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D E C I S I O N
of 17 October 2001

Case Number: T 0838/99 - 3.2.5

Application Number: 91104952.6

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Title of invention:
Injection orientation blow molding method

Patentee:
A.K. TECHNICAL LABORATORY, INC.

Opponent:
Jomar Corporation

Headword:

-

Relevant legal provisions:
EPC Art. 83, 54, 56

Keyword:
"Sufficiency of disclosure (yes)"
"Novelty (main and auxiliary requests) (yes)"
"Inventive step (main and auxiliary requests) (no)"

Decisions cited:

-

Catchword:

-



Case Number: T 0838/99 - 3.2.5

D E C I S I O N
of the Technical Board of Appeal 3.2.5
of 17 October 2001

Appellant: A.K. TECHNICAL LABORATORY, INC.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 6 July 1999
revoking European patent No. 0 454 997 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: W. Moser
Members: W. R. Zellhuber
A. Burkhart

Summary of Facts and Submissions

- I. The appellant (patent proprietor) lodged an appeal against the decision of the Opposition Division revoking the European patent No. 0 454 997.
- II. Opposition was filed against the patent as a whole and based on Article 100(a) EPC (lack of novelty, lack of inventive step) and Article 100(b) EPC (insufficiency of disclosure). The Opposition Division held that the ground for opposition cited in Article 100(a) EPC (lack of inventive step) prejudiced the maintenance of the patent.
- III. Oral proceedings were held before the Board of Appeal on 17 October 2001.
 - (i) The appellant requested that the decision under appeal be set aside and that the patent be maintained, on the basis of the following documents:
 - (a) main request: patent as granted; or
 - (b) first auxiliary request: claims 1 to 5 filed as second auxiliary request on 27 August 2001; or
 - (c) second auxiliary request: claims 1 to 6 filed as first auxiliary request on 27 August 2001; or
 - (d) third auxiliary request: claims 1 to 4 filed as third auxiliary request on 27 August 2001; or

- (e) fourth auxiliary request: claims 2 and 3 filed as fourth auxiliary request on 27 August 2001; or
- (f) fifth auxiliary request: claims 2 and 3 filed as fifth auxiliary request on 27 August 2001.

A sixth auxiliary request presented by the appellant at the end of oral proceedings was refused by the Board.

- (ii) The respondent (opponent) requested that the appeal be dismissed.

IV. Claim 1 as granted (main request) reads as follows:

"1. An injection orientation blow molding method comprising the steps of injecting and filling molten resin into an injection mold to form it into a preform (11), said injection mold comprising a lip mold holding a mouth portion of said preform (11), quick cooling the preform (11) in the injection mold to a state in which the shape of the preform (11) can be maintained by a skin layer (12) produced on the surface of the preform (11) by said cooling and in which the temperature in the resin (13) internally of the skin is still high, releasing the preform (11) from the injection mold during said state while the preform (11) is held in said lip mold, transferring the preform (11) from said injection mold to a blow mold while held in said lip mold, and blow molding in said blow mold a thin-wall hollow article (14) from said-preform (11),

characterised in that said hollow article (14) is orientation blow molded within a time after release of the preform (11) from the injection mold until the surface temperature of the preform (11), which rises responsive to heat transfer from the resin (13) internal of the skin (12) to the surface of the preform (11), reaches a peak temperature."

Claim 1 of the first auxiliary request comprises, in addition to the features of claim 1 of the main request, the following feature:

"wherein the degree of orientation of various portions of the hollow article (14) is adjusted by intentionally adjusting the wall thickness in respectively corresponding portions of the injection molded preform (11)."

Claim 1 of the second auxiliary request comprises, in addition to the features of claim 1 of the main request, the following feature:

"that the orientation degree of an oriented portion of the hollow article(14) is controlled by controlling the quantity of heat included in the corresponding portion of the preform (11) and that said quantity of heat is controlled by intentionally adjusting the wall thickness of the corresponding portion of the preform (11) while the temperature of the injection mold is maintained at a predetermined value."

Claim 1 of the third auxiliary request comprises, in addition to the features of claim 1 of the main request, the following feature:

"wherein the cooling time is so selected that for any wall thicknesses present in the preform (11) the surface temperature after release of the preform (11) allows orientation blow molding of the hollow article (14) as defined in claim 1 and wherein the degree of orientation of various portions of the hollow article (14) is adjusted by intentionally adjusting the wall thickness in respectively corresponding portions of the injection molded preform (11)."

The fourth and fifth auxiliary requests concern amendments in dependent claims 2 and 3.

V. The following documents were inter alia referred to in the appeal procedure:

D1: US-A 2 331 702;

D14: US-A 4 054 629;

D15: US-A 4 151 248;

D18: US-A 4 521 369;

D24: Emery I Valyi, "Fundamentals of Producing Bi-Axially Oriented Rigid Containers", 4th Annual International Conference on Oriented Plastic Containers, March 25-27, 1980;

D27: "AOKI Injection Blow Moulder", brochure of A.K. Technical Laboratory Inc and AOKI Manufacturing Co. Ltd, printed 1988;

D28: "AOKI Stretch-Blow Molding Machines. The Machine

You've been Expecting" by Larry Beres, President, Formex; the corresponding document D51 carrying the title "Three Station Stretch-Blow Moulding Machines-The Machine You've been Expecting!" was published in Conference Proceedings, Antec '88, April 18-21, 1988, Society of Plastics Engineers, 46th Annual Technical Conferences & Exhibits;

D39: US-A 4 385 089;

D44: AOKI Tech '90, Development of the III-Station System; (English translation of the contents of a lecture held by Mr Takeuchi on 23 May 1990)

D48: Hansers Publishers, "Blow Molding Handbook", 1988, pages 146 and 540 to 548;

D52: Affidavit by Mr Seffrin of 19 March 1999;

Annex G: Graph titled "comparison of the surface temperature of a 4.5 mm preform and the central temperature of the section", filed by the appellant on 27 August 2001 by telefax;

Annex H: Time diagrams of the machine cycle of a machine according to the invention and the prior art (SBIII machine), filed by the appellant on 27 August 2001.

VI. In the written and oral procedure, the appellant argued essentially as follows:

VI.1 Sufficiency of disclosure

The patent in suit concerned an injection blow moulding method wherein the preform, after having been released from the injection mould, was redistributing its internal heat while being kept in ambient air. Accordingly, the surface temperature rose responsive to the heat transfer from the interior to the surface of the preform, and the invention consisted in that the hollow article was blow moulded before the surface temperature of the preform reached a peak temperature.

A person skilled in the art was enabled to determine the lapse of time between the release of the preform and the attainment of a peak surface temperature, and to carry out the process according to the invention.

A machine which operated according to the patent in suit was blowing a large number of identical articles. As commonly known, the operational parameters, like the time of blow moulding, were established during initial test runs on the machine, wherein articles of the same type were produced under identical conditions. A plurality of temperature measurements could be obtained and averaged to improve the accuracy.

Means for determining the surface temperature of articles had been commonly available at the priority date of the patent in suit. Moreover, it was not necessary to determine the absolute temperature. It was sufficient to determine the dependence on time of the temperature development during the test runs. Thereafter, the operational parameters could be preset for each type of article. In the course of the production of the articles, further temperature measurements were neither necessary nor subject-matter of the claimed method.

Consequently, the patent in suit disclosed the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

VI.2 Novelty

The cited prior art did not disclose an injection blow moulding method wherein orientation blow moulding was initiated before the surface temperature of the preform reached a peak temperature. In particular, neither document D27 nor document D44 nor document D1, which had been cited by the respondent with respect to the lack of novelty objection, indicated the surface temperature at which orientation blow moulding was carried out. Moreover, they were silent about a surface peak temperature and its significance.

The indication in document D27 that blow moulding was carried out immediately after release of the preform from the injection mould had to be construed as meaning that the preform was directly transferred from the injection station to the blow moulding station without passing a conditioning station. The term "immediate", as used in the context of document D27, did not imply any specific information on the time interval between the release of the preform from the injection mould and the beginning of the blow moulding step. Moreover, the term "immediate" could not be construed as meaning "without any delay" because the preform had to be transferred to the blow moulding station and the latter had to be closed before orientation blow moulding could be started.

The same applied with regard to the prior art as

disclosed in documents D1 and D44.

Furthermore, document D1 did not disclose a process wherein the preform was quickly cooled to a state in which the shape of the preform could be maintained by a skin layer.

Document D44, which had been cited with regard to the subject-matter of dependent claims 5, 6 and 7, disclosed neither blow moulding before the surface temperature reached a peak temperature nor the additional features of dependent claims 5, 6 and 7.

Since the claims of the main request as well as those of the auxiliary requests all comprised the feature of orientation blow moulding before the surface temperature reached a peak temperature, the subject-matter of these claims was novel.

VI.3 Inventive step (main request, claim 1)

Document D27, which represented the closest prior art, disclosed a method according to the preamble of claim 1. However, it did not suggest a method wherein orientation blow moulding was carried out before the surface temperature reached a peak temperature.

Orientation blow moulding before the surface temperature reached a peak temperature signified that the preform was not conditioned, that the temperature gradient between the central area and the outer surface of the preform was high, and that the preform was in a highly transient state, as could be seen in document "Annex G". Blow moulding from such a highly transient state, wherein the centre temperature may initially

even exceed the orientation temperature, as indicated on page 5, lines 29 and 30 of the patent in suit, and the skin of the preform became soft due to the temperature increase, was not rendered obvious by the cited prior art.

Documents D14 and D15 suggested conditioning of the preform and that best results were obtained if the preform attained a substantially uniform temperature.

Document D24 made mention that, in a one-stage process, the temperature distribution of the preform before orientation blow moulding was non-uniform. However, it did not suggest blow moulding of a preform before the surface temperature reached a peak temperature.

Documents D14, D15, D24 and D27 thus suggested, contrary to the teaching of the patent in suit, that a substantially uniform temperature of the preform should be attained before initiating blow moulding.

Furthermore, the invention according to the patent in suit permitted a reduction of the overall machine cycle time by shortening the time for opening and closing the moulds and transferring the preform to the subsequent station, as shown in document "Annex H", thus enhancing the productivity of the machine.

Finally, articles blown according to the process of the patent in suit were not subject to whitening. Bottles which had been stretch blown before, at and after peak surface temperature, respectively, showed the improved quality of those which had been blown before peak.

Therefore, the subject-matter of claim 1 of the patent

in suit as granted, i.e. according to the main request, was not rendered obvious by the available prior art and thus involved an inventive step.

VI.4 Inventive step (auxiliary requests)

Claim 1 of the first auxiliary request further comprised the feature of controlling the orientation degree of a portion of orientation blown product by intentionally adjusting the wall thickness of corresponding portions of the preform. That feature was not suggested by the cited prior art documents, and, in particular, not by document D44.

The additional feature of claim 1 of the second auxiliary request (maintaining the temperature of the injection mould at a predetermined value) facilitated the whole process because that parameter was thus fixed. Accordingly, a process variable less had to be considered.

Claim 1 of the third auxiliary request made it clear that the surface temperature had to be in the orientation temperature range in order to allow blow moulding whereas the inner temperature of the preform might be outside that range. That teaching also went beyond the disclosure of the prior art.

The subject-matter of the claims of the first, second and third auxiliary requests thus also involved an inventive step.

The amended claims 2 and 3 of the fourth and fifth auxiliary requests were intended to replace the corresponding claims of the foregoing requests.

VII. In the written and oral procedure, the respondent argued essentially as follows:

VII.1 Sufficiency of disclosure

The determination of the time when the surface temperature reached its peak temperature was a crucial point of the invention. In order to be enabled to carry out the invention, the surface temperature of the preform had to be measured with high accuracy. However, the graphs represented in Figures 3, 4 and 5 of the patent in suit showed that a peak temperature could not be exactly determined, some of them even indicated two distinct peaks. Averaging did not improve accuracy. The temperature measurement could not be repeated with the same preform. The next preform might have different properties.

Moreover, the temperature measuring instrument mentioned in the patent in suit was insufficient to accurately measure the temperature of the curved surface of the preform with the necessary repeatability as evidenced by document D52.

Therefore, the patent specification did not enable the person skilled in the art to carry out the invention.

VII.2 Novelty (main request)

Document D27 disclosed an injection orientation blow moulding process comprising all the features of the preamble of claim 1 according to the main request. In addition, it taught "immediate orientation-blow" which meant that orientation blow moulding should be performed as quickly as possible without delay. Under

these circumstances, orientation blow moulding was inevitably carried out before the surface temperature of the preform reached a peak temperature.

Furthermore, document D1 also disclosed an injection orientation blow moulding process comprising all the features of the preamble of claim 1 according to the main request. It further disclosed that reheating of the preform before blow moulding was not necessary. Document D1 did not make mention of any delay of the blow moulding process. Thus, when performing the process as taught in document D1, blow moulding inevitably occurred before the surface temperature peaked.

Therefore, the subject-matter of claim 1 of the patent in suit was not novel.

The subject-matter of dependent claims 5, 6 and 7 of the patent in suit as granted was not included in the first priority application of 30 March 1990. Therefore, document D44, which was made available to the public before the filing date of the second priority application, represented prior art with respect to the subject-matter of these claims and destroyed their novelty.

VII.3 Inventive step (main request, claim 1)

Document D27 represented the closest prior art. It disclosed an injection orientation blow moulding process wherein orientation blow moulding was carried out immediately after moulding.

The object underlying the patent in suit might consist

in an increase of productivity. A person skilled in the art would not focus on an improvement of productivity by increasing the amount of cavities, because that would result in an increase of mass and a loss of speed. However, he or she would consider carrying out the process as quickly as possible and would thus consider a reduction of the machine cycle time.

As shown in documents D14, D15, D24, D28, D39 and D48, the prerequisite for carrying out blow moulding was that the temperature of the preform was within the orientation temperature range rather than the attainment of a uniform temperature distribution.

Therefore, in order to increase the productivity by shortening the machine cycle time, a person skilled in the art would carry out the step of blow moulding as soon as possible and independently of the question of whether or not the surface temperature of the preform reached a peak value.

The patent in suit neither disclosed nor claimed blow moulding outside of the orientation temperature range nor did claim 1 of the patent in suit specify a temperature gradient of the preform when blow moulding. There were further no advantages by blow moulding before the surface temperature peaked. According to the patent in suit (Tables 1 and 2, samples 1 and 5), bad bottles were produced although blow moulding had been carried out before the surface temperature reached a peak temperature.

The question, whether or not the surface temperature reached a peak temperature, was thus not relevant. The patent in suit simply re-expressed in time notes what

had been known in temperature notes.

Therefore, in order to increase the productivity of the process disclosed in document D27, it was obvious to carry out orientation blow moulding as soon as the preform reached the orientation temperature range, and thus before the surface temperature reached a peak temperature.

Consequently, the subject-matter of claim 1 of the main request did not involve an inventive step.

VII.4 Inventive step (auxiliary requests)

It was self-evident for a person skilled in the art, to select the structure of a preform with respect to the product to be produced. Moreover, it belonged to the common general knowledge that the thicker the portion of a hot preform, the greater the thermal mass in that portion, and that the degree of thermal mass determined the orientation degree of the oriented portion of the hollow article. Documents D14, D18 and D44 already disclosed that relationship.

Claim 1 according to the second auxiliary request comprised the commonly known feature of maintaining the temperature of a cooled injection mould at a predetermined value.

Claim 1 of the third auxiliary request taught nothing more than that the process worked. It was self-evident that the cooling time of the preform had to be selected such that orientation blow mould could be carried out.

The subject-matter of claim 1 of the first, second and

third auxiliary requests thus did not involve an inventive step.

VII.5 The fourth and fifth auxiliary requests only comprised amended dependent claims. The amended claims did not alter the scope of the broadest claim and therefore offended against Rule 57(a) EPC. Furthermore, the amendments also offended against Article 123(2) EPC.

Reasons for the Decision

1. *Sufficiency of disclosure*

With respect to the issue of sufficiency of disclosure, the question to be answered is whether a person skilled in the art was enabled to determine, with sufficient accuracy, the time when the surface temperature of the preform reaches a peak temperature. A correct determination of that time would enable a person skilled in the art to carry out the invention according to the patent in suit as granted.

1.1 Firstly, the fact that the surface temperature of a preform reaches a peak temperature is a feature to be expected in a process, wherein the preform after its release from a cooled injection mould is redistributing its internal heat while kept in ambient air.

The surface temperature of the preform rises responsive to the heat transfer from the centre to the surface of the preform, attains a peak temperature, when the amount of heat transferred from the centre area of the preform towards the surface area equals the amount of heat dissipating from the surface, and, thereafter,

decreases due to the loss of heat within the preform.

- 1.2 Secondly, a person skilled in the art was enabled to determine the lapse of time between the release of the preform from the injection mould and the moment when the surface temperature reaches that peak temperature.

At the earliest priority date of the patent in suit, i.e. in March 1990, methods and apparatuses for measuring the surface temperature of an object belonged to the common general knowledge. No evidence had been produced which shows that a surface temperature could not be measured with sufficient accuracy in the year 1990. Since temperature measuring is a standard procedure, it was not necessary to indicate a specific method and/or a specific apparatus. It was therefore also not necessary to examine whether the apparatus IR-AHOT mentioned on page 6, line 15 of the patent in suit actually was suitable to determine the time of the peak temperature.

- 1.3 Thirdly, a person skilled in the art was enabled to carry out an orientation blow moulding process in such a way that blow moulding is carried out before the surface temperature reaches a peak temperature.

The patent in suit concerns an injection orientation blow moulding method. Such a process is used for producing a large number of identical objects, for example bottles. Presetting of the machine and process parameters is common practice, and making test runs is a known method for determining the various parameters. In the present case, a person skilled in the art would carry out time-related measurements of the surface temperature of preforms after their release from the

injection mould. In order to determine the accurate time of the peak temperature, he would obviously carry out a sufficiently large number of measurements and process the thus acquired data using commonly known statistical methods. Such an approach falls within the common practice.

1.4 Admittedly, the graphs in Figure 5 of the patent in suit, which indicate time vs. temperature characteristics of specific samples, show some variations which do appear to obstruct the accurate determination of the time when the surface temperature reaches a peak temperature. However, this cannot be regarded as evidence that an accurate determination of that time was impossible. A person skilled in the art would consider carrying out more test runs with a specific type of a preform under predetermined conditions, in order to be enabled to determine the time of the peak temperature with sufficient accuracy. Moreover, Figure 6 of the patent in suit shows a smooth curve which allows an accurate determination of the time when the peak temperature is reached.

1.5 Therefore, the Board comes to the conclusion that a person skilled in the art was enabled to determine the time when the surface temperature reaches a peak temperature for a specific type of preform with sufficient accuracy using commonly available temperature measuring devices and by applying known statistical methods.

The patent in suit thus discloses the invention as defined in the claims of the patent in suit as granted, i.e. according to the main request, in a manner sufficiently clear and complete for it to be carried

out by a person skilled in the art as required by Article 83 EPC. The same applies with respect to the invention as defined in the claims of the auxiliary requests.

2. *Novelty*

Main request

2.1 None of the cited documents explicitly discloses an injection orientation blow moulding method wherein the article is blow moulded before the surface temperature of the preform reaches a peak temperature. None of the cited prior art makes mention of a surface peak temperature and, accordingly, none of the cited prior art relates the occurrence of such a surface peak temperature with the timing of blow moulding of an article.

2.2 That method is not disclosed implicitly in the prior art either.

Document D27 discloses a method wherein an article is blow moulded immediately after injection moulding of the preform. The transfer of the preform from the injection station to the blow moulding station, closing of the blow mould and starting blow moulding inevitably takes some time. Therefore, it cannot be assumed that blow moulding is inevitably started before the surface temperature of the preform reaches a peak temperature.

The same applies with respect to the prior art as disclosed in document D1.

Document D44 appears to have been made available to the

public after the first but before the second and third priority date of the patent in suit. Thus, document D44 may represent prior art with regard to the claims which are not based on the first priority application.

However, document D44 only suggests that the injection moulded preform is immediately transferred to the blowing station and that it should be stretch blown without delay, cf. pages 3 and 4. Thus, for the reasons mentioned above, this cannot be construed as meaning that blow moulding is inevitably initiated before the surface temperature reaches the peak temperature. Therefore, neither the actual publication date of document D44 nor the question, whether or not the subject-matter of all the claims according to the main request is based on the first priority application, has to be investigated in detail with regard to the issue of lack of novelty.

Consequently, the subject-matter of claim 1 as well as that of the dependent claims 2 to 7 of the main request is novel in the sense of Article 54 EPC with regard to the cited prior art.

Auxiliary requests

- 2.3 The same applies to the subject-matter of the claims of the auxiliary requests, which all comprise the feature of orientation blow moulding before the surface temperature of the preform reaches a peak temperature.

- 3. *Inventive step*

Main request

- 3.1 As acknowledged by the appellant, an injection blow moulding method comprising the steps of injecting molten resin, quick cooling, releasing, transferring and blow moulding of a preform as defined in the preamble of claim 1 of the patent in suit was well known in the art. Document D27, which represents the closest prior art, shows a diagram of such an injection orientation blow moulding process with respect to a so-called SBIII series machine. A preform produced in an injection station and held in a lip mould is transferred directly to a stretch blow station wherein perfect control of preform conditioning is achieved by immediate orientation-blow, cf. page 3, left column of document D27.
- 3.2 The prior art, in particular document D27, does not disclose whether orientation blow moulding is carried out before, at or after the surface temperature of the preform has reached a peak temperature. It does not suggest any link between the time of orientation blow moulding and the time the surface temperature of the preform reaches a peak temperature.
- 3.3 Therefore, the question to be answered is whether a person skilled in the art, having the object to provide an injection orientation blow moulding process, would consider carrying out that process in such a way that orientation blow moulding is carried out before the surface temperature reaches a peak temperature.
- 3.3.1 According to the prior art, an essential prerequisite for carrying out orientation blow moulding is that the temperature of the preform attains the stretch temperature range, cf. document D24, page 81, third paragraph and page 88, Figure 10; document D14,

column 5, lines 36 to 40, document D39, column 6, lines 47 to 61 and document D48, page 547, Figure 14.3.

Consequently, a person skilled in the art would, in general, consider blow moulding of a preform provided that the preform attained the stretch temperature. He would consider this course of action regardless of whether or not the surface temperature of the preform reached a peak temperature, because the known prerequisite for blow moulding is the attainment of the stretch temperature rather than the attainment of a surface peak temperature.

- 3.3.2 It is further noted that the patent in suit does not claim blow moulding outside of the stretch temperature range. Furthermore, no evidence has been produced which shows that initiating blow moulding before the surface temperature peaks signifies that blow moulding is carried out on the outside of the stretch temperature range.

Blow moulding of a preform before the surface temperature reaches a peak temperature thus indicates that the step is carried out at an early stage within the time period during which the temperature of the preform is within the stretch temperature range.

- 3.3.3 A person skilled in the art was motivated to carry out an injection blow moulding process in such a way that blow moulding is carried out at such an early stage and thus also before the surface temperature reaches a peak temperature:

It is a common object of a skilled person to improve the productivity of a machine and a process. Starting

from the closest prior art, the productivity could be improved by increasing the number of moulds. However, this results in an increase of mass, which has to be moved, and of costs. Therefore, a person skilled in the art would also consider improving the productivity by reducing the overall machine cycle time, which is a generally known measure for improving productivity. A reduction of the machine cycle time, which obviously can be achieved, for example, by reducing the time for opening and closing the moulds and transferring the preform, results in a shortening of the lapse of time between the release of a preform from the injection mould and its insertion in the blow moulding station.

Therefore, in doing so, a person skilled in the art would obviously arrive at that point where orientation blow moulding is carried out at an early stage, and, finally, also before the surface temperature reaches a peak temperature.

- 3.3.4 There was no prejudice against initiating blow moulding at such an early stage.

Admittedly, blow moulding a short time after release from the injection mould implies that the preform is in a transient stage and that the temperature distribution within the preform is not uniform, as shown in document D24, page 78 and Figure 7, and document Annex G, whereas document D15 suggests a substantially uniform temperature distribution of the preform for best control of orientation, cf. column 7, lines 12 to 16 and column 9, lines 31 to 39.

However, document D24 makes mention that when carrying out such a process, an unavoidable compromise has to be

made with respect to the temperature distribution within the wall of the preform, because, for practical reasons, it is not possible to wait until the preform attains a uniform temperature. According to document D24, pages 77 and 78, an injection moulded preform must be cooled rapidly and, in a one-stage process, it is intended to cool the preform only enough for its average temperature to reach the temperature chosen for orientation, cf. document D24, page 78 bottom.

Furthermore, document D14 suggests an orientation blow moulding system comprising a conditioning station, nevertheless, it makes mention of a temperature difference between the centre of the preform and its surface of up to 28°C (280°F to 230°F) at the time of initiation of the inflation in the blow mould, cf. document D14, column 6, lines 26 to 31. Moreover, according to document D15, the term "a substantially uniform preform temperature" includes temperature distributions wherein the difference between the centre of the preform and its surface amounts to up to 20° C at the time of initiation of the inflation in the blow mould, cf. column 10, lines 20 to 26.

It is further noted that, according to the graphs shown in document "Annex G" representing the inner and outer temperature of a preform, the difference between these temperatures is less than 20°C even several seconds before the surface temperature reaches a peak temperature. These graphs were based on temperature measurements carried out by the appellant. It follows that the temperature differences within a preform several seconds before the surface temperature peaks do not exceed the temperature differences found acceptable for blow moulding in documents D14 and D15.

Therefore, a person skilled in the art would consider orientation blow moulding at an early stage and before the surface temperature reached a peak temperature despite a non-uniform temperature distribution.

3.3.6 Finally, according to the patent in suit, orientation blow moulding before the peak temperature is reached does not necessarily lead to products having an improved quality. In Table 2 (page 8) of the patent in suit, articles which had been blown before the surface temperature reached a peak temperature, are assessed as "bad", "white turbidity", "short of rigidity" and/or "one-sided wall thickness". Therefore, the question, whether the surface temperature has reached a peak temperature or not, cannot be regarded as being the key to making good products. The alleged improved quality of products made by the method according to the patent in suit was thus not in line with the statements in the patent in suit, and, therefore, cannot be considered to be an indication of any inventive step.

3.4 To sum up, a person skilled in the art, having the intention of improving the productivity of the process and apparatus disclosed in document D27, will take into consideration reducing the cycle time and, thus, shortening the time between the release of the preform from the injection mould and the beginning of blow moulding. By doing so, he would obviously consider carrying out the process in such a way that orientation blow moulding is carried out before the surface temperature of the preform has reached a peak temperature despite a non-uniform temperature distribution, provided that the preform attains the orientation temperature.

Therefore, the subject-matter of claim 1 of the patent in suit as granted, i.e. according to the main request, does not involve an inventive step within the meaning of Article 56 EPC.

4. *First auxiliary request*

Claim 1 of the first auxiliary request comprises, in addition to the features of claim 1 of the main request, the feature of adjusting the degree of orientation of various portions of the hollow article by intentionally adjusting the wall thickness in respectively corresponding portions of the injection moulded preform.

However, document D18 suggests that, in a one-stage or hot blow method of making molecularly oriented plastic bottles, a particular area of the preform can be made hotter or cooler by increasing or decreasing the thickness of that area. An extra plastic in the sidewall of the preform relative to the preform bottom thus provides additional heat, permitting a greater stretch, cf. abstract and column 3 lines 21 to 23.

It thus follows that it was already known, in particular, in a one-stage orientation blow mould process, to control the stretch and thus the degree of orientation by adjusting the wall thickness accordingly. It was obvious to apply that known measure for achieving the same purpose in a method wherein orientation blow moulding is carried out before the surface temperature of the preform reaches a peak temperature.

Therefore, the subject-matter of claim 1 of the first

auxiliary request does not involve an inventive step within the meaning of Article 56 EPC either.

5. *Second auxiliary request*

In addition to the features of claim 1 of the first auxiliary request, claim 1 of the second auxiliary request essentially comprises the feature that the temperature of the injection mould is maintained at a predetermined value.

It falls within the common practice to maintain the temperature of a cooled injection mould at a predetermined value in order to improve the control of the process and to provide similar conditions for all preforms.

Moreover, document D24 teaches that an injection moulded preform must be cooled rapidly in chilled mould (cf. page 77, last paragraph) and indicates in Figure 7 (page 78) the level of the mould temperature which corresponds to the ultimate preform temperature.

Therefore, the subject-matter of claim 1 of the second auxiliary request does not involve an inventive step within the meaning of Article 56 EPC either.

6. *Third auxiliary request*

As mentioned above, a prerequisite for orientation blow moulding consists in the temperature of the preform being within the stretch temperature range.

Accordingly, the additional feature of claim 1 of the third auxiliary request is self-evident. In order to carry out the process as desired it is necessary that

the cooling time be selected in such a manner that for any wall thicknesses present in the preform the surface temperature allows orientation blow moulding of the hollow article after release of the preform.

The fact that the inner temperature of the preform is on the outside of the stretch temperature range, when the blow moulding step is carried out, is not a subject-matter of claim 1 of the third auxiliary request.

Therefore, the subject-matter of claim 1 of the third auxiliary request does not involve an inventive step within the meaning of Article 56 EPC either.

7. The fourth and fifth auxiliary requests only comprise amended dependent claims 2 and 3 which are intended to replace corresponding claims of previous requests. However, any amendments of dependent claims do not alter the scope of any independent claim to which these claims may relate. These amendments are not occasioned by one of the grounds for opposition (lack of novelty and inventive step, insufficiency of disclosure) and are not allowable with regard to Rule 57a EPC.
8. Consequently, neither the main request nor any of these auxiliary requests of the appellant are allowable.
9. Almost at the end of oral proceedings, the representative of the appellant expressed his intention to submit a sixth auxiliary request.

However, the discussion at the oral proceedings has been restricted to objections already raised in written proceedings without introducing any surprising new

aspects which would have presented the appellant with a new case. There was therefore no clear justification for submitting a sixth auxiliary request. The Board, therefore, refused to consider a sixth auxiliary request because the latter has not been submitted by the appellant in due time.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

iM. Dainese

W. Moser