin (C). In that respect, the requirements of granted claim 1 would be satisfied by compositions which contained components (A), (B) and (C) merely in very small amounts. Furthermore the comparative examples on file were only directed to very specific compositions in respect of e.g. the nature or the amounts of components (A), (B) and (C). Also, the compositions being claimed could contain additives that could complicate the stretching and for which no effect would be obtained;

- The effect relied upon by the respondent was related to uniaxially stretched films, which could not be taken into account for at least some embodiments presently claimed, such as biaxially stretched films. Besides, that effect could only be achieved if the correct stretching temperature was used, as shown in the examples of D6;
- It was derivable from the comparison of the data reported in Table 1 of D6 and in Table 1 of the patent in suit that the shrinkage properties of the film prepared in example 7 of D6 were better than those of films according to the granted claims.

Considering that either D6 itself or D1 (e.g. column 6, lines 6-12 and 30-42) taught that either a single polypropylene or mixtures thereof could be used as matrix for making each layer of the multilayer film, it was obvious to solve the technical problem underlying the patent by replacing a single polypropylene by a combination of two polypropylene copolymers, in particular those according to granted claim 1. Although D6 gave no specific information regarding melting points, it already taught mixtures of a high melting copolymer and a low melting copolymer, those copolymers being characterised in terms of their Vicat softening points.

It was also known in the art to improve the shrink properties of polypropylene films by lowering the crystallinity e.g. by addition of a propylene-butene copolymer (D4; D3: page 3, lines 10-22) or a hydrocarbon resin such as Arakawa's Arkon products (D2: page 13). Therefore, the subject-matter claimed was also obvious in the light of D6 in combination with common general knowledge.

e) The appellant did not further pursue its objections based on either of D3 or D5 as the closest prior art following receipt of the Board's communication, either in writing or at the oral proceedings.

f) For these reasons, the subject-matter of at least granted claim 1 was not inventive.

XIII. The respondent's arguments as relevant for the main request may be summarised as follows:

Novelty

a) D1 and D6 both failed to disclose the specific combination of components (A), (B) and (C) according to claim 1.

The copolymers disclosed in D6 were characterised in terms of their Vicat softening point and not of their melting points as defined in granted claim 1. There was no evidence on file that there was a generally valid relationship between those parameters. In that respect, D8 was not relevant because it dealt with a different material, namely polypropylene homopolymers. D10 and D11 only disclosed that for a given polymer the Vicat softening point was clearly below the melting point but did not give an absolute range for the magnitude of this difference. The melting point not only depended on the nature and the amounts of the copolymers present but also on some other factors such as the polydispersity as derivable from the data provided in paragraph [0025] of the patent in suit for polymers 1 and 2.

Therefore, novelty over D1 and D6 was given.

Inventive step

b) The composition used to prepare the interlayer of example 7 of D6 was a suitable composition to form the closest prior art.

In the absence of any information regarding the melting point of the copolymer used for the interlayer of example 7, it was not possible to determine whether that polymer corresponded to either of component (A) or (B) according to granted claim 1. Also, considering that there was a gap of 5°C between both ranges of melting point specified in granted claim 1, it could not be concluded that the composition of the interlayer prepared in example 7 of D6 mandatorily comprised a copolymer according to granted claim 1. Further considering that Arkon P-115 was a resin according to component (C) of the patent in suit, the subject-matter of granted claim 1 differed from the closest prior art in that it contained components (A) and (B) in specific amounts.

The examples of the patent in suit and the data provided in D9a and D9b showed that using polypropylene copolymers (A) and (B) in amounts according to granted claim 1 led to an improvement in the shrink properties at low temperature of uniaxially stretched monolayer films. The comparison of the shrinkage properties disclosed in D6 and in the patent in suit made by the appellant was not valid because different measurement methods were used in both cases. Since no comparison with D6 was possible, the comparative data provided in D9a and D9b represented embodiments lying closer to the subject-matter being claimed than example 7 of D6. D9a and D9b further showed that the compositions according to granted claim 1 could be used to prepare monolayer uniaxially stretched films having improved low temperature shrinkability compared to those according to D6. There was no reason to consider that said improved performance would not be shown either for biaxially stretched films or for multilayer films and laminated films. The appellant's objection according to which that effect was not present on the whole scope of the claims was not supported by any evidence.

For these reasons, it was credible that the improvement in low temperature shrinkability was obtained over the entire scope of the granted claims.

There was no hint in D6 to solve that problem by combining three components (A), (B) and (C) according to granted claim 1. In that respect, D4 did not disclose combinations of high and low melting point polypropylene copolymers and D3 did not teach copolymers having a melting point of 40-115°C as specified for component (A) of granted claim 1.

Under these circumstances, the compositions according to granted claim 1 as well as the films according to granted claims 2-4 were not obvious over D6.

XIV. The appellant (opponent) requested that the decision under appeal be set aside and that the European patent No. 1 336 641 be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed and the patent be maintained as granted (main request), or alternatively that the decision under appeal be set aside and the patent be maintained in amended form according to any of the auxiliary requests 1-6 filed with the letter of 19 March 2014.

XV. The Board announced its decision at the end of the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

Main request (patent as granted)

2. Novelty

2.1 Granted claim 1 is directed to a polyolefin resin composition comprising:
(A) (a0) 10 to 70 wt% based on the total amount of components (A) and (B) of
(a1) a propylene/α-olefin random copolymer obtained by random copolymerization of propylene and a C_2 to C_{20} α-olefin, other than propylene having
(a2) a melting point as measured by differential scanning calorimeter (DSC) of 40 to 115°C and
(a3) an α-olefin content of 5 to 50 mol%;
(B) (b0) 30 to 90 wt% based on the total amount of components (A) and (B) of
(b1) a random propylene resin having
(b2) a melting point as measured by DSC of 120 to 150°C; and
(C) (c0) 5 to 100 weight parts per 100 weight parts of the total amount of the components (A) and (B) of
(c1) an alicyclic saturated hydrocarbon resin having
(c2) a glass transition point of 20 to 100°C and
(c3) a number average molecular weight of 1200 or less.

2.2 D1 discloses a multilayer polyolefin film comprising a base layer and at least one heat-sealable top layer on the base layer. Either the base layer or the top layer may comprise a mixture of propylene copolymers (D1: claims 10, 12, 18; col. 3, lines 14-31, 39-48 and

59-62; col. 4, lines 19-28). The comonomer content of the propylene copolymer may be as low as 2 or 4 w.% (col. 4, lines 29-36) and that of the terpolymer as low as 4 wt.% (col. 4, lines 36-42). According to col. 4, lines 6-12, the melting point of the copolymers and/or terpolymers is in the range of 100-150°C, pref. 120-135°C. The respective amounts of co- and terpolymers may vary within broad limits (D1: col. 3, lines 59-62). Low molecular weight resins may further be used, including e.g. cyclopentadiene polymers having a softening point of above 100°C (col. 5, lines 8-62, in particular lines 55-62).

Although within the disclosure of D1 there are elements corresponding to features of the operative claims, in order to arrive at the specific combination of technical features according to granted claim 1, a series of selections within the ambit of the claims and/or the description of D1 have to be made, in particular regarding the combination of features (a0), (a2), (a3), (b0), (b2), (c1), (c2), (c3) identified above in respect of granted claim 1, which selections are disclosed neither explicitly nor implicitly by D1.

In the example of D1 (col. 10, lines 44-64), the base layer comprises a single propylene copolymer, while the top layers comprise a mixture of a propylene copolymer and a propylene terpolymer. None of the layers comprises a hydrocarbon resin (C) according to granted claim 1 and no evidence has been advanced that the polymers of the top layers satisfy the requirements (a0), (a2), (a3), (b0), (b2) identified above in respect of granted claim 1.

Therefore, D1 does not directly and unambiguously disclose a composition comprising the combination of components (A), (B) and (C) according to claim 1.

2.3 D6 discloses multilayer shrink films comprising an interlayer e.g. comprising a propylene resin having a Vicat softening point of 115°C or less, sandwiched between outermost layers comprising a propylene resin having a Vicat softening point higher than that of the propylene resin of the interlayer and within the range of 80-150°C (D6: claims 1 and 3). The interlayer may further comprise a blend of a flexible propylene resin and a hydrocarbon resin (D6: claim 2).

2.3.1 The outermost layers are further described from page 2, line 45 to page 3, line 32 of D6. They may in particular comprise a blend of two propylene copolymers, whereby the first has a Vicat softening point of 80-150°C (page 2, lines 50-51) and the second one a Vicat softening point of 150°C or higher (page 2, lines 58-61). The latter requirement implies that the melting point of said copolymer is higher than 150°C, which is in contradiction with each of features (a2) and (b2) identified above for granted claim 1. No hydrocarbon resin (C) is mentioned in relationship with the outermost layers in D6.

2.3.2 The interlayer is described from page 3, line 33 to page 4, line 17 of D6. Mixtures of propylene copolymers similar to those used for the outermost layers are mentioned in a general manner on page 3, lines 44-47, albeit without disclosing specifically polymers (A) and (B) according to granted claim 1. Although a mixture of a propylene copolymer and hydrocarbon resin is also mentioned as an alternative embodiment (page 3, lines 48-51), mixtures of two propylene random copolymers, of any kind, let alone corresponding specifically to components (A) and (B) according to granted claim 1, are thereby not disclosed.

2.3.3 The only passages of D6 disclosing a hydrocarbon resin (C) according to granted claim 1 are in respect of the interlayers prepared in examples 7 and 8. In that respect, it was agreed by the parties that the hydrocarbon resin used, Arkon P-115, has a glass transition temperature and a molecular weight according to granted claim 1 (features (c2) and (c3) as identified in section 2.1 above). However, those resins are used in examples 7 and 8 in a blend with a single propylene copolymer and not in a blend of two copolymers according to granted claim 1. In that respect, it was neither shown nor argued by the appellant that said single copolymer used in combination with Arkon P-115 in examples 7 and 8 of D6 would correspond to a composition comprising two copolymers corresponding to components (A) and (B) as defined in granted claim 1.

2.3.4 The appellant argued that the multilayer film prepared in example 8 of D6 had as a whole, i.e. taking into account the aggregated properties of the compositions of the three layers, a composition according to granted claim 1 because components (A), (B) and (C), although not present in a single layer, were present in separate layers.

In making this argument the appellant thus equated the term "composition" with "multilayer film".

However, the appellant failed to show that there was any reason to deviate from the usual interpretation according to which, in the case of multilayer films obtained by forming an assembly of different layers, as in the case of D6, the term "composition" is used in respect of each of those layers individually but not for the whole film i.e. if each layer of a multilayer film may be defined as having a given composition, the multilayer film would not, under the terminology conventionally employed in the field, be considered as itself constituting "a composition" comprising all the components present in each of its layers. The interpretation of "composition" as applying to the entire multilayer film structure, employed by the appellant, is inconsistent not only with the terminology used in the patent in suit (claims 2-4; paragraphs [0007], [0008], [0018]), but also with the terminology as employed in D6 (claims 1-3; page 2, lines 34-40; page 4, lines 29-30; examples) as well as with the terminology employed in each of D1, D3 and D5. For these reasons, in the present case, the appellant's argument was not followed.

2.3.5 Therefore, D6 fails to disclose a composition comprising the combination of components (A), (B) and (C) according to claim 1.

2.4 In these circumstances, the subject-matter of claim 1 of the main request is novel both over D1 and D6 and the novelty objections raised by the appellant against claim 1 of the main request cannot be followed.

2.5 The main request thus meets the requirements of Art. 54 EPC.

3. Inventive step

3.1 Closest prior art

3.1.1 The patent in suit relates to polyolefin resin compositions and shrink films made therefrom. It also aims at providing polypropylene shrink films having good rigidity, transparency and appearance that can be stretched at temperatures of 80°C or lower, that have a shrinkage factor at 80 °C of at least 30 % and at 90 °C of at least 40 % and a "natural shrinkage" (i.e. shrinkage during storage at room temperature to 40°C after stretching the film) after stretching of 6 % or less ([0005], [0023]). Although both uniaxial and biaxial stretching is mentioned in the description ([0022]) and in claim 4 of the patent in suit, the examples all illustrate that uniaxial stretching and shrinkage is evaluated in the stretching direction (longitudinally).

3.1.2 Such multilayer films having good mechanical properties, appearance and improved low-temperature shrinkability are known from D6 (page 2, lines 2-4 and 27-29). Regarding orientation of the stretched film, D6 addresses both monoaxially as biaxially stretched films (page 4, lines 31-35) and the examples are limited to biaxially stretched films. Therefore, D6 represents a suitable starting point for the assessment of the inventive step. Example 7 of D6, which was considered by both parties as the closest prior art, is particularly relevant.

3.1.3 During the oral proceedings before the Board, the appellant considered that among the examples of D6, example 7, in particular the interlayer thereof, was the most promising starting point for the assessment of the inventive step, in particular because the film prepared in example 8 of D6 exhibited worse shrinking properties (see Table 1 of D6) and could not be stretched at a temperature lower than 80°C (D6: page 6, lines 32-33). The Board sees no reason to deviate from that view, which was also not contested by the respondent.

3.2 Problem to be solved

During the appeal proceedings the respondent formulated the problem to be solved as compared to the closest prior art as residing in the provision of polypropylene shrink films which can be stretched at low temperatures and have increased shrinkage in the stretching direction at temperatures of 80-90°C. In view of paragraphs [0005] and [0023] of the patent in suit, that formulation of the problem is acceptable.

3.3 Solution

3.3.1 The solution to the problem identified above resides in the compositions and the films defined in granted claims 1 to 4. In that respect, since the parties did not arrive at a consensus in respect of how the compositions being claimed differed from those of the closest prior art, the distinguishing features of granted claim 1 over the interlayer of example 7 of D6 have to be established.

3.3.2 Example 7 of D6 concerns a film consisting of two identical outermost layers and an interlayer. The outermost layers are made from a resin consisting of a propylene-butene-1 copolymer containing 19.0 mol.% butene and having a Vicat softening point of 99°C. The interlayer is made from the same resin as used for the outermost layer to which 15 pbw of a petroleum resin Arkon P-115 was added, which, as agreed by the parties, corresponds to component (C) according to granted claim 1. D6 provides no information relating to the melting point of the polypropylene copolymer used and no evidence was provided that would give cause to deviate from the conclusion drawn by the opposition division according to which there is no clear and reliable correlation between Vicat softening point and melting point (see contested decision: page 11, section 13.3, second paragraph). In that respect, the appellant argued that the melting point of the copolymer used in example 7 of D6 could be derived from the data provided in respect of the three random polypropylene-butene polymers disclosed in paragraph [0025] of the patent in suit. However, D6 does not disclose whether or not the copolymer used in example 7 is a random copolymer (as defined in paragraph [0025] of the patent in suit). Therefore, it cannot be concluded that any information derived from paragraph [0025] would apply to the copolymers of example 7 of D6. Besides, even if to the appellant's benefit one were to follow its argument that there is a linear relationship between the butene content and the melting point, the data available were not shown to allow it to be concluded whether the DSC melting point of the polypropylene copolymer used in example 7 of D6 would be 40 to 115°C according to component (A) of granted claim 1, or be 120 to 150°C according to component (B) of granted claim 1 or between 115°C and 120°C, in which case the copolymer would not correspond to either of said components (A) and (B) as defined in granted claim 1. In any case, the validity of a calculation of linear regression derived from only three values appears highly questionable.

In these circumstances, the subject-matter of granted claim 1 differs from the composition of the interlayer of example 7 of D6 in that it comprises two polypropylene random copolymers in specific amounts and having melting points in two specific ranges (higher and lower melting points) according to components (A) and (B).

3.4 Success of the solution - Reformulation of the problem effectively solved

3.4.1 The subject-matter claimed in the patent in suit encompasses the following embodiments:

(a) compositions comprising components (A), (B) and (C) as defined in granted claim 1;
(b) single-layer films formed from (a);
(c) multilayer film comprising at least one layer formed (a);
(d) laminated film comprising one layer formed from (a);
(e) single-layer shrink films obtained by stretching (b);
(f) multilayer shrink film obtained by stretching (c) or (d).

3.4.2 The respondent argued that D9b showed that the problem identified in section 3.2 was effectively solved.

D9b comprises examples 1-4 and comparative example CE 1 of the patent in suit (see Table 1 in paragraph [0040]) as well as the comparative examples Ref. CE (filed as D9a) and Ref. CE2 (first submitted in D9b). These data all deal with the preparation of single-layer shrink films and the determination of their shrinkage properties (heat shrinkage factor and natural shrinkage as defined in paragraphs [0028] and [0023], respectively, of the patent in suit). Those films are obtained by stretching a film formed from the following compositions:

(a) Examples 1-4: a composition comprising components (A), (B) and (C) according to granted claim 1 in various amounts.

(b) Example CE 1: a composition comprising a random ethylene-polypropylene (B1) having a melting point of 135°C corresponding to component (B) and the same component (C) as employed in examples 2-4, but no component (A).

(c) Example Ref. CE: a composition comprising a propylene/ethylene/butene random copolymer (T1*) having a melting point of 128°C corresponding to component (B) and the same component (C) as in examples 2-4, but no component (A).

(d) Example Ref. CE2: a composition comprising a blend of (B1) and (T1*), both corresponding to components (B), and the same component (C) as in examples 2-4, but no component (A).

Whereas none of examples CE 1, Ref. CE and Ref. CE2 illustrates the subject-matter being claimed and has to be seen as comparative/reference examples, examples 1-4 are illustrative of the subject-matter of granted claims 1, and those embodiments of claims 2 and 4 relating to single-layer films.

However, D9b cannot support the argument of the respondent in respect of a multilayer or a laminated film encompassed by any of granted claims 2 to 4 which comprises a layer that is e.g. not shrinkable because there is no evidence that such a film assembly, as a whole, would, despite the presence of a non-shrinkable layer nevertheless have good shrinking properties.
In view of such an embodiment, which is encompassed by the claims, the respondent has submitted no evidence to

render credible that the technical problem identified in section 3.2 is effectively solved on the whole scope of the subject-matter being claimed.

3.4.3 For that reason, in the present case, the technical problem effectively solved has to be reformulated in a less ambitious manner and namely as the provision of further polyolefin resin compositions forming alternatives to those of the closest prior art.

3.5 Obviousness

3.5.1 It remains to be decided whether it was obvious to modify the interlayer of example 7 of D6 so as to arrive at the subject-matter of claim 1 of the main request. In the present case, this means that it has to be assessed whether or not it was obvious either i) to replace the polypropylene-butene-1 copolymer used as matrix in example 7 of D6 by a blend of two random polypropylene copolymers having a lower and a higher melting point according to granted claim 1 or ii) to add such a blend of polypropylene copolymers to said matrix.

3.5.2 The teaching of D6 in respect of the interlayer of the multilayer films is provided on page 3, lines 33 to page 4, line 17 of D6. According to those passages, two embodiments are proposed, either directed to a flexible polypropylene resin or a linear very low density polyethylene. Regarding the polypropylene resin, which is the sole embodiment of interest in the present case, D6 discloses the use of a polypropylene copolymer according to page 2, lines 45-57, optionally in a mixture with "the same polypropylene-α olefin copolymer as specified for the polypropylene resin used for the outermost layer" (D6: page 3,lines 44-47), which

correspond to those disclosed from page 2, line 58 to page 3,line 28 of D6. Those passages, however, fail to disclose the specific combination of two random polypropylene copolymers having a lower and a higher melting points as defined in granted claim 1.
In that respect, it is conspicuous that it cannot be decided from the evidence on file whether or not the polypropylene copolymer used in example 7 of D6 corresponds to either of polymers (A) and (B) according to granted claim 1 (see above section 3.3.2). Besides, D6 discloses that, should a blend of polypropylene copolymers be used, the second copolymer should have a Vicat softening point of 150°C or higher (D6: page 2, lines 58-59). That teaching is incompatible with the requirement set in granted claim 1 of a higher limit of 150°C for the higher melting point (it was not disputed by the parties that the melting point is higher than the Vicat softening point). Also, none of the examples of D6 discloses an interlayer comprising a blend of two polypropylene polymers. Therefore, the description of D6 contains no hint to the combination of polypropylene copolymers specified in granted claim 1.

3.5.3 Examples 5-6 and 8 of D6 disclose multilayer films wherein the outermost layers comprise a mixture of two polypropylene copolymers. The respondent argued that those polymers corresponded to components (A) and (B) of granted claim 1 and that it would have been obvious to use said polypropylene blend in the interlayer of example 7. However, the core of the invention of D6 resides in an appropriate combination of inner layer(s) and outermost layers satisfying a specific relationship between their Vicat softening points, that relationship being met by carefully selecting the components making up each layer. Therefore, the skilled person would have had no motivation no deviate from the teaching of each of the specific examples provided in D6, in particular to exchange the matrices of interlayers and outermost layers in different examples. In the Board's opinion, starting from example 7 of D6, the subject-matter of granted claim 1 may not be arrived at by considerations arising from the prior art, either D6 on its own or in combination with other documents, but only by relying on technical similarities between the claimed invention and the features of D6, i.e. with knowledge of the claimed invention (hindsight).

3.5.4 Therefore, it was not obvious to modify the composition of the interlayer of example 7 of D6, by using a blend of copolymers (A) and (B) as defined in granted claim 1, either as a substitute for or as an additional component to the polypropylene copolymer matrix.

3.5.5 The appellant argued that the subject-matter of the granted claims was not inventive over a combination of D6 with any of D2 or D3.

Although D2 deals with the use of Arkon resins (corresponding to component (C) of granted claim 1) in polypropylene compositions for making shrink films (pages 11-16), it fails to disclose a combination of two polypropylene copolymers in general, let alone specifically copolymers according to components (A) and (B) of granted claim 1.

D3 deals with shrink films comprising a basis layer (Basisschicht) sandwiched between two outermost layers (Deckschichten) (claim 1). The basis layer comprises 5-40 wt.% polypropylene homopolymer, 0-30 wt.% hydrocarbon resin having a melting point of 80-125 °C (claim 1; page 3, lines 27-33 and 39-45) and 30-95 wt.% random ethylene/polypropylene-copolymer, preferably having a melting point of 125-145 °C (claim 1; page 3, lines 46-48), thus corresponding to (B) of granted claim 1.

D3 does not disclose a basis layer comprising a combination of two polypropylene copolymers, let alone copolymers according to components (A) and (B) of granted claim 1. Although D3 discloses that the polymers of the outside layers have a lower melting point than the polymer blend of the basis layer (D3: page 4, lines 4-5), it was not shown that D3 disclosed the combination of a lower melting and a higher melting polypropylene random copolymer according to granted claim 1.

Under these circumstances, the subject-matter of granted claim 1 may not be arrived at in an obvious manner by combination of example 7 of D6 with either of D2 or D3.

3.5.6 Departing from the problem-solution approach usually employed to assess the inventive step, the appellant also argued that the subject-matter of granted claim 1 was so broad that it could not solve any problem over its entire scope. In the Board's view, the appellant's conclusion is arrived at without reformulating the problem effectively solved in a less ambitious way than that set out in the patent in suit, and without assessing obviousness of the claimed solution to that reformulated problem in the light of the cited prior art. However, Art. 56 EPC requires that "an invention shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art". Thus, when it comes to the issue of inventive step, obviousness has to be assessed in respect of the prior art, which was not done by the appellant. For that reason, the appellant's objection was not followed.

3.5.7 Under these circumstances, the subject-matter of granted claim 1 is not obvious in the light of the prior art cited and may be acknowledged as being founded on an inventive step.

3.6 The compositions of granted claim 1 being inventive, the films according to granted claims 2-4, which all comprise at least one layer prepared from those compositions, are also inventive.

3.7 Therefore, the appellant's objection of lack of an inventive step based on D6 as closest prior art cannot be followed.

4. Since D7 and D8 are not relevant for the present decision, the question of their admission to the proceedings does not need to be addressed.

5. The respondent/patent proprietor's main request being allowable, there is no need to consider the auxiliary requests.

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

C. Spira M. C. Gordon

Decision electronically authenticated