

**Internal distribution code:**

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

**Datasheet for the decision  
of 23 March 2007**

**Case Number:** T 0238/04 - 3.3.03

**Application Number:** 96202872.6

**Publication Number:** 0768325

**IPC:** C08G 18/08

**Language of the proceedings:** EN

**Title of invention:**

Polyol blends

**Patent Proprietor:**

SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ B.V.

**Opponents:**

Huntsman International LLC  
BASF Aktiengesellschaft  
Bayer MaterialScience AG  
THE DOW CHEMICAL COMPANY

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 52(1), 56, 84, 100(a), 123(2), 123(3)  
EPC R. 57a

**Keyword:**

"Clarity of amended claims - main request (no)"  
"Amendments - added subject-matter - fourth and sixth  
auxiliary requests (yes)"  
"Inventive step - general technical teaching (seventh  
auxiliary request)"

**Decisions cited:**

T 0331/87, T 0582/91

**Catchword:**

-



Case Number: T 0238/04 - 3.3.03

**D E C I S I O N**  
**of the Technical Board of Appeal 3.3.03**  
**of 23 March 2007**

**Appellant:** SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ  
(Patent Proprietor) B.V.  
Carel van Bylandtlaan 30  
NL-2596 HR Den Haag (NL)

**Representative:** -

**Respondents:** Huntsman International LLC  
(Opponent 1) 500 Huntsman Way  
Salt Lake City, UT 84108 (US)

**Representative:** Baken, Philippus Johannes L. H.  
HUNTSMAN (EUROPE) BVBA  
Intellectual Property Department  
Everslaan 45  
B-3078 Everberg (BE)

(Opponent 2) BASF Aktiengesellschaft  
D-67056 Ludwigshafen (DE)

**Representative:** -

(Opponent 3) Bayer MaterialScience AG  
Patents and Licensing  
D-51368 Leverkusen (DE)

**Representative:** -

(Opponent 4)

THE DOW CHEMICAL COMPANY  
2030 Dow Center, Abbott Road  
Midland, MI 48640 (US)

**Representative:**

Marsman, Hermanus Antonius M.  
Vereenigde  
Postbus 87930  
NL-2508 DH Den Haag (NL)

**Decision under appeal:**

**Decision of the Opposition Division of the  
European Patent Office posted 30 December 2003  
revoking European patent No. 0768325 pursuant  
to Article 102(1) EPC.**

**Composition of the Board:**

**Chairman:** R. Young  
**Members:** A. Däweritz  
E. Dufrasne

## Summary of Facts and Submissions

I. The grant of European patent No. 0 768 325 in respect of European patent application No. 96 202 872.6, filed on 15 October 1996 and claiming the priority of 16 October 1995 of an earlier application filed in the European Patent Office (95 307 467), was announced on 30 May 2001 (Bulletin 2001/22). The patent was granted with seven claims, reading as follows:

1. Method of preparing a polyol blend ready for transportation, which comprises withdrawing from their respective storage tanks a plurality of streams of different base polyols, continuously and simultaneously feeding said streams of base polyols in a predetermined ratio into a blender, and continuously discharging the resulting polyol blend into a transporter tank.
2. Method as claimed in claim 1, wherein the base polyols fed to the blender are selected from up to 6 different base polyols.
3. Method as claimed in claim 1 or claim 2, wherein the different base polyols are selected to encompass a wide range of hydroxy values and functionalities.
4. Method as claimed in claim 3, wherein the different base polyols encompass hydroxyl values in the range of from 200 to 700; functionalities in the range of from 2.0 to 5.5; and include at least one aromatic polyol.
5. Method as claimed in claim 4, wherein the different base polyols comprise:- at least two with functionality below 3.5, one having an OH value above 500 and another having an OH value less than 300; at least one having a functionality of at least 4.5 and an OH value in the range of from 200 to 600; at least one having an aromatic content of at least 15%; and at least one having a nitrogen content of at least 2.5% m/m.
6. Method as claimed in any one of claims 1 to 5, wherein a stream of aliphatic diol or triol is fed into the blender simultaneously with the streams of base polyols.
7. Method as claimed in claim 6, wherein the aliphatic diol or triol is glycerol.

In this decision, any reference to passages in the patent in suit as granted will be given underlined in squared brackets, eg [Claim 1]. References in underlined italics concern passages in the application as originally filed, eg page 1, lines 5 to 10.

II. On 26, 27, 28 and 28 February 2002, respectively, four Notices of Opposition were filed, in each of which revocation of the patent in its entirety was requested. More particularly, each of Opponents 1 to 3 referred to Articles 100(a), 52(1) and 56 EPC and asserted that the subject-matter of the patent in suit did not involve an inventive step, Opponent 4 based its opposition on Article 100(a) EPC, in general. More particularly, it

raised objections of lack of novelty and lack of inventive step under Articles 54 and 56 EPC, respectively. In order to support their respective objections under Article 100(a) EPC, the opponents cited altogether a total of 25 documents, including (numbered as in the decision under appeal):

- D1: GB-A-1 039 663;
- D2: US-A-3 486 013;
- D3: US-A-3 606 903;
- D5: EP-A-0 368 270;
- D8: Polyurethane, Kunststoff-Handbuch 7, 3<sup>rd</sup> edit., Carl Hanser Verlag München, 1993, page 268;
- D10: EP-A-0 097 458;
- D11: Dr.-Ing. U. Knipp, "Herstellung von Großteilen aus Polyurethan-Schaumstoffen", Zechner & Hüthig Verlag Speyer, 1974, pages 5, 28 and 29;
- D12: The ICI-Polyurethanes-Book, George Woods, 2<sup>nd</sup> edition, ICI Polyurethanes and John Wiley & Sons Chichester, 1990, pages 14 and 39;
- D15: DE-A-43 09 691;
- D16: US-A-5 196 476;
- D21: The ICI-Polyurethanes-Book, George Woods, ICI Polyurethanes and John Wiley & Sons Chichester, 1988, pages 1 to 24; and
- D22: US-A-5 013 766.

III. With a letter dated 30 September 2003, the Patent Proprietor, who had already requested that oral proceedings be arranged if the Opposition Division was of the opinion that the patent in suit could not be maintained (letter dated 2 August 2002, page 2), additionally filed four auxiliary requests.

IV. The oral proceedings were held before the Opposition Division on 2 December 2003.

V. In the decision announced at the end of the oral proceedings and issued in writing on 30 December 2003, the Opposition Division revoked the patent.

(1) Novelty was acknowledged, because, none of the documents cited in this respect contained a joint disclosure of a simple continuous process for blending different polyols in order to prepare a polyol composition in the manner defined in [Claim 1]. Thus, specific reference was made to D16 (No. 3a of the reasons in the decision under appeal):

**In particular, document D16 does not unambiguously disclose a continuous method for blending polyols. D16 refers to the manufacture of polymer polyol compositions and preformed stabilizers used therefor. It is indicated in D16 that polyol blends may be used (cf. D16, column 19, lines 64-65) to prepare preformed dispersion stabilizers which are pumped into a reactor continuously after going through an in-line mixer, where they form a crude reaction product which is subsequently collected in a vessel (cf. D16, column 23, lines 32 to 46). Although said vessel could be compared with the transporting tank claimed in claim 1 of the patent-in-suit, document D16 does not aim at blending polyols explicitly for transportation purposes. Therefore, it is not anticipatory for the subject-matter of claim 1.**

(2) The Opposition Division considered D11 as the closest piece of prior art, which disclosed blends of polyols (page 29, paragraph 6.2). In comparison with this prior art, the technical problem to be solved was seen in the provision of a continuous process for the production of polyol blends useful for the production of polyurethanes.

(3) Furthermore, the skilled person had been aware from D10 that basically two ways of carrying out the blending operation had been available, either batch

blending or in-line blending (D10: page 1, lines 10 to 30). Moreover, he had been aware of the facts that the in-line blender would be a suitable means for continuously mixing liquid organic materials (D10: Claim 1, Figure 5) and that according to D16 an in-line mixer could be used for mixing a polyol with other ingredients including a further polyol (D16: column 23, lines 34 to 37, Example 3).

Therefore, it would have been a routine operation, which did not imply any inventive activity, to evaluate the in-line blending technology for mixing polyols, because there had been only one choice if a continuous process had been desired (No. 3b of the reasons).

(4) Consequently, it was decided that the subject-matter of Claim 1 of the Main Request did not involve an inventive step, and the Main Request was refused.

(5) These arguments were also held valid for Auxiliary Request 1, wherein the feature of [Claim 3] had been incorporated in Claim 1, because each polyol known from the cited documents had a specific hydroxy/hydroxyl value/number (which will be referred to herein below as "OHV") and a specific functionality which fell within the scope of the additional feature of Claim 1. Consequently, this Auxiliary Request was also refused for lack of inventive step (No. 4c of the reasons).

(6) The further Auxiliary Requests were found not to comply with Article 123(2) EPC. Thus, the feature "encompass hydroxy values in the range of from 200 to 700 and functionalities in the range of from 2.0 to 5.5" (in Auxiliary Requests 3 and 4) did not include

all the features of [Claim 4] (section I, above), which had additionally contained the feature to the mandatory presence of at least one aromatic polyol, as confirmed by [page 2] (item 5a of the reasons).

(7) Furthermore, the Opposition Division stated that even if the Auxiliary Requests 2 to 4 had been considered to fulfil the requirements of Article 123(2) EPC, they could not have been considered as inventive for the same reasons as those given for the Main Request (item 7).

VI. On 12 February 2004, a Notice of Appeal was filed against this decision by the Patent Proprietor/Appellant, who requested that the decision under appeal be set aside and the patent in suit be maintained. The prescribed fee was paid on the same date.

(1) In the Statement of Grounds of Appeal received on 7 April 2004, the Appellant argued that the assessment of inventive step in the decision under appeal was based on a combination of features from several prior art documents whilst there had been no hint of teaching to combine these features in this way.

With regard to D11, the Appellant argued that the claims were directed to "a very specific method of in-line blending namely one in which only a limited number of polyols are being used and in which the resulting blend is continuously discharged in a transporter tank", whereas D11 related to mixtures of polyols, and polyol mixtures could be obtained in many different ways.



The Appellant continued that there would be no need for storing the blend produced according to the patent in suit, which could rather be sent directly and continuously to a transporter tank, whilst, hitherto, there had apparently been a prejudice against the use of in-line blending of polyols.

Furthermore, there would be no teaching or hint in either of D11 and D10 to combine these documents. Although someone skilled in the art could have used in-line blending for preparing polyol blends, there was, in the Appellant's view, no reason why the skilled person would have done so in the expectation of some improvement or advantage.

D16 related to the preparation of polymer/polyol compositions. Any combination of a selected feature of D16 with a selected feature of D10 and/or D11 could only be done by applying hindsight.

(2) Moreover, the Appellant replaced Auxiliary Request 4 by a new version and disputed the reasons given in the decision under appeal for the refusal of the auxiliary requests.

VII. The arguments of the Appellant were disputed by Respondents/Opponents 1, 2 and 4, who requested that the appeal be dismissed, the decision under appeal be confirmed and the patent in suit be revoked in its entirety, respectively.

(1) Thus, Respondent/Opponent 1, in its letter dated 13 July 2004, referred, in particular, to continuous mixing processes for liquids other than polyols in D1

and D2 and put emphasis on the argument that neither document was restricted to certain liquids. Furthermore, D3 would have related to the process of Claim 1 with only the exception, that in D3 the mixture had not been fed to a transporter tank but to a mixing nozzle. Moreover, D5 would make it clear that, in accordance with D11 (chapter 6.2, lines 9 to 12), the blending of polyols could be carried out by the polyol producer (D5: page 2, column 1, lines 29 to 31). When the in-line blending of the polyols had been disconnected from the polyurethane production, this had, of course, required transportation. The skilled person would immediately have checked, how this had been done for other liquids, and would have found the solutions offered in D1 and D2.

According to Respondent 1, the same arguments were also valid for Auxiliary Request 1.

(2) Respondent/Opponent 2 referred in its letter, dated 23 July 2004, to its previous arguments and disputed that there had been a prejudice to use an in-line mixer for mixing polyols. It would be self-evident to the skilled person that the process of D10 could be used for polyols.

(3) In a letter dated 18 October 2004, Respondent/Opponent 4 reiterated its previous arguments concerning its objections of lack of novelty on the basis of D16, supported the decision under appeal as regards the assessment of inventive step, referred additionally to its previous submissions in this respect, and also supported the reasons given in the decision under appeal for the refusal of the auxiliary requests, in particular with regard to Article 123(2) EPC. In

summary, Respondent 4 took the view that the subject-matter of all the requests, including the new Auxiliary Request 4, did not meet the requirements of novelty and/or inventive step and that Auxiliary Requests 2 and 3 violated the provisions of Article 123(2) EPC.

VIII. With a letter dated and received on 23 February 2007, the Appellant withdrew all its pending requests and replaced them by a new Main Request and new first to sixth Auxiliary Requests. Moreover, it filed an experimental report describing the preparation of rigid and flexible polyurethane foams from different polyol mixtures and cited a further document:

D26: "Advances in POLYURETHANE TECHNOLOGY", J.M. Buist and H. Gudgeon (Edit.), MacLaren and Sons Ltd., London 1968, pages 190 and 191.

Furthermore, the Appellant formulated its view of the technical problem to be solved by the claimed subject-matter (page 1, last paragraph) as follows:

It is submitted that for the enclosed main request, the objective technical problem should be seen in preparing rigid polyols in a way which enables a polyol producer to prepare a significant number of different rigid polyol grades from only a limited number of base polyols. Such method of blending a limited number of base polyols should, however, still lead to polyol blends having properties which match those of commercial rigid polyol grades which are not made by blending base polyols. Further, said method should be performed in such a way that there is no longer a need to store blended polyol grades in addition to base polyol grades.

IX. Oral proceedings were held before the Board on 23 March 2007.

(1) At the beginning of the oral proceedings, the Chairman summarised the relevant facts as appearing from the file and asked the parties for their requests.

(2) In reply to this question, the Appellant, on the one hand, maintained its requests as on file except for

the first and second Auxiliary Requests (section VIII, above), both of which were withdrawn. The Respondents, on the other hand, requested that the appeal be dismissed, but did not object to the admission of the remaining requests of the Appellant to the proceedings.

Then, in the further course of the hearing, the third and fifth Auxiliary Requests (sections VIII, above, IX(8) and (11), below) were also withdrawn by the Appellant.

(3) The Main and fourth and sixth Auxiliary Requests, on which this decision is partly based, concerned the following subject-matter:

- Claim 1 of the Main Request read as follows:

"1. Method of preparing rigid polyols ready for transportation, wherein a polyol blend is prepared by withdrawing from their respective storage tanks a plurality of streams of different base polyols, continuously and simultaneously feeding said streams of base polyols in a predetermined ratio into a blender, and continuously discharging the resulting polyol blend into a transporter tank."

Each of the further Claims 2 to 7 appendant thereto was identical to its granted version (section I, above).

- In Claim 1 of the fourth Auxiliary Request, the following features had been added at the end of [Claim 1] (cf. section I, above): "wherein the different base polyols encompass hydroxyl values

in the range of from 200 to 700 and functionalities in the range of from 2.0 to 5.5".

Moreover, [Claim 3] had been deleted and the further claims had been renumbered and adapted to these amendments. Thus, new Claim 3, derived from [Claim 4] (section I above), read as follows:

"3. Method as claimed in claim 1 or 2, wherein the different base polyols include at least one aromatic polyol."

- Claim 1 of the sixth Auxiliary Request differed from [Claim 1] by the following additional features added to the end of the claim: "wherein the different base polyols encompass hydroxyl values in the range of from 200 to 700; functionalities in the range of from 2.0 to 5.5; and include at least one aromatic polyol".

The further Claims 2 to 5 corresponded to [Claims 2 and 5 to 7] (section I, above), respectively.

(4) As a guidance for the further discussion of the case, the parties were given the following preliminary, provisional remarks to the wording of the claims:

"Arguments in support of a claim can be convincing only, insofar as they rely on mandatory features of this claim. Claim 1 of each of the requests relates to a method of preparing a blend of polyols ready for transportation.

This means, however, that the use of the product of the claimed method, or in other words, any step or measure beyond the step of discharging the polyol blend to a transporter tank, which has been the last feature in all of these claims, has no bearing on the claimed method.

Consequently, arguments referring to the use of the blends cannot apparently be convincing with regard to the claims at issue."

(5) The discussion about the substantive issues started with those concerning the Main Request, to which the Respondents, who argued essentially along the same lines, objected under Articles 84 and 123(2) EPC.

In particular, the Respondents criticised the term "rigid polyol" as being vague and as having no definite, but only a relative meaning. More particularly, the term, of which a clear definition could not be found anywhere in the patent in suit, had only been mentioned once in paragraph [0001]. Furthermore, the Respondents pointed out that neither at the stage of grant nor later - until the Appellant's letter of 23 February 2007 - had any significance or importance been attributed at all to this term with regard to the subject-matter of the patent in suit.

Paragraph [0001] mentioned above had, according to the Respondents, addressed essentially the facts that a substantial number of different polyols having a range of characteristics such as functionality, OHV, nitrogen content, aromaticity and viscosity, was manufactured by polyol producers for the manufacture of polyurethane

articles in general, and that these polyols had to be stored separately and thus required investment in a large number of storage vessels. The Respondents quoted from paragraph [0001] that, although the manufacturing operation could be simplified by producing a limited number of base polyol grades, from which a larger number of commercial grades could be prepared, the general problems related to their storage had not been overcome, but were, according to paragraph [0002], to be solved according to the patent in suit, in order to meet all the different requirements of the polyol customers for their polyurethane process and end products.

With regard to the sentence referring to "so-called rigid polyols which are used in the manufacture of rigid polyurethane foam ...", emphasis was put by the Respondents on the word "particularly" in that sentence, which, in their opinion, demonstrated that the above statements about the "number" and "characteristics" in paragraph [0001] referred to polyols in general [page 2, lines 4 to 9 and, in particular, lines 6 and 7].

Furthermore, the Respondents put emphasis on the fact that the remainder of the specification was completely silent about the types of polyols to be processed in accordance with the patent in suit. Even paragraph [0007], referring to the base polyols, which could preferably be used in the claimed method, did not provide any link between these particular base polyols and "rigid foams", nor did it mention, let alone define the term "rigid polyol". Nor did it provide any information about the preparation of such polyols.

In summary, the Respondents considered Claim 1 neither to be clear, nor to have a basis in the application.

(6) By contrast, the Appellant argued that the term "rigid polyol" was often used in this art, and that the skilled person was well-aware of its meaning. In support of this argument, the Appellant referred to D26, in particular to Table 6.1 and Figure 6.1. which were to show that it would be common general knowledge that, for the manufacture of rigid foams, rigid polyols having functionalities in the range of from 3 to 8 and molecular weights of between 300 and 1000 were used. The OHVs could be calculated from these values according to the formula which had been referred to by the Opponents during the opposition proceedings (cf. the letter of Opponent 4, dated 30 September 2003, page 4). These limitations should, however, not be taken in a purely literal sense, the important requirement would be that the polyol *mixture*, but not necessarily each base polyol, met the requirements of the rigid polyol, such as, in particular, an OHV of at least 200. This would be known by the skilled person. By contrast, for flexible foams, "flexible polyols" would be used having very high molecular weights, functionalities of from 2 to 3 and OHVs of below 180.

Moreover, the Appellant argued that the whole of paragraphs [0001] and [0002] was to be read together and that it would be evident therefrom that the storage problem concerned specifically rigid polyols, which like those as used in all the examples in the patent in suit complied with the above definition in D26. By contrast, paragraph [0007] had, according to the Appellant, nothing to do with the Main Request.



(7) One of the Respondents agreed that the term "rigid polyol" was often used, however without having a clear meaning ("unscharfe Bedeutung"). In order to illustrate this issue, the Respondents additionally referred to D22 disclosing a process for the preparation of rigid polyurethane foams which included the use of "one or more polyols having an hydroxyl functionality of from 2 to 3 and an hydroxyl number of from about 25 to about 115" (column 2, lines 10 to 15). This statement was, however, disputed by the Appellant with reference to the first part of the definition of that process additionally requiring the presence of "one or more polyols having an hydroxyl functionality of from 3 to 8 and an hydroxyl number of from about 300 to about 800" (D22: column 2, lines 7 to 9). In any case the minimum limit of the OHV of rigid polyols would be 180.

Finally, in the discussion about this point, reference was additionally made to D8, chapter 6.1.1, disclosing a different OHV range of from 350 to 650 for polyols usually used in the manufacture of rigid polyurethane foams. According to the Appellant, the range lay, however, within the broadest range disclosed in D26.

One of the Respondents additionally argued with respect to the latter document, that the calculation of the OHV from the functionalities and the molecular weights referred to by the Appellant (ie based on combinations of the functionality values 3 and 8 and molecular weights of 300 and 1000, respectively; section IX(6), above) resulted in still further limits of the OHV range, extending from 168 to 1500.

(8) At this stage of the proceedings, the parties did not wish to comment on the above issues any further and the debate about the Main Request was, therefore, closed in this respect. Moreover, the Appellant indicated that it would withdraw its third and fifth Auxiliary Requests, if the Main Request was refused on the grounds discussed before.

(9) The next point addressed in the hearing concerned the same "formal" aspects concerning the fourth Auxiliary Request (section IX(3), above). In particular, the Respondents argued that Claim 1 of this Auxiliary Request did not comply with Article 123(2) EPC. To this end, they referred not only to the decision under appeal (cf. section V(6), above), but also to the three characteristics of the base polyols as defined in [Claim 4] (section I, above) and in paragraph [0007], ie the OHV and functionality ranges and the presence of at least one aromatic polyol, and they argued that the original text of the application did not provide a basis for disconnecting these features from one another. However, no mention was made in Claim 1 of an aromatic polyol. Furthermore, they pointed out that [Claim 4] had been appendant to [Claim 3] (section I, above), wherein it had been required that the different base polyols were to encompass a wide range of OHVs and functionalities. However, contrary to this requirement, Claim 1 would rather include the possibility of combining different polyols, whereby each of them might have eg a OHV of 200 or slightly above and at the same time a functionality of 2.0 or slightly above. Moreover, reference was made to the deletion of [Claim 3].

(10) The Appellant disputed the above arguments of the Respondents and also the reasons in the decision under appeal in this respect, because the aromaticity of a polyol would have nothing to do with its OHV and its functionality, both of which would relate to the OH-groups, whilst aromaticity would not. This would even be confirmed by the first sentence of paragraph [0007], which did not refer to aromaticity but only to OHV and functionality. Moreover, the second sentence of this passage mentioning all three properties of preferred base polyols would not relate to one single embodiment. This could also be seen from the examples in the patent in suit, none of which included the use of an aromatic base polyol.

The Appellant additionally relied on two decisions, T 331/87 (OJ EPO 1991, 22) and T 582/91 of 11 November 1992 (not published in OJ EPO), to support its argument that in the present case (i) the combination of [Claim 1] and of two of the three features from [Claim 4] would be allowable, since the aromaticity of the base polyols would not be indispensable for the solution of the technical problem.

(11) After deliberation, the Board gave the decisions on the Main Request and on the fourth Auxiliary Request, both of which were refused. At this point, the Appellant confirmed that the third and fifth Auxiliary Requests were withdrawn (cf. section IX(8), above).

(12) With regard to the sixth Auxiliary Request (section IX(3), above), the Respondents referred again to the deletion of [Claim 3] to which [Claim 4], now incorporated in Claim 1, had been appendant. The

Appellant, however, took the view that it would not be necessary additionally to put the features of [Claim 3] into Claim 1, because they would not limit the subject-matter of Claim 1.

This argument was disputed by the Respondents along the lines of their previous arguments concerning this point in the context of the fourth Auxiliary Request (section IX(9), above).

(13) In reply to this objection, the Appellant stated that Claim 1 of the sixth Auxiliary Request was based on a combination of [Claim 1] with the second sentence of paragraph [0007], rather than on the combination of [Claims 1 and 4]. More particularly, it stated that the first and second sentences of paragraph [0007] should be read separately and independently from one another.

(14) This view was criticised by the Respondents with a hint to the statements of the Appellant concerning the interpretation of paragraphs [0001] and [0002] (section IX(6), above, second paragraph). They further concluded from the Appellant's above statements that the new Claim 1 did not correspond to the purely reworded subject-matter of [Claim 4], but to [Claim 1] including significant amendments from the description. Such amendments would, however, be open to objections under Article 84 EPC, as established in many decisions.

On this basis, they then raised the question of the meaning of the term "encompass" in the claim. More particularly, it was not clear to them whether it meant that only one or all of the base polyols would have to

fulfil at least one or all the requirements specified in the second sentence of paragraph [0007].

(15) The answer of the Appellant to this item, that all polyols referred to in Claim 1 had the OHV and functionality within the defined ranges and included aromatic base polyols, threw, however, in the Respondents' opinion, further doubts on the meaning of "encompass", because glycerol, which was evidently a polyol and was used in the examples of the patent in suit, would have a OHV of about 1800.

Hence, the Appellant supplemented its previous definition of polyols (see the last paragraph) by stating that the base polyols were not to be construed as encompassing the diols and triols, such as glycerol, as referred to in Claims 4 and 5 of this request/[Claims 6 and 7] (sections IX(3) and I, above).

(16) The hearing was interrupted for deliberation of the Board. When it was resumed, the Appellant submitted a further, the seventh Auxiliary Request. Thereafter, the decision on the sixth Auxiliary Request was given, ie it was refused.

In the seventh Auxiliary Request, which contained only three claims, Claim 1 had got the following wording:

"1. Method of preparing a polyol blend ready for transportation, which comprises withdrawing from their respective storage tanks a plurality of streams of different base polyols, continuously and simultaneously feeding said streams of base polyols in a predetermined ratio into a blender, and continuously discharging the

resulting polyol blend into a transporter tank wherein the different base polyols are selected to encompass a wide range of hydroxy values and functionalities and encompass hydroxyl values in the range of from 200 to 700; functionalities in the range of from 2.0 to 5.5; and include at least one aromatic polyol."

The dependent Claims 2 and 3 corresponded to [Claims 2 and 5] (section I, above), respectively.

(17) The Respondents neither objected to the admission of the additional seventh Auxiliary Request at the oral proceedings nor raised any objections under Articles 84 or 123 EPC. Nor did Respondent 4 wish to provide any arguments with regard to its previous novelty objection.

(18) The Appellant then presented its case with regard to inventive step. To this end, it argued against the reasons in the decision under appeal. Starting from D11 identified in the decision as the closest piece of prior art, the Appellant stated that the document had disclosed neither continuous mixing and discharging, nor rigid polyols having OHVs within a range of from 200 to 700. With respect to D11, the Appellant saw the technical problem underlying the claimed invention as already stated in its letter dated 23 February 2007 (section VIII, above).

The Appellant criticised the decision under appeal in that three documents (D11, D10 and D16) had been combined with each other allegedly contrary to case law. It would not, however, be obvious to combine the teaching of more than two documents.

Whilst admitting that in-line blending, in general, (cf. D10) and polyol blends (cf. D11) had been known "for ages", it argued that nobody had apparently realised before, that rigid polyols could be blended in this way, thereby achieving advantages. Thus, the patent in suit provided a method which would allow - with one mixing equipment - to blend without any difficulties any desired, large or even very small, quantities of polyols, thereby dispensing with the need for storage of the obtained blends and the efforts and costs of cleaning the machinery, used before in batch-wise blending of, in particular, small quantities. On the basis of the paragraph bridging pages 1 and 2 of D10, the Appellant saw the skilled person even as being taught away by D10, because it would clearly refer to in-line blending, when large quantities of blended product were to be produced. As demonstrated by the drawings in D1 and D10, these documents were directed to the mixing of large quantities of liquids other than polyols. Nor did D10, according to the Appellant, teach to discharge the product directly to a transporter tank.

Moreover, prior to the patent in suit, the choice of the mixing equipment had, according to the Appellant, to be adapted to the quantity and to the ratios of the liquids to be blended. To this end, the Appellant additionally referred to D21, pages 20 and 21: "Uniform and reproducible mixing" "Static mixers".

Even with the knowledge of the cited documents, no one would have expected any improvement or advantage by the use of an in-line blender.

Furthermore, the Appellant went into the contents of D16 in great detail, in particular with regard to the method of preparing the polymer/polyol composition described in its examples.

(19) The Respondents did not rely on D16 anymore, but, besides D11, referred, instead, to D1, D2, D3, D8, D10, D12 and D15. Since D8, D11 and D12 were text books, they were, according to the Respondents, illustrating the common general knowledge in this sector of the art.

Thus, according to D8, D11 and D12, it had been the common general knowledge that (i) polyol blends/mixtures were provided by the polyol producers, which fact made transportation of the blends in some sort of tank or pipe necessary, and (ii) that such blends were used in the production of polyurethane foams, respectively. Moreover, the disclosure of D15 would confirm this knowledge (as shown by the compositions of each component A in its Examples 2 to 5).

The further documents D1 (*viz.* its drawing), D3 and D10 (in particular its Figure 1) showed, according to the Respondents, furthermore, that the continuous mixing of liquid organic materials and the direct feeding of the mixture, thus obtained, to transporter tanks had been state of the art. In their opinion, the skilled person, faced with the problem of mixing polyols, would have considered any document dealing with the blending of liquid materials, irrespective of the particular nature of the materials, as long as they were compatible. The compatibility depended, according to the Respondents, on the ethylene oxide/propylene oxide ratio in the polyols.



In any case, the skilled person would have learnt from the above documents that the storage problem could be solved by using in-line blending. Nor could any prejudice be derived from those documents against this form of blending, even when quantities of the raw materials deviating from about 1:1 were to be used as shown eg in D3, Figure 1, with regard to the "resin" (ie polyol) and castor oil (also a polyol).

Furthermore in view of the lack of any further explanation of the kind of the "transporter tank" and of the "blender" and of the respective sizes of these devices in the specification (let alone in Claim 1) and with regard to the Appellant's arguments relating to the preparation of even only small quantities, the Respondents raised the question of what the word "continuously" in Claim 1 meant.

(20) When the parties indicated that they intended no further contributions, the debate was closed.

- X. The Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the Main Request, filed on 23 February 2007, or, in the alternative, of the one of the fourth or sixth Auxiliary Requests, both filed on 23 February 2007, or of the seventh Auxiliary Request, filed at the oral proceedings.

The Respondents requested that the appeal be dismissed.

## Reasons for the Decision

1. The appeal is admissible.
2. *Main Request* (section IX(3), above)
  - 2.1 The essential first issue concerning the allowability of this request depends on the amendment of its Claim 1 relating to a method, wherein "a plurality of streams of different base polyols" are blended with each other to prepare a polyol blend, which is, however, defined in the claim neither in terms of its qualitative, nor in terms of its quantitative composition, but which is only referred to as "rigid polyols".

Even the description does not provide a clear definition of this term, but refers only to "so-called rigid polyols, which are used in the manufacture of rigid polyurethane foam where a wide variety of applications requires an extensive range of foam properties ..." (paragraph [0001], in particular [page 2, lines 6 to 8]).

- 2.2 According to Rule 57a EPC, the description, claims and drawings of a European patent may be amended, provided that the amendments are occasioned by grounds for opposition specified in Article 100, even if the respective ground has not been invoked by the opponent.

This means, in the Board's view, that any amendment should *prima facie* serve to meet the objections raised by the Opponents.

2.3 The oppositions against the patent in suit (section II, above) were based only on grounds for opposition as listed in part (a) (*viz.* lack of novelty and lack of inventive step) of Article 100 EPC as mentioned in the above Rule.

2.4 Consequently, it is indispensable, in the Board's view, that an amendment can only be justified by the aim of achieving a clear and unambiguous delimitation of the claimed subject-matter from the state of the art. However, this aim cannot be achieved by the use of a term, which is vague, not definite and has only a relative meaning, as argued by the Respondents (section IX(5), above).

2.5 In fact, as already mentioned (section 2.1, above), the term "rigid polyol" has, in the patent in suit, only been explained with reference to "rigid polyurethane foam". However, this latter term, as shown in the second paragraph of that section, does not give a clear explanation either. Rather, it refers only to "an extensive range of foam properties", which depends on the "wide variety of applications" of the foam. Nor are any ranges of the functionality and the OHV defined for these "rigid polyols". In [Claims 4 and 5] and in paragraph [0007], ranges are given only for the functionality and the OHV of the base polyols (cf. section IX(6), above, last sentence, referring to the Appellant's statement that paragraph [0007] would have nothing to do with the Main Request).

Furthermore, the Appellant has pointed out that the base polyols *per se* did not have to comply with this term (section IX(6), above).

2.6 The above statements and findings are further compounded by the fact that the prior art literature referred to by the parties shows a large variety of the limits concerning the characteristics of the polyols suggested for the preparation of such foams.

2.6.1 Thus, in D22 rigid polyurethane foams were prepared from mixtures of at least two different polyols (column 2, lines 1 to 15). Whilst the first component of the polyol mixture comprises (i) one or more polyols having a hydroxy functionality of from 3 to 8 and an OHV of from about 300 to about 800 (ie overlapping with the corresponding ranges in [Claim 4]), the mixture additionally comprises (ii) a further mandatory component of one or more polyols having a hydroxyl functionality of from 2 to 3 and an OHV of from about 25 to about 115, which, according to the explanation of the Appellant, is typical for "flexible polyols" (ie those having a functionality of 2 to 3 and an OHV of below 180; section IX(6), above). This latter polyol component (ii) is not present as a minute and, therefore, ignorable trace, but it is required to be present in a quantity of from about 10 to 90 parts by weight, based on the 100 parts by weight of polyol (i) or, in other words, polyol (ii) may amount to nearly half the total polyol component. Further limitations concerning the functionality and the OHV (of eg  $\geq 180$ , cf. section IX(6) and (7), above) of the *polyol blend* to be used in the process claimed in D22 are not given in the document. A further OHV range of from 200 to 800 is only mentioned with regard to a polyether polyol used in the prior art in combination with a copolymer of allyl alcohol and styrene (D22: column 1, line 42).

The broad range of functionalities of between 2 and 8, encompassing both types of polyols used in D22, is also mentioned in D12, page 39, Table 3-3, whereby particular reference is made to mixtures having an average functionality of 4 to 5 (in the paragraph below the above Table).

2.6.2 Furthermore, the Appellant itself referred to D26. In this document, polyol initiators are mentioned, which have functionalities of from 3 to 8 (page 190, last paragraph and Table 6.1). Then mention is made of the limits of the molecular weight of polyols derived from any of these initiators, above which the polyols become unsuitable for use in the manufacture of urethane rigid foam. In practice this range would lie approximately between about 300 and 1000. Figure 6.1 depicts the variation of the OHV of two polyethers of functionality 3 (glycerol) and 8 (sucrose) within a range of molecular weights of between 300 and 1300. The OHV range in this diagram extends from 180 to 680, with additional dotted lines at 380 and 580. In the area between the two curves labelled "FUNCTIONALITY 3" and "FUNCTIONALITY 8" and limited by the two dotted lines, the figure contains a statement "APPROX. OH-RANGE FOR RIGID FOAM".

In addition to these different data derivable from Figure 6.1 of D26, which themselves do not, in the Board's opinion, allow to derive therefrom a clear and unambiguous definition of "rigid polyol", the Respondents referred to still further data, which could be calculated (and were not disputed by the Appellant) from the functionality values in Table 6.1 of D26 and

from the range of molecular weights given in its text (section IX(7), above: extending from 168 to 1500).

2.6.3 Table 2-2 "Characteristics of polyols" of D21 (page 9), mentions a molecular weight range of from 400 to 1200 and a range of functionalities of 3.0 to 8.0 under the heading "Rigid foams, rigid solids, and stiff coatings".

2.6.4 In D8, mention is made of an OHV of from 350 to 650 for the preparation of a rigid polyurethane foam.

2.7 In view of the various different ranges given with regard to the functionalities and the OHVs of the polyols used in the manufacture of rigid polyurethane foams according to the documents cited above and in view of the fact that the patent in suit is completely silent with regard to the meaning of the term "rigid polyol", the Board has come to the conclusion that the amendment of Claim 1 imparts lack of clarity to the wording and the scope of the claim.

This means that Claim 1 of the Main Request does not meet the requirements of Article 84 EPC.

In view of this finding, it is not necessary to consider any further issues which might also affect the allowability of the claim.

2.8 Consequently and since a decision cannot be made on single claims, but only on a request as a whole, the Main Request is, for the reasons given above, refused.

3. *The fourth Auxiliary Request* (section IX(3), above)

3.1 Claim 1 of this request differs from [Claim 1] by the additional features "wherein the different base polyols encompass hydroxyl values in the range of from 200 to 700 and functionalities in the range of from 2.0 and 5.5". These features correspond to the first two characteristics of the base polyols in [Claim 4] and in the second sentence of paragraph [0007], whilst at both of these instances in the patent in suit the base polyols had additionally been characterised as including at least one aromatic polyol.

3.2 According to the Respondents, the patent in suit did not provide a basis for disconnecting the above three features from one another (section IX(9), above). This argument was disputed by the Appellant, because the aromaticity of a polyol would have nothing to do with its functionality and OHV. Therefore, the three features of the polyol in [Claim 4] would not relate to a single embodiment. This argument would be supported by the first sentence of paragraph [0007] referring only to the two properties related to the hydroxyl groups, but not to an aromatic character of the polyol. Nor would the examples of the patent in suit comprise such an aromatic polyol. Furthermore, the Appellant referred to jurisprudence to strengthen its case (sections IX(10), above, and 3.4, below).

3.3 Although it is true that none of the examples in the patent in suit refers to the presence of at least one aromatic polyol, which had been completely in line with the wording of, but not with each and every embodiment encompassed by [Claim 1], eg [Claim 4] is to be

mentioned in this context, the Board is not in a position to concur with the Appellant's arguments, because the embodiment forming the basis of [Claim 4] comprised three features, ie (1) the range of functionalities, (2) the range of OHV **and** (3) the aromatic character of at least one polyol. These features had never been disclosed separately from one another or in the form of alternatives, but had been presented at all occurrences and consistently throughout the proceedings before the EPO only in close relation with each other (see page 3, lines 16 to 21 and paragraph [0007], [page 2, lines 42 to 44]). Therefore, there is , in the Board's view, no basis for inserting in Claim 1 only two of the three features as disclosed in [Claim 4] and in the second sentence of paragraph [0007].

For these reasons alone, the Board cannot accept Claim 1 as amended to comply with the requirements of Article 123(2) EPC, irrespective of the further point raised by the Respondents on the basis of the fact that Claim 4/[Claim 4] had been appendant to Claim 3/[Claim 3]. This latter point will further be dealt with in regard to the sixth Auxiliary Request, further below.

3.4 As mentioned above, the Appellant additionally referred to two decisions in order to support its case. In view of this jurisprudence, it would, in the Appellant's view, be allowable to omit from Claim 1 one feature of [Claim 4], ie the presence of at least one aromatic polyol, as confirmed by the [examples].



3.4.1 The case underlying T 331/87 (above) concerned a machine tool punch press which had different tools, for which it had been evident to a person skilled in that art, that they had to be positioned independently from one another (*viz.* (i) a laser beam generator highly sensitive to shocks and vibrations and (ii) a machine tool punch press subjected to pounding vibrations during punching operations) in order to avoid interference between the different tools (No. 7.4 of the reasons in conjunction with No. 7.2). In these circumstances, the question specific for that case had to be decided of whether, in the claim, an amendment of the feature which concerned the fixation of the laser cutting tool to the claimed machine tool punch press had satisfied the requirements of Article 123(2) EPC. It was found that the amendment (which included the deletion of a certain formulation from the claim) did not contravene this Article, because it complied with the three criteria formulated in No. 6 of the reasons ("the skilled person would directly and unambiguously recognise that (1) the feature was not explained as essential in the disclosure, (2) it is not, as such, indispensable for the function of the invention in the light of the technical problem it serves to solve, and (3) the replacement or removal requires no real modification of other features to compensate for the change").

3.4.2 In T 582/91 (above), the Board held that "one feature of a dependent claim can be readily combined with a preceding independent claim as long as the skilled person recognises that there is clearly no close functional or structural relationship between the one

feature of that dependent claim and its other features ..." (no. 2.2 of the reasons).

3.4.3 As already mentioned above with regard to the present case, [Claim 4] and paragraph [0007], second sentence, relate, however, to "the different base polyols" and "the base polyols", respectively, specified by three features: OHV and functionality ranges and the aromaticity of at least one of these polyols (cf. section 3.3, above). Even from this wording at both instances, it is clear for the Board that these different features could never be construed as relating to completely separate embodiments (or as put in T 582/91, above: "that there is clearly no close functional or structural relationship between the one feature of that dependent claim and its other features"). Thus, it is not derivable from these parts of the patent in suit that the OHV and functionality ranges would not be related to, let alone would not be mandatory for the at least one aromatic polyol.

3.5 For the reasons considered in detail in sections 3.3 and 3.4.3, above, the Board has, consequently, come to the conclusion that the fourth Auxiliary Request cannot be successful for non-compliance with Article 123(2) EPC. It is, therefore, refused.

4. *The sixth Auxiliary Request* (section IX(3), above)

4.1 The comparison of the set of claims as granted with the claims of this request appears, at first glance, to indicate that the new wording of Claim 1 is derived from a true combination of all the features of [Claims 1 and 4]. However, a further detailed

consideration of these claims shows that [Claim 4] (wherein the features are defined by the same wording as used in the second sentence of paragraph [0007]) had been appendant to [Claim 3], which had required (in a manner consistent with the first sentence of paragraph [0007]) that the different base polyols were "selected to encompass a wide range of hydroxy values and functionalities". This requirement is, however, not present in the new Claim 1.

4.1.1 Hence, the Board is not in a position to refute the Respondents' argument (sections IX(9) and (12), above) that it would be possible to combine two different polyols yet having identical or nearly identical functionalities and OHVs, contrary to the appendance of [Claim 4] to [Claim 3]. Therefore, the Board cannot concur with the statement of the Appellant that the incorporation of the features of [Claim 3] would have no limiting effect on the scope of a new Claim 1 formed by the inclusion of these additional features.

4.1.2 The Appellant's further argument, that Claim 1 was not based on [Claims 1 and 4], but on the combination of [Claim 1] and the second sentence of paragraph [0007] (sections IX(13) and (14), above), is not convincing either, because [Claim 3 and 4], on the one hand, and the first two sentences in paragraph [0007], on the other hand, like their respective predecessors in the application, clearly corresponded to each other. Moreover, Claim 4 had already been appendant to Claim 3. This leaves no room for an interpretation, that the second sentence of paragraph [0007] would relate to an embodiment independent from that of its first sentence.

This view is even further supported by the remainder of that paragraph and the wording of Claim 5/[Claim 5] which had been appendant to Claim 4/[Claim 4].

Therefore, the Board takes the view that page 3, lines 16 to 31 (corresponding to paragraph [0007]) had already presented the three features of the base polyols as being closely related to one another. This finding is also consistent with the presentation in Claims 3, 4 and 5 with their cascade of dependencies, according to which the embodiment of Claim 5 had been an elaboration of the subject-matter of Claim 4, which in turn had been a preferred embodiment of Claim 3.

In this respect, it is additionally noteworthy that Claim 3 had been worded as a claim appendant to "claim 1 or claim 2", which demonstrates in the Board's view, that the former Applicant at the time of filing had been aware of the significance of the choice of the wording in claims concerning their interdependencies.

4.1.3 Consequently, the Board takes the view that Claim 1 contravenes the requirements of Article 123(2) EPC. Like the higher ranking requests, the sixth Auxiliary Request as a whole cannot, therefore, be successful either, it is refused.

4.1.4 Just for the reason of completeness, the parties are reminded here that these findings would have been equally valid for the fourth Auxiliary Request (cf. section 3.3, above, second paragraph).

*The seventh Auxiliary Request* (section IX(16), above)

4.2 The claims of this request do not include the deficiencies addressed above with regard to the Main, the fourth and the sixth Auxiliary Requests (cf. section IX(17), above). Consequently, no objections arise under Articles 84 and 123(2) EPC.

Moreover, since the scope of Claim 1 has been restricted by incorporation of the further limitations of [Claims 3 and 4], Article 123(3) EPC is also complied with.

4.3 The arguments presented by Opponent 4 in writing with regard to novelty over D16 were already dealt with in the decision under appeal (section V(1), above). Additional different arguments concerning this issue have not been presented by this party during the appeal proceedings before the Board (sections VII(3) and IX(17), above). Nor does the Board itself see any reason for taking a view different from the decision under appeal in this respect. Consequently, the claimed subject-matter of this request fulfils the requirements of Article 54 EPC.

4.4 The patent in suit relates to a method for preparing a polyol blend ready for transportation (section IX(16), above). According to the further description in the specification, which is not, however, relevant for the interpretation or scope of the claims (cf. section IX(4), above), the blend thereby obtained is to be suitable for the preparation of polyurethane foams.

- 4.5 As already indicated in section IX(19), above, two groups can be formed from the documents relied upon by the Respondents in these appeal proceedings for the assessment of inventive step, ie one group relating to polyol blends/mixtures as used in polyurethane foam manufacture and the other relating to blending processes of organic liquids and the devices used therefor.
- 4.6 The first group of documents includes D8, D11 and D12, all of which demonstrate that it had been common practice to use polyol blends for the production of polyurethane foams.
- 4.6.1 Reference can be made in particular to chapter 6.1.1 of D8, second paragraph, according to which it was usual to use polyol formulations comprising one or several polyols and being provided by the polyol supplier.
- 4.6.2 According to D11, chapter 6.2, a single polyol in its pure form is seldom reacted with polyisocyanate in the manufacture of polyurethanes. Rather, polyol mixtures are mainly used in this reaction. This reduces the complexity of the process and, consequently, the risk of mistakes, and it allows in a simple manner (by choosing the appropriate polyol mixture) to achieve specific properties of the final products. The polyol mixtures are delivered by the manufacturer of the raw material or supplier of the formulations to the polyurethane foam manufacturer.
- 4.6.3 In D12, page 14, mention is made of the possibility for the polyurethane manufacturer to buy fully or partially compounded chemical systems. On page 39, penultimate

paragraph, it is additionally stated that blends of polyols are often used to obtain the best combination of processability, cost and the properties of the final product.

4.6.4 Hence, it can be derived from these documents that the production of polyol blends by the polyol producer is normal practice and that transportation of the blends from the supplier to the customer of the blends is, therefore, required. Although the storage of polyols and/or polyol blends, as addressed in paragraph [0001], may, thus, be a problem for either partner or both in this business, ie the supplier and/or its client, it appears to be, in view of this common practice, a problem not so much for the polyurethane manufacturer, who can order the polyol component according to its needs at a given time, but rather for the supplier of the component, who has to provide the ordered batch of the desired product in the desired (optionally small) quantity (cf. section IX(18), above, paragraph 3). In these circumstances, the supplier need not necessarily be a polyurethane specialist, but rather a specialist in the provision of blends of raw materials, eg of liquid chemical components, optionally including polyol blends. Moreover, the Appellant's arguments putting emphasis on the suitability of the claimed method to produce even very small quantities of polyols, on the one hand, and the fact that the kind and size of the blender have been described nowhere in the patent in suit, have given rise to the question concerning the consistency of the use of "continuously" and of "transporter tank" and the meaning of "blender" in Claim 1, as addressed by the Respondents (sections IX(19), above).

4.7 In view of these facts and findings, the technical problem may, thus, only be seen in achieving improvements in the efficiency of placing ready for delivery mixtures of liquid chemical materials, particularly of polyol blends, irrespective of their intended use.

The solution to this problem should avoid logistic complications, particularly storage problems, and allow to provide the desired material in the form of a blend in any desired quantity, as required by the customer.

4.8 In this context, it is, in addition, noteworthy that the patent in suit, inclusive of the claims under consideration, is completely silent about any specific problems which might occur when particular polyols are mixed with each other, in particular, about any compatibility issues in this respect, which have been addressed by the Respondents at the hearing (section IX(19), above) with regard to the ethylene oxide/propylene oxide ratio of the polyols and which have remained undisputed.

4.9 Since the documents of the above first group had been silent about the processes for obtaining polyol blends, the Appellant argued (section VI(1), above) that polyol mixtures could be obtained in many different ways. However, this argument is not only valid for polyols, but for any liquid organic materials as long as they are compatible with one another.

Moreover, although an important field for the use of polyols is the manufacture of polyurethane, the skilled



person is aware of the fact that polyol is a starting material for a number of different chemical processes for processing or manufacturing of certain products designed for the ultimate consumer (cf. D5, page 1, lines 7 to 10).

4.10 In view of the common general knowledge made evident by D8, D11 and D12 and the above findings derived therefrom, the Board takes the view that the skilled person would not limit his search for a solution of the above technical problem to literature limited to the manufacture of polyurethane, let alone to documents related only to the production of polyurethane hard foams, but he would rather look for highly efficient methods of controlled mixing of liquid chemicals.

4.11 Documents D1, D2, D3 and D10, as again referred to at the oral proceedings (section IX(19), above), represent literature of this kind.

4.11.1 Thus, D1 relates, in general, to "a system for controlling two flowing streams which are to be admixed and more specifically for controlling the admixture of two petroleum streams ..." (page 1, lines 11 to 16). In particular, the document refers to an automatic in-line blending system allowing the control of the quality and the volume of the product, which can then be placed directly into storage tanks of sea-going tankers or "other facilities for delivery to the ultimate purchaser." (page 1, lines 24, 25 and 35 to 38; page 2, lines 12 to 14, and the drawing).

4.11.2 In D2, a control system for in-line blending of materials is disclosed (abstract of D2) which can be used in many industrial applications, especially in the chemical and petroleum industries. Many chemical processes require the mixing or blending of two materials to provide a mixture having a predetermined portion of each of the materials, which had hitherto been done by means of "batch processes", which showed, however, drawbacks which could be overcome by in-line blending. Furthermore, mention is made in D2 of the possibility to supply the product directly to a "tank truck" (D2: column 1, lines 21, 22, 25 to 30 and 33 to 35; column 2, lines 10 to 12).

4.11.3 In D3, a process for producing polyurethane foam stock and the like is described. As shown, in particular, in Figure 1, a number of different components are mixed together by means of a "line blender". From the amounts of the individual components depicted in the above drawing, it can be derived that different components can be mixed not only in amount ratios of approximately 1:1, but in ratios deviating therefrom to a significant degree. Mention can, thus, be made of a ratio of 100 to 1.12 or even 0.75 as shown in the drawing.

4.11.4 Likewise, D10 discloses a further example for such a device and process making use of an in-line blender being suitable for "the blending of petroleum products, but ... applicable to the blending of other liquid or fluent materials ..." (D10, the abstract and page 1, first paragraph). On page 5, line 1 *et seq.*, the "in-line blender for blending components in the form of liquid or other fluent materials" is described in further detail.

Based on the statement that "Such an in-line blending process is widely used and although not restricted thereto is particularly desirable when large quantities of blended products are to be produced" (D10, page 2, first paragraph), the Appellant argued that such a device or process would never have been considered for the preparation of small amounts (section IX(18), above, third paragraph).

- 4.12 However, neither this quotation from D10, nor the references, which have been made in paragraph [0003] to problems related to the batch-mixing of very small or large quantities of polyols in contrast to advantage obtained by using in-line mixing equipment, which would be smaller and easier to clean than batch mixing equipment ([page 2, lines 22 and 23]), do, in the Board's opinion, support, let alone establish a prejudice, derivable from the prior art, against the use of in-line blending. Even from the passage quoted above from D10, it cannot be deduced that in-line mixing would not be suitable for small quantities.

By contrast, the cited prior art, in particular D2, clearly shows that in-line blending had been known as a mixing method advantageous over batch blending (D2: column 1, lines 33 to 34). In the subsequent sentences of that paragraph, D2 further describes the general manner of carrying out in-line blending.

Similarly, D1 refers to such a method on page 1, lines 24 to 43 for the example of blending lubricating oils and D3, column 5, the description of Figure 1 to the blending of polyol (the "resin", column 1, lines 45

and 46) with other components including castor oil, which, irrespective of its intended purpose, may be considered as being a polyol.

4.13 Furthermore, in the Board's opinion, paragraph [0005], referring to "conventional equipment utilised for blending different feedstreams", which can be used for the claimed process, and the Appellant's own statement that in-line blending had been known "for ages" (section IX(18), above), confirm that in-line blending had been a conventional method for blending any liquid materials within chemical processes. Any further adjustments of the size of such a conventional blender and of the feed streams to the blender and of the discharge stream to the "transporter tank" can only be considered as being within the normal skill of the person skilled in this art. This view is additionally confirmed by the fact that the patent in suit itself and its claims at all stages of the proceedings before the EPO have been completely silent in this respect.

Nor is the argument of the Appellant convincing that the prior art of the second group would not have been taken into consideration in the expectation of some improvement or advantage (section VI(1), above), because no evidence demonstrating such improvements or advantages has been made available to the Board.

4.14 Therefore, the Board has come to the conclusion, that the subject-matter of Claim 1 is not based on an inventive step.

Consequently and for the reason given in section 2.8, above, the seventh Auxiliary Request must also be refused.

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:

E. Görgmaier

R. Young