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**Datasheet for the decision
of 15 March 2007**

Case Number: T 0413/05 - 3.3.03

Application Number: 97943415.6

Publication Number: 0927225

IPC: C08L 23/16

Language of the proceedings: EN

Title of invention:

Vehicle power transmission belts

Patent Proprietor:

ExxonMobil Chemical Patents, Inc.

Opponent:

LANXESS Deutschland GmbH

Mitsui Chemicals Inc.

Headword:

-

Relevant legal provisions:

EPC Art. 54, 56, 83, 100(b)

RPBA Art. 10b(1)

Keyword:

"Sufficiency of disclosure (yes)"

"Novelty (yes)"

"Inventive step (yes)"

Decisions cited:

T 0013/84, T 0332/87, T 0182/89, T 0739/90, T 0793/93,

T 0234/03

Catchword:

-



Case Number: T 0413/05 - 3.3.03

DECISION
of the Technical Board of Appeal 3.3.03
of 15 March 2007

Appellant: Mitsui Chemicals Inc.
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Representative: -

Decision under appeal: Decision of the Opposition Division of the
European Patent Office dated 26 January 2005
and posted 10 February 2005 rejecting the
opposition filed against European patent
No. 0927225 pursuant to Article 102(2) EPC.

Composition of the Board:

Chairman: R. Young
Members: C. Idez
C. Heath

Summary of Facts and Submissions

I. The grant of the European patent No. 0 927 225 in the name of ExxonMobil Chemical Patents Inc. in respect of European patent application No. 97 943 415.6 filed on 19 September 1997 and claiming priority of the US patent application No. 717376 filed on 20 September 1996 was announced on 3 July 2002 (Bulletin 2002/27) on the basis of 7 claims.

Claims 1 and 5 read as follows:

"1. A power transmission belt fabricated from a compound comprising at least one ethylene, α -olefin, vinyl norbornene elastomeric polymer; wherein said compound including said elastomeric polymer has:

- a) a Mooney viscosity (ML 1+4, 100°C), as determined according to ASTM D 1646, of up to 80;
- b) a cure state MH-ML, as determined by an oscillating disk rheometer (ODR) @ 180°C, + 3° arc according to ASTM D 2084, of at least 140 daN·m;
- c) a cure rate measured in the same conditions by the ODR of at least 70 daN m/min.;
- d) a modulus @ 100% elongation, as determined according to ASTM D 412 dieC, of at least 5 MPa measured on pads cured 10 minutes @ 180°C; and
- e) a compression set, as determined according to ASTM D 395 method "B", of up to 25% when measured on button cured 12 minutes @ 180°C and compressed by 25% for 22 hrs @ 150°C.

5. The power transmission belt of Claim 1 wherein said elastomeric polymer includes ethylene in the range of

from 50 to 65 mole percent, and said vinyl norbornene in the range of from 0.2 to 0.8 mole percent, said α -olefin being present in the range of from 35 to 50 mole percent, based on the total moles of the elastomeric polymer, wherein said α -olefin is propylene, and wherein said elastomeric polymer has a branching index in the range of from 0.1 to 0.7; wherein said compound including said polymer has:

- a) a Mooney viscosity (ML 1+4, 100°C), as determined according to ASTM D 1646, of up to 50;
- b) a cure state MH-ML, as determined by an oscillating disk rheometer (ODR) @ 180°C, $\pm 3^\circ$ arc according to ASTM D 2084, of at least 200 daN·m;
- c) a cure rate measured in the same conditions by the ODR of at least 100 daN·m/minute;
- d) a modulus @ 100% elongation, as determined according to ASTM D 412 dieC, of at least 9 MPa; and
- e) a compression set, as determined according to ASTM D 395 method "B", of up to 10% when measured on button cured 12 minutes @ 180°C and compressed by 25% for 22 hrs @ 150°C."

Claims 2 to 4, 6 and 7 were dependent claims.

II. Two notices of Opposition were filed against the patent, as follows:

- (i) by Bayer AG (later Lanxess Deutschland GmbH; Opponent I), on 3 April 2003, on the grounds of lack of inventive step (Article 100(a) EPC, and insufficient disclosure (Article 100(b) EPC); and
- (ii) by Mitsui Chemicals Inc (Opponent II), on 2 April 2003 on the grounds of lack of novelty and lack of

inventive step (Article 100(a) EPC) and insufficient disclosure (Article 100(b) EPC).

Both Opponents requested revocation of the patent as the whole.

The following documents were *inter alia* considered during the opposition proceedings:

D1: WO-A-96 13544;

D2: EP-A-0 275 925;

D7: EP-A-0 765 908;

D8: Extract of Webster's Third New International Dictionary, concerning the definition of the term "belt".

D9: JP-A-59 14497 and English translation thereof;

D10: EP-A-0 094 051;

D12: F. Baldwin et al "The influence of residual olefin structure on EPDM vulcanization", Rubber Chem. and Techn., Vol. 43, 1970, pages 522 to 548;

D14: JP-A-64-54010 and English translation thereof;

D16: EP-A-0 235 381;

D17: EP-A-0 225063;

D21: Experimental Report by Mr. T. Hakuta dated March 25, 2003;

D22: Experimental Report by Mr. H. Murakami et al., dated November 16, 2004;

D23: Experimental Report by Mr. H. Murakami et al., dated November 16, 2004;

D24: Expert opinion by Mr. T. Hakuta dated November 16, 2004; and

D25: Experimental Report by T. Hakuta dated November 16, 2004.

III. By a decision announced orally on 26 January 2005 and issued in writing on 10 February 2005, the Opposition Division rejected the oppositions.

According to the decision, the subject-matter of Claims 1, 2, 4 and 5 met the requirements of Article 83 EPC, since the manufacture of a transmission belt was within the general knowledge of any skilled person, since following the indication of Claim 2, the skilled person would only have a difficulty in precisely determining the effective mole percent of the components of the elastomeric polymer, and since the obtainment of a polymer having the specific branching index referred to in Claim 5 had been disclosed in the examples.

The subject matter of the claims had to be regarded as being novel over documents D7 and D10, since neither of them disclosed directly and unambiguously a power transmission belt made from the specific elastomeric composition as defined in Claim 1.

Concerning inventive step the decision held that document D1 would represent the closest state of the art.

According to the decision, the technical problem was to provide a power transmission belt having improved resistance to deterioration in high temperature aging in air or polar fluids, better low temperature performance and which resisted shrinkage when exposed to heat and polar fluids.

The solution proposed by the patent in suit consisted in fabricating a power transmission belt from a compound comprising at least one ethylene, α -olefin, vinyl norbornene (VNB) elastomeric polymer.

The belts disclosed in D1 were based on elastomeric compositions comprising copolymers of ethylene and propylene (EPM) and EPDM terpolymers including 1,4-

hexadiene, dicyclopentadiene or ethylidene-2-norbornene (ENB) as non-conjugated diene. The use of VNB was neither mentioned nor suggested in D1.

According to the decision, only an arbitrary choice among the different teachings in document D2 or D10 in combination with D1 would be relevant in order to arrive at the objective of the opposed patent. That would however be possible only considering the contents of the state of the art having a hindsight knowledge how the problem could be solved, namely operating an ex post-facto analysis. According to the decision the further documents cited by the Opponents were not relevant when considering inventive step.

IV. Notice of Appeal was filed on 4 April 2005 by the Appellant (Opponent II) with simultaneous payment of the prescribed fee.

V. In the Statement of Grounds of Appeal submitted on 9 June 2005, the Appellant argued essentially as follows:

(i) Concerning novelty:

(i.1) D7 disclosed ethylene, α -olefin, VNB terpolymers.

(i.2) All of the Examples of D7 used VNB as the polyene component.

(i.3) The Appellant had reproduced Examples 5 and 6 of D7 and had demonstrated that the polymers disclosed therein had all of the properties (a) to (e) according to Claim 1 of the patent in suit (cf. also Experimental Reports D21, D22 and D23).

(i.4) D7 further disclosed the use of the polymers as an industrial rubber belts (page 11, penultimate line).

(i.5) The Opposition Division had considered that D7 was not novelty destroying, because the elastomers disclosed in these examples were not formulated into belts.

(i.6) According to the decision T 332/87 of 23 November 1990 (not published in OJ EPO), the whole disclosure of a document must be taken into account when assessing novelty.

(i.7) The passage at page 11 which disclosed the possible applications for the rubbers of D7 was clearly generally applicable to all of the polymers of the invention according to D7.

(i.8) Consequently, D7 directly and unambiguously disclosed to the skilled person a belt having the composition and properties of the rubbers of Examples 5 and 6.

(i.9) Claim 1 was a product claim and should, accordingly, encompass any product having the specified properties.

(i.10) Any industrial rubber belt formulated from an ethylene, α -olefin, VNB rubber as disclosed in D7 would be fully capable of transmitting power.

(i.11) In any case, as shown by document D8, only two potential uses for an industrial rubber belt existed

(i.e. for transmitting power and motion, and for conveying materials.

(i.12) The Patentee's selection of one of these two uses clearly was not a novel selection.

(i.13) There was no multiple selection in formulating the polymer into an industrial rubber belt and in using that belt for the transmission of power. Any industrial rubber belt according to D7 would clearly be capable of transmitting of power and motion.

(i.14) The Opposition Division had considered that D10 disclosed polymers comprising ethylene, an α -olefin and VNB and further that D10 disclosed polymers having all of properties (a) to (e) of Claim 1 (see paragraphs 2 and 4 of Section 4 of the decision under appeal).

(i.15) D10 also disclosed industrial rubber belts produced from these polymers at page 10, line 25.

(i.16) No multiple selection was made by selecting an industrial rubber belt from the possible applications disclosed in D10, and by selecting a power transmission belt.

(i.17) It was also quite clear that the passage of D10 at page 10, line 14 onwards related to any of the copolymer rubbers of the invention.

(i.18) It was therefore appropriate to combine this passage with the specific example given in Example 5.

(ii) Concerning inventive step:

(ii.1) D1 related to the same problems as the patent in suit (belts made of a polymer having good processability and heat stability; cf. page 3, lines 20 to 21; page 3, line 16; cf also discussion of the prior art at pages 2 and 3).

(ii.2) The difference between D1 and the patent was that D1 used an EPDM including 1,4-hexadiene, dicyclopentadiene or ENB as the non conjugated diene, whilst the use of VNB was not disclosed.

(ii.3) The Patentee had alleged that VNB provided better processability as well as improved cure properties.

(ii.4) Some of the other advantages mentioned in the patent in suit (heat ageing properties, low temperature properties, reduced shrinkage, improved compression set were not achieved as a result of using VNB as the diene.

(ii.5) The only problem which could be said to be addressed compared with D1 was therefore an improvement in processability and cure properties.

(ii.6) In order to solve this problem, the skilled person would turn to D10 since D10 precisely addressed the same problem which the skilled person was attempting to solve over D1.

(ii.7) In combining D1 with D10, the skilled person would learn that using VNB as the diene component of

the copolymer rubber provided good processing properties and good cure properties using either sulphur or peroxide curatives (page 7, lines 30 to 31).

(ii.8) Furthermore, the skilled person would be aware from D1 itself (page 3, lines 1 to 4) that peroxide curing had an advantage in terms of compression set and improved adhesion when used in the context of belts.

(ii.9) The Appellant had provided data to confirm that the copolymers described in D10, when cured with peroxide curing agents, had all of the properties (a) to (e) required by Claim 1.

(ii.10) Thus, the subject-matter of Claim 1 lacked inventive step based on D1 combined with D10.

(ii.11) The skilled person seeking improvements to the polymers of D1 would also consider D12.

(ii.12) D12 directly addressed the issue of cure state which the skilled person was seeking to improve starting from D1.

(ii.13) D12 taught that VNB provided a much higher cure state (or cross-linking density) than ENB even at low peroxide concentrations.

(ii.14) Thus, the skilled person seeking improved cure properties compared with the teaching of D1 would be motivated to employ VNB as the diene in the EPDM polymers of D1.

(ii.15) The patent itself (cf. paragraph [0035]) indicated that polymers having properties (a) to (d) could easily be produced using standard catalysts and processing conditions.

(ii.16) Thus, once the skilled person had been taught that VNB should be employed, parameters (a) to (d) would automatically follow.

(ii.17) With respect to property (e), the compression set was not improved by using VNB rather than ENB as the diene component (cf. comparison of the Examples set out in Table 3 of the patent itself).

(ii.18) Furthermore the skilled person was already aware from D1 that good compression set properties were obtained by using peroxide cures.

(ii.19) Claim 1 was therefore obvious from a combination of D1 with D12.

(ii.20) The skilled person would also consider combining D1 with D17.

(ii.21) D17 taught the skilled person that rubbers employing dicyclopentadiene or ENB as the copolymer component did not have satisfactory processability and that this problem could be solved by the use of VNB as the diene component.

(ii.22) The patent therefore lacked inventive step over the combination of D1 with D17.

(ii.23) D2 or D16 could also be considered as appropriate starting points for the present invention.

(ii.24) In the case of both D2 and D16, the preferred diene components of the rubber did not include VNB.

(ii.25) Thus, the difference between D2 or D16 and the subject matter of Claim 1 of the patent would be the essential use of VNB as the diene component.

(ii.26) The skilled person seeking an improvement in cure properties and/or processing properties of an industrial rubber belt would look to D10, D12 or D17, each of which taught that improvement was provided by the use of VNB as the diene component.

(iii) Concerning the scope of the claims:

(iii.1) The scope of the claims was too broad and was not coterminous with the alleged invention.

(iii.2) The advantageous results which were said to be provided by the invention could only be achieved using an organic peroxide curative as shown by Experimental Report D25.

(iii.3) The claims should therefore be restricted to the specific peroxide curative system employed in the Examples of the patent.

(iv) Concerning sufficiency:

(iv.1) Claim 1 of the patent included five different specific parameters, whilst Claim 5 included a further parameter (branching index).

(iv.2) However, there were no particular directions in the patent as to how polymers having these parameters should be produced.

(iv.3) The skilled person must therefore conclude from the teaching of the patent that standard techniques, such as those described in paragraph [0035] of the patent, should be used to produce the polymers of Examples 1 and 2.

(iv.4) Thus, the teaching of the patent would be that elastomeric polymers made of ethylene, propylene and VNB, and produced using standard processing techniques and standard catalyst systems, inherently would have each of properties (a) to (e) of Claim 1.

(iv.5) The skilled person certainly must expect to be able to achieve properties (a) to (e) of Claim 1 by making alterations which would already be well known to him in the art.

(iv.6) If this were correct, then properties (a) to (e) could not in themselves provide an inventive step. Inventive step would rather be linked to the use of VNB as the diene component.

(iv.7) If it were not correct that properties (a) to (e) could be achieved by the skilled person using

standard techniques, then the patent would be insufficient.

VI. In its letter dated 10 February 2006, the Respondent argued essentially as follows:

(i) Concerning novelty:

(i.1) Document D7 was concerned with a rubber composition comprising a copolymer rubber of ethylene, an alpha-olefin and a non-conjugated polyene copolymer represented by a general formula which also included VNB.

(i.2) While the rubber composition might be used for producing e.g. "belts", the requirements for power transmission belts were unique for those kinds of belts and did not apply to other belts, such as industrial conveyor belts.

(i.3) Since Document D7 did not clearly and unambiguously disclose power transmission belts, the subject-matter of the claim was novel in view of document D7.

(i.4) Furthermore, Document D7 did not disclose features (a) to (e) of Claim 1 of the patent-in-suit.

(i.5) The tests provided by Appellant (cf. D21) were not suitable to prove that the compounds disclosed in Examples 5 and 6 cf D7 would inevitably fulfil the requirements in Claim 1 of the patent-in-suit.

(i.6) Reference was also made in this connection to the decision T 793/93 of 27 September 1995 (not published in OJ EPO).

(i.7) Document D10 related to an ethylene-alpha-olefin-propylene random copolymer rubber comprising ethylene, an alpha olefin having 3 to 10 carbon atoms and a polyene. The polyene was a mixture of ENB and VNB.

(i.8) Although D10 indicated that the vulcanized rubber could be used in industrial parts, such as "belts", there was no clear and unambiguous disclosure of a "power belt".

(i.9) Furthermore, D10 also did not disclose features (a) to (e) of Claim 1 of the patent-in-suit.

(i.10) The tests provided by Appellant (cf. D21) were not suitable to prove that the compounds disclosed in Example 5 and Comparative Example 3 of D10 would inevitably fulfil the requirements of Claim 1 of the patent-in-suit.

(ii) Concerning inventive step:

(ii.1) The closest prior art was document D1 since it was the only document relating specifically to power transmission belts.

(ii.2) The problem to be solved vis-à-vis D1 was to provide a power transmission belt having improved resistance to deterioration in high temperature aging in air or polar fluids, better low temperature performance and resisting shrinkage when exposed to

heat and polar fluids (See patent in suit paragraph [0017]).

(ii.3) The comparison between the products of Examples 5 and 6 and those of 7 to 9 showed that this problem was solved by the products according to Claim 1 of the patent in suit.

(ii.4) This solution of the specific problem set out in the patent-in-suit was not rendered obvious by document D1 alone since it neither disclosed the use of VNB nor features (a) to (e) of Claim 1 of the patent-in-suit.

(ii.5) Documents D10, D12 and D17 were not concerned with the production of power transmission belts.

(ii.6) Thus, the present claims were based on an inventive step.

(iii) Concerning insufficiency

(iii.1) The manufacture of power transmission belts belonged to the ambit of the general knowledge of any skilled person in that field.

(iii.2) Reference was also made to the submissions made in the letter dated 25 February 2004 in that respect.

(iii.3) The Appellant had not been able to discharge his burden of proving that the invention was not disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

- VII. With its letter dated 14 February 2007, the Respondent filed an auxiliary request consisting of two claims. Claims 1 and 2 thereof were said to correspond to Claims 5 and 6 as granted.
- The Respondent also argued that none of the results presented in Experimental Report 2 by the Appellant met all the requirements set out in Claim 1 of the auxiliary request simultaneously, and that consequently the subject-matter of the auxiliary request was novel and inventive over D7 and D10.
- VIII. In its letter dated 15 February 2007, the Appellant argued essentially as follows:
- (i) Concerning novelty:
 - (i.1) The Patentee had indicated that the required properties that make belts suitable for power transmission were inherent in the belts according to Claim 1 of the patent in suit.
 - (i.2) Since the compounds of Examples 5 and 6 of D7 had all the features of the compound referred to in Claim 1, it followed therefore, that a belt made from the compound of Example 5 or Example 6 of D7 would should also possess the properties required to render it suitable for power transmission.
 - (i.3) In order to distinguish the belts claimed in the present patent from the belts disclosed in D7 by the alleged fact that the intended use was different, the burden of proof was on the Patentee to show without

ambiguity that the belts of D7 would not be suitable for the use defined in the patent in suit.

(i.4) Reference was made in that respect to the decision T 234/03 of 18 May 2006 (not published in OJ EP0).

(i.5) The formulations used in D21 were identical to those used in D7. Thus, Examples 5 and 6 of D7 both disclosed compounds which had properties (a) to (e) referred to in Claim 1 of the patent in suit.

(i.6) The argument of the Patentee that Examples 5 and 6 did not themselves mention "belts" was not pertinent, since D7 (cf. page 11, line 58) disclosed that such compounds could be favourably used for industrial rubber parts, such as belts.

(i.7) Thus, D7 disclosed directly and unambiguously disclosed a power transmission belt according to Claim 1 of the patent in suit.

(i.8) Concerning document D10, reference was made to the submissions made in the Notice of Opposition (paragraph bridging pages 7 and 8 thereof).

(ii) Concerning inventive step:

(ii.1) In view of the comparison between the products of Examples 5 and 6 and the product of Examples 7 to 9, there was no evidence to support that the claimed power transmission belt had an improved resistance to deterioration in high temperature aging, a better low temperature performance, or an improved resistance to

shrinkage, compared with belts not containing VNB such as those in D1.

(ii.2) There was also no evidence of any surprising improvement in processability.

(ii.3) Consequently, starting from D1, the problem to be solved in view of D1 would be to provide an improvement of the cure properties of the material used in the belt.

(ii.4) Since the problem to be solved was merely to improve the cure properties of the material used to make the belt, the skilled person would have consulted D10, since D10 taught how to improve the cure rate.

(ii.5) Similarly, the skilled person seeking to improve cure properties would have been motivated to consult D12, because D12 directly addressed the issue of cure state.

(ii.6) Consequently, the subject-matter of Claim 1 was obvious over a combination of D1 and D10, or over a combination of D1 and D12.

(ii.7) If D10 would be considered as the closest state of the art, it would have been obvious to combine (A) the polymer of Example 5 of D10 with (B) the disclosure, in the same document, that the polymer could be used to produce an industrial rubber belt.

(ii.8) It could also be considered that D10 disclosed an industrial rubber belt made of a compound containing an ethylene, alpha-olefin, VNB polymer and having all

of the properties (a) to (e) of Claim 1 of the patent in suit.

(ii.9) The problem would be hence to find a use for which the EPDM industrial rubber belt was suitable.

(ii.10) The skilled person would have known that an industrial rubber belt was extremely likely to have the property of transmitting power.

(iii) Concerning the scope of the Claims 1 and 2:

(iii.1) The scope of Claims 1 and 2 was too broad because the problem to be solved was not solved across the whole scope of these claims.

(iii.2) The patent indicated that the heat aging properties were linked to the use of a reduced amount of diene (page 9, line 12 in paragraph [0040] of the patent). The low temperature performance properties were also linked to diene content.

(iii.3) It was unlikely therefore that the allegedly improved properties would be observed when using high diene contents of 2, 3, 4 or 5 mol%.

(iii.4) Claim 1 did not even specify the amounts of ethylene, alpha-olefin and VNB in the elastomeric polymer.

(iii.5) Elastomeric polymers with high amounts of VNB (e.g. above 10, 30 or 50 mol %), and/or those with almost no VNB at all, would not be expected to show the

allegedly improved properties of the claimed power transmission belts.

(iii.6) Furthermore, none of the Examples showed all of the benefits alleged by the Patentee.

(iii.7) It could not therefore be considered that the objective technical problem has been solved over the whole scope of the claims.

(iv) Concerning insufficiency:

(iv.1) Examples 1 and 2, which were the only examples provided of the production of ethylene, propylene, VNB elastomeric polymers, merely indicated that the polymers should be produced using a certain catalyst system.

(iv.2) No further directions were given to the skilled person as to how to produce these polymers.

(iv.3) The reference to Japanese laid open patent applications JP 151758 and JP 210169 was incomplete and the skilled person would not therefore have been able to locate these documents.

(iv.4) It would not have been possible to make all the compounds defined in Claim 2 because the limits of the ranges for ethylene, alpha-olefin and VNB contained total greater than 100 wt%.

IX. Oral proceedings took place before the Board on 15 March 2007.

At the oral proceedings the discussion essentially focussed (α) on the question of sufficiency of disclosure of the subject-matter of Claims 5 and 1 as granted, (β) on the question of novelty of the subject-matter of Claim 1 in view of D7 and D10 and (γ) on the question of inventive step in view of D1 taken as closest prior art and its combination with documents D2, D10, D12, D16 or D17.

The arguments presented by the Parties in these respects may be summarized as follows:

(i) Concerning point (α):

(i.1) By the Appellant:

(i.1.1) The elastomer compositions according to Examples 5 and 6 of the patent in suit included ethylene, α -olefin and VNB in the amounts defined by Claim 5.

(i.1.2) The compositions of Example 5 did not however fulfil the requirements in terms of the features (a), (b), and (e) set out in Claim 5 and the composition of Example 6 did not meet the requirements in terms of the features (a), (b), (c) and (e) set out in Claim 5.

(i.1.3) The reproduction of Examples 5 and 6 of the patent in suit carried out by the Appellant (D25; Table 1) further confirmed that the compositions of these examples did not fulfil all the requirements set out in Claim 5 for the features (a) to (e).

(i.1.4) Furthermore the reproduction of Example 5 of D7 showed that the use of an elastomer having all the characteristics in term of monomer composition and branching index defined in Claim 5 (cf. D21, Table 1, Exp. I-1) did not allow to obtain a compound having all the features (a) to (e) as required by Claim 5 (cf. D21, Table 4, Exp. I-1)). The same considerations applied in view of the reproduction of Comparative Example 3 of D10 (cf. D21, Tables 5, and 6, Exp. II-1).

(i.1.5) There was hence no indication in the patent in suit as how to obtain a compound according to Claim 5.

(i.1.6) Since the subject-matter of Claim 5 was part of the subject-matter of Claim 1, it thus followed that the subject-matter of Claim 1 could not be reproduced over the whole area claimed, since the subject-matter of Claim 5 represented an area of insufficiency.

(i.2) By the Respondent:

(i.2.1) This line of argument based on the non-reproducibility of the subject-matter of Claim 5 had never been presented before the oral proceedings.

(i.2.2) In its Notice of Opposition (cf. page 9, lines 12 to 15) the Appellant had submitted that either the compounds produced using ethylene, alpha olefin, VNB polymers must either inherently have the properties set out in Claim 1 or it would be well within the capabilities of a skilled chemist to make the adjustments required.

(i.2.3) This would hence represent a change of case.

(i.2.4) Furthermore, the values of the Mooney viscosity feature (a), of the cure state (feature (b)) indicated for Example 5 in the patent in suit were very close to the values required for these features in Claim 5.

(i.2.5) The reproduction of Example 6 of the patent in suit by the Appellant (cf. D25; Tables 1 and 2) showed that all the features (a) to (d) defined in Claim 5 were met.

(i.2.6) In any case the burden of the proof was on the Appellant to show that the claimed invention could not be reproduced.

(ii) Concerning point (β):

(ii.1) While essentially relying on the arguments presented in the written phase of the appeal, the Appellant made additional submissions which may be summarized as follows:

(ii.1.1) Document D7 on page 11, lines 56 to 59 disclosed the use of the elastomer compositions disclosed therein as industrial belts.

(ii.1.2) Even if document D8 would appear to mention two types of belts i.e. power belts and conveyor belts, these belts would inevitably transmit a small amount of power.

(ii.1.3) The iodine values indicated in the examples 5 and 6 of D7 were directly linked to the amount of VNB in the elastomer.

(ii.1.4) The reproduction of Examples 5 and 6 of D7 (cf. D21; Table 4) had been carried out according to processes described in document D9 which was mentioned in D7 (page 7, lines 7 to 8) as an example of processes for preparing the elastomer compounds of D7.

(ii.1.5) Consequently, the combination of Examples 5 and 6 of D7 with the teaching on page 11 concerning the use of the compositions of D7 as industrial belts would be novelty destroying for the subject-matter of Claim 1.

(ii.2) By the Respondent:

(ii.2.1) The non conjugated polyene which might be used in the elastomer compositions of D7 was defined by the general formula set out on page 3, lines 41 to 54.

(ii.2.2) On page 6, lines 2 to 3 several examples of non conjugated polyenes were given.

(ii.2.3) One had to make a first selection among the polyene components mentioned in D7 in order to come to VNB.

(ii.2.4) In the paragraph "Effect of the invention" on page 11, D7 referred to three different compositions having different effects, i.e. the compositions disclosed from line 39 to line 42, those disclosed from line 43 to line 50, and those disclosed from line 51 to line 55.

(ii.2.5) It was not clear to which groups of compositions the applications mentioned on lines 56 to 58 on page 11 of D7 indeed referred.

(ii.2.6) Document D8 defined to two different types of belts. There was no reference in D7 to power transmission belts.

(ii.2.7) Thus in order to come to the claimed subject-matter, one would have to select VNB as polyene, to select specific examples 5 and 6 of D7 among the examples of D7, to select the application as industrial belts among the many application mentioned on lines 56 to 58 on page 11 of D7 for the specific compositions of Examples 5 and 6, and to select among industrial belts power transmission belts.

(ii.2.8) Furthermore, the reproduction of Examples 5 and 6 of D7 had not been carried out according to the processes disclosed in D9, since as indicated in the letter dated 23 November 2004 of the Appellant (page 5, first paragraph), the process disclosed in the examples of D9 must be adjusted to the use of VNB as polyene.

(ii.2.9) In view of document D10, the Respondent declared that the elastomeric polymer referred to in Claim 1 of the patent in suit was a terpolymer having only the three monomers indicated therein.

(ii.2.10) Consequently, D10 in which a mixture of VNB with ENB was used as polyene component could not be novelty destroying for the subject-matter of Claim 1.

(iii) Concerning point (γ):

(iii.1) By the Appellant:

(iii.1.1) Document D1 would represent the closest state of the art.

(iii.1.2) Since the subject-matter of Claim 5 was not workable, it could not solve any problem over D1.

(iii.1.3) Since the subject-matter of Claim 1 included the subject-matter of Claim 5, it was hence evident that any problem which could be elaborated starting from D1 would not be solved over the whole scope of Claim 1.

(iii.1.4) Consequently, the subject-matter of Claim 1 lacked inventive step.

(iii.1.5) Even if one would consider that the technical problem starting from D1 was to provide alternative power transmission belts, it would have been obvious to use VNB as the polyene component in the EPDM compositions for transmission belts mentioned in D1, since document D2, D10, D16 and D17 clearly mentioned the use of VNB in elastomeric compounds for making belts.

(iii.1.6) Furthermore, D12 disclosed the advantage of using VNB instead of ENB in elastomer compositions, since it led to a better crosslinking (cf. Tables VII and VIII of D12).

(iii.1.7) In that respect, the alleged improvement of modulus and elongation properties (cf. patent in suit Table III) were to be expected in view of the higher crosslinking efficiency of VNB.

(iii.2) By the Respondent:

(iii.2.1) D1 should be considered as the closest state of the art.

(iii.2.2) In view of the comparison the compositions of Examples 5 and 6 and the compositions of Examples 7 to 9 made in the patent in suit, the technical problem starting from D1 might be seen in the provisions of power transmissions having an improved modulus, an improved elongation, better low temperature flexibility, with acceptable aging properties, and which could be easily processed (Cf. patent in suit Tables II and III, page 11, paragraph [0060]).

(iii.2.3) Documents D2, D10, D16, D17 were not concerned with power transmission belts.

(iii.2.4) D10 taught to use a mixture of VNB with ENB, and D17 was concerned with chlorinated rubber.

(iii.2.5) Document D12 was not concerned at all with belts. Furthermore, according to D12, 5-methylene-2-norbornene (MNB) and not VNB would be the most effective polyene in terms of crosslinking efficiency (cf. D12, page 528; last paragraph).

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

The Respondent requested that the appeal be dismissed, or, in the alternative that the decision under appeal be set aside and the patent be maintained on the basis of the auxiliary request comprising claims 1 and 2 as submitted with the letter dated 14 February 2007.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Sufficiency of disclosure*

- 2.1 As indicated above in Section IX the Appellant challenged at the oral proceedings the reproducibility of the invention claimed in dependent Claim 5, and, consequently, the possibility to carry out the invention corresponding to the subject-matter of Claim 1 on the whole scope of that claim, which included that of Claim 5.

- 2.2 Although this argument has never been presented before in the course of the appeal proceedings by the Appellant, and hence could be considered as amounting to an amendment of the Appellant's case in the sense of Article 10b(1) of the Rules of Procedure of the Boards of Appeal, the Board deems it appropriate to admit it and consider it in view of the direct implications of this argument on the assessment of novelty and inventive step of the claimed subject-matter.

2.3 According to the Appellant, the compositions of the elastomeric polymer used in Examples 5 and 6 of the patent in suit, although fulfilling the requirements in terms of ethylene content, α -olefin content and VNB content set out in Claim 5 do not meet all the requirements in terms of the features (a) to (e) also set out in Claim 5. Since, according to the Appellant, there is no guidance in the patent in suit as how to come to a composition of an elastomeric polymer meeting all the requirements (a) to e) according to Claim 5, the subject-matter of Claim 5 would not be workable, and would, in the Appellant's view, represent an area of non reproducibility within the subject-matter of Claim 1 on which it depends. In other words, the invention defined in Claim 1 hence could not be reproduced over the whole area claimed.

2.4 In this connection, the Board however notes that in its Notice of Opposition (page 9, lines 12 to 15) the Appellant had submitted that compounds produced using ethylene, α -olefin, VNB polymers must either inherently have the properties set out in Claim 1, or that it would be well within the capabilities of a skilled chemist to make the adjustments required.

2.5 While it is, in the Board's view, highly questionable as to whether any compound produced using ethylene, α -olefin, VNB polymers would inevitably exhibit the properties (a) to (e) set out in Claim 1, the Board, however, sees no reason not to concur with the Appellant that the skilled person using common general knowledge would nevertheless be able to make the adjustments necessary for example in terms of process features, of compositional features or curing system to

- prepare elastomeric compounds meeting the requirements set out in Claim 1 for the features (a) to (e).
- 2.6 This view is further supported not only by the fact that the compositions of Examples 5 and 6 of the patent in suit meet all the requirements set out in Claim 1 for the features (a) to (e) (cf. patent in suit, Tables I and III), but furthermore by the fact that the Appellant has had no difficulties in obtaining elastomeric compounds meeting all the requirements (a) to (e) set out in Claim 1 using process conditions within those disclosed in paragraph [0037] of the patent in suit (cf. D25, page 2, Experimental Work; Reproduction of Examples 5 and 6 of the patent in suit; Tables 1 and 2).
- 2.7 Consequently, the Board can only come to the conclusion that there is no undue burden for a skilled person using the instructions given in the patent in suit to obtain elastomeric polymers of ethylene, α -olefin and VNB meeting the requirements set out in Claim 1 for the features (a) to (e).
- 2.8 Nevertheless, it has been argued by the Appellant that the non reproducibility of the subject-matter of dependent Claim 5 would generate an area of non reproducibility within the subject-matter of Claim 1.
- 2.9 Since the requirements in terms of features (a), (b), (c), (d) and (e) set out in Claim 5 are more stringent than the ones set out in Claim 1, it thus follows from the considerations made in paragraph 2.7 above, that the question of reproducibility of the subject-matter of Claim 5 would boil down to the question as to

whether or not the skilled person would be able to carry out without undue burden the adjustments needed in the preparation of the elastomeric compounds in order to fill the gap between the properties required in terms of features (a) to (e) respectively in Claims 5 and 1, taking also into account that, in contrast to Claim 1, Claim 5 already provides guidance as to the monomer contents of the elastomeric polymer.

- 2.10 In that respect, while it is correct, as submitted by the Appellant, that the composition of Example 6 according to the patent in suit does not meet the requirements in terms of features (a), (b), (c) and (e) according to Claim 5, it is noted by the Board that the elastomeric compound issued from the reproduction of Example 6 in the framework of the process disclosed in paragraph [0037] by the Appellant meets all the requirements except for feature (e) set out in Claim 5 (cf. D25, Table 2), so that there can be no doubt that the gap between the requirements in terms of features (a), (b), (c) and (d) between Claim 5 and Claim 1 can be filled with adjustments within the normal practice of the skilled artisan and without undue burden.
- 2.11 Since, as submitted by the Appellant in its Notice of Opposition (page 9, lines 6 to 7) it is known that the achievement of an improved compression set (i.e. the feature (e)) is linked to an improved cure state of the elastomeric polymer as are the achievements of improved properties (b) to (d) (cf. Notice of Opposition page 9, lines 3 to 4; cf. also patent in suit paragraph [0059], lines 18 to 20), the additional and concomitant fulfilling of the requirements in terms of feature (e) according to Claim 5 would at most, in the Board's view,

require routine experiments in order to determine the appropriate cure state of the elastomeric compound (cf. also paragraph [0040] of the patent in suit; lines 10 to 12), but it would in no way amount to an undue burden.

2.12 Consequently, the question set out in paragraph 2.9 above must be positively answered. It hence follows that the argument of the Appellant concerning the lack of reproducibility of the subject-matter of Claim 1 due to an alleged non workability of the subject-matter of Claim 5 must fail.

2.13 Nor could, in the Board's view, the reproducibility of the subject-matter of Claim 5 be challenged by the further argument of the Appellant that the patent in suit provides no direction as how to obtain the branching index specified in that claim.

2.14 This is because the patent in suit in its paragraph [0039] discloses that elastomeric polymers with a branching index of **0.2** to 0.7 can be obtained while using the process disclosed in paragraph [0037], and because no evidence has been provided by the Appellant, which has the onus of the proof (cf. T 182/89, OJ EPO, 1991, 391), that the adjustments necessary to obtain of a branching index of between **0.1** to 0.7 would hence amount to an undue burden for the skilled person.

2.15 Nor could also the arguments presented by the Appellant in view of the incomplete application numbers of the Japanese application referred to in paragraph [0035] of the patent in suit (cf. point VIII. (iv.3) above), and

in view of granted Claim 2 (cf. point VIII (iv.4) above) challenge the reproducibility of the claimed invention.

- 2.15.1 Independently of the fact that it is doubtful to the Board as to whether the documents referred as JP 151758 and JP 210169 in paragraph [0035] of the patent in suit could not, as submitted by the Appellant, be located by the skilled person in view of their incomplete application numbers, since document D14 cited by the Appellant itself with its Notice of Opposition would appear to correspond to the JP 210169 referred to in this paragraph [0035] (cf. also decision T 737/90 of 9 September 1993; not published in OJ EPO), this is because, even if the skilled person would have been impaired to rely on the disclosure of these Japanese applications, it still remains that the patent in suit discloses in its paragraph [0037] in a very detailed manner how elastomeric polymers to be used in the claimed invention could be obtained.
- 2.15.2 Concerning Claim 2, this is because, although the total amounts of monomers indicated in that claim might formally exceed 100%, the skilled person, when considering this claim, would, in the Board's view, rule out interpretations which did not make technical sense and would take into account the whole disclosure of the patent (cf. patent in suit, page 6, paragraph [0030], lines 38 to 43) according to which the amount of ethylene could be in the range 50 to 90 mole percent, the amount of VNB could be in the range 0.2 to 5.0 mole percent, and the balance of the elastomeric polymer could be made by the α -olefin. The skilled person would hence arrive at an interpretation which is technically

sensible and reproducible by the process disclosed in paragraph [0039] of the patent in suit.

2.16 Thus, for the reasons mentioned above, the Board comes to the conclusion that it has not been shown to its satisfaction that there is a deficiency in the patent in suit contrary to Article 83 EPC. Consequently the ground of opposition under Article 100(b) EPC cannot succeed.

3. *Novelty*

3.1 Lack of novelty of the subject-matter of Claim 1 has been alleged by the Appellant in view of documents D7 and D10.

3.2 In that respect, the Board notes that the line of argument of the Appellant is essentially based on the alleged reproduction of Examples 5 and 6 of D7 and of Example 5 and Comparative Example 3 of D10, and on the conclusions drawn from these reproductions that the elastomeric compounds disclosed in these examples fulfilled all the requirements in terms of features (a) to (e) set out in granted Claim 1 of the patent in suit.

3.3 In this connection, it is however immediately evident that neither D7 nor D10 contains an explicit disclosure as to whether the elastomeric compounds of the respective examples relied on by the Appellant exhibit the features (a) to (e) as required by Claim 1 of the patent in suit. It is further evident, that these examples do not expressly refer to the manufacture of power transmission belts.

3.4 According to decision T 793/93 (not published in OJ EPO), "concerning the issue of novelty, Article 54(2) EPC defines a state of the art as comprising 'everything made available to the public by means of written or oral description, by use or in any other way'. The term 'available' clearly goes beyond literal or diagrammatical description, and implies a communication, express or implicit, of technical information by other means as well. In the case where a prior art document fails explicitly to disclose something falling within a claim, availability in the sense of Article 54 may still be established if the inevitable outcome of what is literally or explicitly disclosed falls within the ambit of that claim" (Reasons 2.1). As further stated in decision T 793/93 "in deciding what is or is not the inevitable outcome of an express literal disclosure in a particular prior art document, a standard of proof much stricter than the balance of probability, to wit 'beyond all reasonable doubt', needs to be applied. It follows that if any reasonable doubt exists as to what might or might not be the result of carrying out the literal disclosure and instructions of a prior art document, in other words if there remains a 'grey area', then the case on anticipation based on such a document must fail" (Reasons 2.1).

3.5 In that context, documents D7 and D10 could only be considered as novelty destroying documents for the subject-matter of Claim 1 provided it could be established beyond any reasonable doubt

(i) that the elastomeric compositions disclosed in these examples of these documents relied on by the Appellant exhibited all the features (a) to (e), and

(ii) that the elastomeric compositions disclosed in these specific examples were to be used in the manufacture of power transmission belts.

3.5.1 Concerning point (i) as indicated above D7 and D10 do not mention the features (a) to (e) of the elastomeric compositions of the examples relied on by the Appellant.

3.5.2 Consequently, when trying to establish that the compositions of Example 5 and 6 of D7 and the compositions of Example 5 and of comparative Example 3 of D10 exhibit this combination of properties (a) to (e) set out in Claim 1 of the patent in suit, the Appellant has relied on a reworking of these examples.

3.5.3 This line of argument based on the reworking of these examples would however presuppose that this reworking is an exact repetition of the corresponding examples of D7 and D10, since as indicated above in paragraph 2.4 the obtaining of the properties (a) to (e) set out in Claim 1 of the patent as granted cannot be considered as the inevitable result of its compositional structure but may be dependent on adjustments for example in terms of process features or curing system carried out by the skilled person in order to get these properties.

3.5.4 In this connection, it is, however, noted by the Board, that D7 does not disclose the exact process conditions for the preparation of the elastomeric compositions of its Examples 5 and 6. It thus follows that the lack of

information on these operative features evidently precludes an exact duplication of these examples of D7, i.e. in other words it would remain a "grey zone" as to whether the conditions used in the repetitions inevitably corresponded to the actual conditions used in these examples of D7.

3.5.5 This deficiency cannot, in the Board's view, be repaired by the mention at page 7, lines 7 to 8 of D7 that the elastomer polymer according to D7 could be "prepared by processes described in, **for example** (emphasis by the Board) Japanese Patent Publication No. 14497/1984" (i.e. document D9), or by the fact that the reworking of Examples 6 and 7 of D7 in D22 and D23 has been carried following fundamental polymerization conditions set out in D9 (cf. D22 and D23, paragraphs 5.1), since the process of D9 is only an example of processes which may be used for preparing copolymers of D7 and since it cannot be deduced clearly and unambiguously that that the Examples 5 and 6 have effectively been obtained using the fundamental polymerization conditions applied in the reworking according to D22 and D23. This vitiates *ab initio* the reworking of Examples 5 and 6 of D7 made by the Appellant, which hence cannot provide any clue as to whether the compositions of Examples 5 and 6 of D7 meet the requirements in terms of features (a) to (e) set out in Claim 1.

3.5.6 According to document D10, the elastomer compositions according to Example 5 and Comparative Example 3 have been prepared by compounding 100 parts by weight of the respective ethylene/propylene/VNB/ENB copolymers with 5 parts of zinc oxide, 1 part of stearic acid, 60 parts

of HAF carbon black, 80 parts of calcium bicarbonate, 40 parts of paraffinic oil, 0.75 parts of 2-mercaptobenzothiazole, 0.75 parts of dibenzothiazyl disulfide, 0.5 parts of tetramethylthiuram disulfide, and 1 part of sulfur (all by weight) by roll milling on 8 inch open rolls at a roll temperature of 60°C for 30 minutes (page 14, lines 11 to 19; page 15, lines 13 to 19).

3.5.7 According to the reworking of Examples 5 and Example 3 described in document D21 (paragraph II-3), the elastomer compositions have, however, been prepared by using 7 parts of dicumyl peroxide and 2 parts by weight of ethylene dimethacrylate instead of 0.75 parts of 2-mercaptobenzothiazole, 0.75 parts of dibenzothiazyl disulfide, 0.5 parts of tetramethylthiuram disulfide, and 1 part of sulfur. It is evident that the sulfur based curing system used in the examples of D10 has been replaced by a peroxide based curing system and an acrylic polymerization activator in D21.

3.5.8 It thus follows that the reworking of Example 5 and of Comparative Example 3 of D10 carried out in D21 by the Appellant cannot be considered as a true reworking of these examples of D10. Since there can be no doubt that the modification of the curing system would influence the cured state of the elastomer compositions, the reworking of these examples cannot provide any clue as to whether the compositions of Example 5 and Comparative Example 3 of D10 meet the requirements in terms of features (a) to (e) set out in Claim 1.

3.6 Consequently, the tests presented by the Appellant in documents D21, D22 and D23 as reworking of Examples 5

and 6 of D7 and of Example 5 and Comparative Example 3 of D10 cannot demonstrate beyond any reasonable doubt that the elastomeric compounds of these examples indeed exhibited the properties (a), (b), (c), (d), and (e) set out in Claim 1. Since for this reason (cf. paragraph 3.5 above) D7 and D10 cannot be considered as novelty destroying for the subject-matter of Claim 1, there is no need for the Board either to examine whether the compositions disclosed in the examples of these documents relied on by the Appellant were to be used as power transmission belts or to deal with the considerations made by the Appellant in that respect in view of the decision T 332/87 in its Statement of Grounds of Appeal and of decision T 234/03 in its letter dated 15 February 2007.

3.7 Consequently, the subject-matter of Claim 1, and by the same token that of dependent Claims 2 to 7 must be regarded as novel over the cited prior art (Article 54 EPC).

4. *Closest state of the art, the technical problem*

4.1 The patent in suit relates to a power transmission belt made of a compound comprising at least one ethylene, α -olefin VNB elastomeric polymer.

4.2 Power transmission belts made from ethylene, propylene and a non conjugated diene such as ENB are disclosed in document D1 (cf. D1; page 3, lines 20 to 32; page 4, lines 25 to 32), which the Board, in accordance with the Parties and the Opposition Division, considers as the closest state of the art.

- 4.3 According to the patent in suit (cf. paragraph [0016] thereof), the aim of the latter would appear to be to provide power transmission belts which have improved resistance to high temperature aging in hostile environments, maintain low temperature flexibility, do not substantially shrink when exposed to heat and/or polar fluids, which have improved compound processability as measured by viscosity at high shear and injection temperatures, and improved cure rates as measured by time to cure after a mold is filled, and improved physical and compression set properties and keep the original attributes of good adhesion to textile and cord without dramatically increasing the cost of the power transmission belt.
- 4.4 Nevertheless, at the oral proceedings, the Patent Proprietor, in view of the comparison made between the compositions according to Examples 5 and 6 of the patent in suit illustrating compositions of the claimed invention and the compositions of Examples 7 to 9 illustrating compositions within the disclosure of D1, defined a less demanding technical problem starting from D1 as closest state of the art, which consisted in the provision of power transmission belts exhibiting better tensile properties, better lower temperature flexibility and improved processability, while maintaining good aging properties, good shrinkage properties and good compression properties.
- 4.5 In that respect, the Board observes that the compositions of Example 5 and 6 exhibit a better processability than those of Examples 7 to 9 (cf. Table II of the patent in suit, cf also Table II of the application as originally filed), a higher tensile

modulus and a lower elongation at break than those of Examples 7 to 9 (cf. Table III of the patent in suit, cf. also Table III of the application as originally filed) and a lower Tg than those than those of Examples 7 to 9 (cf. paragraph [0060] of the patent in suit, cf. also page 22, lines 10 to 21 of the application as originally filed), while the aging properties, the shrink properties and the compression remain at an acceptable level.

- 4.6 Consequently, the Board comes to the conclusion that the reformulation of the technical problem made by the Respondent can be allowed, since it can be clearly inferred by the skilled reader from the experimental evidence in the application as originally filed (Article 123(2) EPC) (cf. also (T 13/84, OJ EPO 86, 253)).
- 4.7 The solution to this technical problem proposed by the patent in suit is to use a compound comprising at least one ethylene, α -olefin, VNB elastomeric polymer having the properties (a) to (e) set out in Claim 1 for the manufacture of power transmission belts.
- 4.8 The Board is also satisfied (cf. also paragraph 4.5 above) that the claimed measures provide an effective solution to the technical problem.
- 4.9 This conclusion would not altered by the arguments of the Appellant (cf. points V (iii) and VIII (iii) above) that the subject-matter of Claim 1 is too broad, and that the technical problem would not be solved on the whole scope claimed.

4.10 This is because, although it is true, as submitted by the Appellant, that Claim 1 does not explicitly define either the contents of ethylene, α -olefin and VNB in the elastomeric polymer or the curing system, it is however evident that the combined requirements in terms of features (a), (b), (c), (d) and (e) amount to implicit constraints on the compositional structure of the elastomeric rubber and on its curing system.

4.11 This has for its consequence that the experimental data presented by the Appellant in document D25 (Table 3) concerning the use of a sulfur crosslinking system are not relevant for showing that the claimed subject-matter is too broad and should be restricted to compositions cured with peroxides, since the obtained elastomeric compound of Table 3 of D25 does not fulfil the requirements set out in Claim 1 for the features (b) to (e), and hence does not fall under the scope of Claim 1. The same conclusion also applies to the argument of the Appellant that elastomers containing high amounts of VNB (e.g. 10, 30 or 50%) would not solve the technical problem, since no data have been submitted by the Appellant, which had opposed the patent in suit and which has the onus of proof in this respect, which would support any doubts that a compound based on such elastomeric compound would meet the requirements in terms of features (a) to (e) but would not solve the technical problem.

4.12 Nor could the conclusion drawn in paragraph 4.8 above be challenged by the further argument of the Appellant that the non-workability of the subject-matter of Claim 5 implies that the subject-matter of Claim 5 does not solve any problem, and that hence the technical

problem could not evidently be solved over the whole scope of Claim 1, which inevitably encompass the subject-matter of Claim 5, since as stated above in paragraph 2.11, the invention defined by the subject-matter of Claim 5 can be carried out by the skilled person.

5. *Inventive step*

5.1 It remains to be decided whether the claimed subject-matter was obvious to a person skilled in the art having regard to the relevant prior art relied on by the Appellant, i.e. D1, D2, D10, D12, D16 and D17.

5.2 According to D1, its aim is to provide elastomeric compositions which can be readily processed, and with adequate mechanical properties in dynamic applications and acceptable adhesion to textile reinforcement materials and in particular to provide improved belting comprising as its main belt body portion an ethylene-alpha-olefin elastomer exhibiting improved mechanical properties and excellent adhesion to textile reinforcement materials (page 3, line 20 to page 4, line 4). Although document D1 discloses that EPDM elastomeric compounds can be used in the manufacture of such belting and mentions that any appropriate non conjugate diene may be used in the EPDM rubber (cf. page 8, lines 29 to 32), it is firstly clear that D1 is totally silent on the use of VNB as non-conjugated diene for these applications. Since D1 also does not make even the slightest reference to the combination of properties (a) to (e) mentioned in Claim 1 of the patent in suit, it is hence evident that D1 alone could not suggest the solution proposed in the patent in suit.

5.3 Document D2 is concerned with vulcanizable rubber compositions comprising an ethylene/propylene/non-conjugated polyene copolymer and exhibiting in particular excellent in properties in terms of elasticity, tensile strength, heat resistance and oil resistance (page 3, lines 9 to 13). While it is true that D2 mentions that VNB may be used as non-conjugated diene, it is firstly noted by the Board that D2 clearly presents dicyclopentadiene and ENB as the preferred dienes (page 3, lines 44 to 46). It is also noted by the Board, that D2, although referring to heat resistant belts (page 7, lines 16 to 17) does not specifically refer to power transmission belts. Taking further into account that D2 is totally silent on the combination of features (a) to (e) set out in Claim 1 of the patent in suit, the Board can only come to the conclusion that D2 cannot provide any hint to the solution of the technical problem.

5.4 Document D10 is concerned with an ethylene-alpha-olefin-polyene random copolymer rubber comprising ethylene, alpha-olefin having 3 to 10 carbon atoms, and polyene, wherein (A) the molar ratio of the ethylene/alpha-olefin is 55/45 to 95/5, (B) the polyene is a mixture of ENB and 5-vinyl-2-norbornene VNB in a molar ratio of ENB/VNB of 1/1 to 20/1, (C) the iodine value of the copolymer rubber is 2 to 40, (D) the intrinsic viscosity of the copolymer rubber is 1.0 to 6.0 dl/g measured in decalin at 135°C, and (E) the ratio of the intrinsic viscosity to an intrinsic viscosity of a linear ethylene-propylene random copolymer having an ethylene content of 70 mole % and having the same weight-average molecular weight

determined by a light-scattering method as that of the copolymer rubber is 0.2 to 0.9 (page 2, line 26 to page 3, line 7).

5.5 While it is true that D10 mentions that these compositions have excellent extrudability (i.e. processability) and fast cure rate, as well as high tensile strength of the vulcanizate (page 2, lines 22 to 25), it is however evident that these properties could only be obtained according to the teaching of D10 provided the ratio ENB/VNB in the copolymer is within 1/1 to 20/1 (page 4, lines 8 to 14). It thus follows that the skilled person looking for elastomeric compositions to be used in the manufacture of power transmission belts and exhibiting a good processability and improved tensile properties would have no motivation to disregard the feature (i.e. the ratio of ENB/VNB) presented as essential in D10 in order to get these properties. Consequently, at least for this reason, D10 cannot provide any hint to the solution proposed in the patent in suit.

5.6 Document D12 relates to the influence of the diene component on the vulcanization of EPDM rubbers. While it can be deduced from D12 that with peroxide curing VNB and MNB are the most effective dienes in terms of crosslinking efficiency (cf. page 528; last paragraph, lines 1 to 5 thereof), it is also clear that MNB is better than VNB and ENB in that respect (cf. Tables VII and VIII; swelling ratio of EPDM containing ENB, VNB or MNB).

5.7 Since, as admitted in the patent in suit (cf. paragraph [0059], lines 18 to 24), improvement of tensile

strength and elongation at break is correlated with a higher degree of crosslinking, the skilled person looking for rubber compositions leading to an improvement of these properties over compositions based on EPDM rubbers containing ENB as diene component such as those disclosed in D1 and aware of the teaching of D12, would have, in the Board's view, chosen the most promising alternative, i.e. using an EPDM containing MNB, so that, at least for this reason, it is at least questionable whether D12 could provide a hint to the solution proposed in the patent in suit.

5.8 In any case, even if the skilled person aware of the teaching of D12, would have considered the use of VNB as diene component in view of its better crosslinking efficiency over ENB, the Board can only state that D12 is totally silent on the respective processability of EPDM rubber containing either VNB or ENB and on the manufacture of power transmission belts. Taking further into account that it could not, in the Board's view, have been expected that a higher crosslinking efficiency would result in a better lower temperature flexibility, the Board comes to the conclusion that the combination of D1 with the teaching of D12 could not suggest the solution proposed by Claim 1 of the patent in suit.

5.9 D16 relates to ethylene- α -olefin copolymer rubbers containing a specifically low molecular weight portion and exhibiting a characteristic molecular weight distribution curve. More precisely D16 discloses ethylene- α -olefin copolymer rubbers which are characterized in that said copolymer rubbers comprise ethylene and an α -olefin having 3 to 6 carbon atoms, or

ethylene, an α -olefin having 3 to 6 carbon atoms and a non conjugated polyene, the molar ratio of ethylene/ α -olefin is 40/60 to 95/5, the non-conjugated polyene content being 0 to 25% by weight, the intrinsic viscosity measured in xylene at 70 C being 0.8.to 5.0 dl/g, and a ratio weight average molecular weight/number average molecular weight measured by GPC being 4 to 20, and the peak characteristic numbers of the molecular weight distribution curve I , $P(i)$, $A(i)$ and $A(M)$ are in the range of $A(M) > A(i)$, $I \geq 2$ and $1.5 \leq A(1) \leq 3.0$, respectively (page 3, lines 1 to 20).

- 5.10 According to D16, these elastomer compositions exhibit excellent processability and good physical properties in particular a high tensile strength (page 3, lines 21 to 27).
- 5.11 While D16 effectively mentions the use of VNB as diene in the elastomer compositions (page 4, lines 16 to 17) it specifies, however, that ENB belongs as dicyclopentadiene and 1,4 hexadiene to the preferred dienes components (page 4, lines 20 to 22), so that there would have been no motivation in D16 for the skilled person to consider the use of rubber compositions containing VNB for solving the technical problem.
- 5.12 Furthermore, the Board notes that D16 is not only totally silent on the combination of the features (a) to (e) set out in Claim 1 of the patent in suit, but essentially relies on other characteristics of the elastomeric compound (i.e. molecular weight distribution) in order to obtain a good processability and good mechanical properties.

- 5.13 Consequently, for all these reasons, D16 cannot provide any hint to the solution proposed by Claim 1 of the patent in suit.
- 5.14 D17 is, in the Board's view, even less relevant, since it relates to the chlorination of ethylene/ α -olefin/non-conjugated diene copolymer rubber containing VNB as the non-conjugated diene. According to D17, the resulting chlorinated rubber has markedly improved moldability (i.e. processability) over rubbers obtained by chlorinating copolymers rubbers containing another non-conjugated diene such as dicyclopentadiene or ENB (page 2, lines 9 to 18).
- 5.15 While it can hence be deduced from D17 that chlorinated rubbers containing VNB would have a better processability than chlorinated rubbers based on ENB, this could not suggest to the skilled person that non chlorinated rubber containing VNB would have a better processability than non chlorinated rubber containing ENB, let alone better lower temperature flexibility.
- 5.16 Consequently D17 is of no help for solving the technical problem.
- 5.17 In view of the above, the Board comes to the conclusion that the subject-matter of Claim 1 must be regarded as involving an inventive step in view of the prior art relied on by the Appellant. The same conclusion applies to the subject-matter of dependent Claims 2 to 7 (Article 56 EPC).

6. It thus follows that the main request of the Respondent is allowable. Since the main request is allowable there is no need for the Board to deal with the auxiliary request of the Respondent.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

E. Görgmaier

R. Young