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# Datasheet for the decision of 13 October 2017

**Case Number:** T 0661/14 - 3.2.07

**Application Number:** 02742203.9

**Publication Number:** 1421000

**IPC:** B65B51/22

**Language of the proceedings:** EN

**Title of invention:**
METHOD AND SYSTEM FOR ULTRASONIC SEALING OF FOOD PRODUCT PACKAGING

**Patent Proprietor:**
Robert Bosch GmbH

**Opponents:**
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Azionaria Costruzioni Macchine Automatiche A.C.M.A. S.p.A.
Hutchinson, Thomas Owen
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**Headword:**

**Relevant legal provisions:**
EPC Art. 123(2), 56
RPBA Art. 12(4), 13(3)



This datasheet is not part of the Decision.
It can be changed at any time and without notice.

**Keyword:**
Representation - oral submissions by accompanying person (allowed)
Late-filed request - admitted (yes)
Amendments - allowable (yes)
Inventive step - (yes)

**Decisions cited:**

**Catchword:**


This datasheet is not part of the Decision.
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**Case Number: T 0661/14 - 3.2.07**

# D E C I S I O N
# of Technical Board of Appeal 3.2.07
# of 13 October 2017

| | |
|---|---|
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**Decision under appeal:**

**Interlocutory decision of the Opposition Division of the European Patent Office posted on 20 January 2014 concerning maintenance of European patent No. 1421000 in amended form.**

**Composition of the Board:**

**Chairman** G. Patton
**Members:** V. Bevilacqua
C. Brandt

## Summary of Facts and Submissions

I. The patent proprietor (appellant 1) and opponent 2 (appellant 2) lodged appeals against the interlocutory decision of the opposition division maintaining European patent EP 1 421 000 in amended form.

Opponents 1, 3 and 4 have not appealed against the interlocutory decision. They are parties to the appeal proceedings as of right pursuant to Article 107, second sentence, EPC.

II. The present decision refers to the following documents mentioned during the opposition proceedings:

E1: US 4 517 790 A;
E3: EP 0 676 331 A;
E6: WO 00/15381 A; and
A2: EP 0 731 022 A.

III. Appellant 1 requested with its statement setting out its grounds of appeal that the decision under appeal be set aside and that the patent be maintained on the basis of one of the sets of claims according to a main request or one of the first to third or fifth to seventh auxiliary requests, or that appellant 2's appeal be dismissed (fourth auxiliary request), all sets of claims being filed therewith.

IV. Appellant 2 requested with its statement setting out its grounds of appeal that the decision under appeal be set aside and that the patent be revoked.

V. In the annex to the summons to oral proceedings the Board provided the parties with its preliminary opinion on appellant 1's requests.

VI. By letter of 13 September 2017 appellant 1 replaced all the previously submitted requests with a new main request and new auxiliary requests 1-7.

VII. By letter of 28 September 2017 appellant 2 requested that an accompanying person be authorised to make submissions on the admissibility of the amendments to the main request and on inventive step for all appellant 1's requests under the supervision of the authorised representative(s).

VIII. Oral proceedings were held on 13 October 2017.

For the further course of the oral proceedings, in particular the issues discussed with the parties, reference is made to the minutes.

At the end of the oral proceedings appellant 1 requested that the decision under appeal be set aside and that the patent be maintained in amended form according to the main request, as amended during the oral proceedings, or, in the alternative, on the basis of any of the first to sixth auxiliary requests, all requests as filed with the letter dated 13 September 2017.

Appellant 2 requested that the decision under appeal be set aside and that the European patent be revoked.

IX. The wording of the independent claim 1 of the main request is as follows (the features added with respect to the originally filed claim 1 are in bold, emphasis added by the Board):

"A system for ultrasonically sealing food product packaging, said system including:

a direct on-item-packaging forming box **(116)** forming a food product packaging directly around a food product **in an ultrasonic sealing system** to form a partially packaged food product **(118)**;

an ultrasonic food product packaging fin-sealing unit **(130)** for ultrasonically fin-sealing said partially packaged food product **(118)** to form a partially sealed food product packaging around said food product **(118)**~~;~~, and~~,~~

an ultrasonic food product packaging end-sealing unit **(140**) for ultrasonically end-sealing said partially sealed food product (**118**) packaging to form a completely sealed food product packaging around said food product, **the ultrasonic product packaging end-sealing unit (140) comprises a rotating ultrasonic horn unit (310) having at least two ultrasonic sealing horns (315) and a rotary anvil (320) having at least two anvil sealing edges, wherein the rotary anvil (320) and the rotating horn unit (310) are adapted to rotate around a rotating axis, respectively.**"

The wording of the independent claim 14 of the main request is as follows (the features added with respect to the originally filed claim 6 are in bold, emphasis added by the Board):

"A method for ultrasonically sealing food product packaging formed directly around a food product **(121)**, said method including the steps of:

forming a food product packaging **(113)** directly around a food product **(121) in an ultrasonic sealing system** to form a partially packaged food product **(118)**;

ultrasonically fin-sealing said partially packaged food product **(118)** to form a partially sealed food product packaging around said food product **(118)**; and,
ultrasonically end-sealing said partially sealed food product packaging to form a completely sealed food product packaging around said food product, **wherein a rotating ultrasonic horn unit (310) having at least two ultrasonic sealing horns (315) and a rotary anvil (320) having at least two anvil sealing edges are provided, which rotate around a rotating axis, respectively, to ultrasonically end-seal the partially sealed food product."**

In view of the present decision, the wording of independent claims of the auxiliary requests is irrelevant.

X. The appellant 2 substantially submitted the following objections against the main request.

The set of claims according to the main request submitted by letter of 13 September 2017 was late-filed and should not be admitted on the ground that it was not *prima facie* allowable because it did not deal with all the objections to it raised during the opposition and appeal proceedings.

This main request should have been filed earlier, because the issue of the lack of compliance of granted claim 9 with the requirements of Article 123(2) EPC had already been raised during the opposition proceedings.

The amendments made to claims 1 and 14 of the main request extended beyond the content of the originally filed application and in particular could not be derived from the original description, page 21, lines 4 to 16, figures 3 and 12 and original claim 21.

Neither this passage in the description nor the figures disclosed that the rotating ultrasonic horn unit had at least two ultrasonic sealing horns and that the rotary anvil had at least two anvil sealing edges.

There was no basis for having three horns and three edges, but as a result of the above-mentioned amendment such a configuration had now been claimed in the main request.

The original description stated that the ultrasonic horn unit and the rotary anvil rotated along a horizontal axis and not around a generic "rotating axis". The description and the drawings gave no indication at all of the possibility that the axes of the ultrasonic horn unit and the rotary anvil might be vertical or inclined, as now encompassed by the claims.

Original claim 21 could not be considered to be a basis for the above amendments because the following features thereof:
"said ultrasonically activated end-sealing horn and rotary anvil operating in conjunction to ultrasonically end-seal said food product packaging passing between said ultrasonically activated end-sealing horn and rotary anvil"
were missing from claims 1 and 14 of the main request.

Claim 2 of the main request recited that the rotating axes of the rotating ultrasonic horn unit and rotary

anvil extended in parallel, which had not originally been disclosed.

These features were also not derivable from the original description, page 21, lines 14-16, and from figures 3 and 12 because this passage in the description only specified that the ultrasonic horn unit and the rotary anvil might rotate along a horizontal axis.

In addition, nowhere in the specification as filed was it indicated that the rotational axes of the horn unit and of the anvil were parallel but not horizontal.

Claims 6 and 7 of the main request recited that the ultrasonic sealing horns and the anvil edges of the rotary anvil were arranged at the same radius with respect to the centre point of the ultrasonic horn unit and of the rotary anvil respectively.

This was also not disclosed in the originally filed documents, especially because figures 3 and 12, being perspective views, did not make it possible to measure the distance of the horns and the anvil edges from the respective centres.

For these reasons the requirements of Article 123(2) were not fulfilled.

E3 and A2 both disclosed a system and a method which were suitable starting points to discuss inventive step.

The only distinguishing feature of the subject-matter of claims 1 and 14 of the main request was therefore

that the end seals were performed using ultrasound technology instead of heat-seal technology.

This increased the speed of the welding step, and therefore led to an improvement in efficiency.

Documents E6 and E1 showed that the skilled person was well aware of ultrasound technology and its advantages in relation to process efficiency.

The skilled person would therefore, on the basis of his general knowledge, as documented by E1 and E6, be able to apply ultrasound technology to the methods and systems disclosed in E3 and A2 in a straightforward way, by modifying their rotating heat-sealing horn units into ultrasonic horn units, thereby arriving at the subject-matter of claims 1 and 14 of the main request without inventive skill.

This modification would be particularly straightforward starting from A2, as this document disclosed protruding horns which would be particularly suitable for ultrasonic sealing.

The skilled person would also, in order to improve the productivity of the methods and systems of E3 or A2, immediately apply the ultrasonic sealing method steps and devices taught by E6 or E1, thereby arriving again at the subject-matter of claims 1 and 14 of the main request in an obvious manner.

That the single horn (52) of E1 did not carry out a purely rotational movement would not be a problem in applying ultrasound technology because purely rotational movement of the welding unit was already known from E3 (and A2), and the skilled person would

therefore only take from E1 the teachings which allowed him to improve the process efficiency.

In addition, if the skilled person was able to bring ultrasonic energy to the tool of E1, which moved according to a complex movement (linear plus pivotal), he would find it easier to bring the same energy to a tool moving according to a simple (rotating) movement.

XI. Insofar as relevant to the present decision, appellant 1 argued substantially as follows:

The person accompanying the representatives of appellant 2 could be allowed to speak, under supervision, only on technical issues, but could not make submissions to the board on the admissibility of the requests submitted by letter of 13 September 2017, because this was a legal issue.

The amendments made to set of claims of the main request submitted by letter of 13 September 2017 (deletion of claim 9) were a straightforward reaction to an objection of added subject-matter raised by the Board in its preliminary opinion. These amendments neither raised new issues, nor increased the complexity of the case. The main request should hence be admitted into the proceedings.

The amendments made to claims 1 and 14 of the main request which had been objected to by appellant 2 were allowable in the light of original claim 21 and the embodiment disclosed on page 21, lines 4-9, of the originally filed description.

E3 and A2 were both suitable starting points for an inventive-step discussion, but in such a discussion due

regard should be paid to the fact that they did not relate to ultrasound technology at all.

As a consequence, it was not correct to say, as appellant 2 did, that the only difference was the use of ultrasonic sealing instead of heat sealing. E3 and A2 both failed to disclose a rotating ultrasonic horn unit having at least two ultrasonic sealing horns.

The use of a rotating ultrasonic horn unit having at least two ultrasonic sealing horns instead of the rotating thermal sealing horn unit of E3 or A2 achieved the effect that process speed and seal quality were both improved.

The objective technical problem to be solved was therefore to improve the efficiency and quality of the food product packaging systems and methods known from E3 or A2.

Looking for a solution, the skilled person would not consider E6, because the ultrasonic bonding device disclosed therein was not suitable for providing seals on a food product packaging.

There was no motivation for a person skilled in the art to replace the identical cross-seal shafts (12) for performing electric heat sealing of E3 (or those (15) of A2) with the single roll-shaped ultrasonic horn (16) and the anvil (18) of E6, by means of which layers of material were continuously bonded together, because this sealing configuration was not suitable to form seals at predetermined positions between two food products.

Further, even assuming a person skilled in the art would combine the teaching of document E3 (or A2) with that of E6, he would still not arrive at the subject-matter of claims 1 and 14 of the main request, as there was no disclosure in said documents of a rotating ultrasonic sealing horn unit having at least two ultrasonic sealing horns.

E1 also did not contain any teaching towards such an ultrasonic sealing unit which might cast doubt on the presence of an inventive step.

E1 disclosed a single ultrasonic horn (52), which carried out a pivotal movement, i.e. not a rotation, to come in contact with an anvil bar (48).

A person skilled in the art would not combine the teachings of E3 (or A2) and E1, because of the differences in the movement pattern of the ultrasonic horn unit (52) of document E1 (pivotal movement) and of the cross-seal shafts (12) of document E3 (rotating) (or those (9, 10) of A2).

E3 (or A2) and E1 were also not compatible because the ultrasonic converter (84) and the booster (90) of E1 were arranged as an extension of the ultrasonic horn (52), pivoted together with the horn (52) and, thus, could not be used to replace the heat sealing tools (15) of E3 (or those (15) of A2).

Therefore, the subject-matter of claims 1 and 14 of the main request was also based on an inventive step in view of a combination of documents E3 with E1, and A2 with E1.

## Reasons for the Decision

1. *Accompanying person - right to speak on legal issues*

Appellant 1 holds the view that accompanying persons at oral proceedings who are not qualified patent attorneys can only be allowed by the Board to speak on technical issues, and not to make submissions on legal issues. Hence, for appellant 1 the person accompanying appellant 2's authorised representative(s) at the oral proceedings should not be allowed to make submissions on legal issues.

The Board disagrees.

There is no reason, when dealing with the question whether an accompanying person may make oral submissions before the the Board, to make a distinction between legal and technical issues, provided that these submissions are made under the control and supervision of an authorised professional representative. In this respect the Board refers to the Case Law of the Boards of Appeal, 8th Edition 2016, III.R.5.1. Since three authorised professional representatives were present at appellant 2's side during the oral proceedings, the Board decided to authorise the accompanying person to address the Board under their supervision.

2. *Main request - admissibility*

2.1 Appellant 2 argues that the main request should not be admitted in application of Article 12(4) RPBA because the issue of the lack of compliance of granted claim 9 with the requirements of Article 123(2) EPC was raised during opposition, and as a consequence appellant 1

should have deleted this claim earlier, and not shortly before oral proceedings before the Board.

The Board disagrees. The fact that this objection was raised during opposition is not a reason for concluding that the present main request should have been filed earlier. This is particularly true because the opposition division decided on this particular issue (see point 1.3 of the grounds of the appealed decision) in favour of appellant 1, such that no need to remove claim 9 became apparent.

2.2 Appellant 2 also argues that, as only one of the objections raised to the main request has been dealt with by this amendment, the request is not clearly allowable, and should therefore not be admitted in application of Article 13(3) RPBA.

The Board disagrees again. Clear allowability is only one of the possible criteria to be used when deciding on the admissibility of claims submitted after a summons to oral proceedings has been issued.

In the present case the Board notes that the amendment made to the main request decreases the complexity of the discussion, as it clearly overcomes one of the objections raised to the previous main request, without introducing new issues, and therefore decides to admit it pursuant to Article 13(3) RPBA.

3. *Main request - amendments*

3.1 Original claim 21

The Board considers that the subject-matter of claims 1 and 14 of the main request does not extend beyond the content of the originally filed documents.

The following features of claim 1 of the main request are disclosed in original claim 21: a system for ultrasonically sealing food product packaging, said system including an ultrasonic food product packaging end-sealing unit for ultrasonically end-sealing a food product packaging to form a sealed food product packaging around said food product, whereby the ultrasonic product packaging end-sealing unit comprises a rotating ultrasonic horn unit (call end-sealing horn) and a rotary anvil, wherein the rotary anvil and the rotating horn unit are adapted to rotate around a rotating axis, respectively.

Analogously, the following features of independent claim 14 of the main request can be regarded as being disclosed in original claim 21: a method for ultrasonically sealing food product packaging including the steps of ultrasonically end-sealing a food product packaging to form a sealed food product packaging, wherein a rotating ultrasonic horn unit (called end-sealing horn) and a rotary anvil are provided, which rotate around a rotating axis, respectively, to ultrasonically end-seal the partially sealed food product.

3.2 "At least two"

3.2.1 Appellant 2 argues that the features of claims 1 and 14 of the main request according to which the rotating ultrasonic horn unit has at least two ultrasonic sealing horns and the rotary anvil has at least two

anvil sealing edges contravene the requirements of Article 123(2) EPC.

This is because a skilled reader of the application as originally filed would not understand "more or less [than four]", when accompanied by the values 2 and 8 which are half and double four respectively, to define a continuous range.

By contrast "at least two", as now claimed, is a continuous range, also encompassing configurations in which the number of horns or edges can be an odd number (three, for example).

3.2.2 The Board disagrees.

According to page 21, lines 4-9, there can be two, four or eight, or "more or less" than four horns and edges. Not only is this statement (more or less than four) accompanied by the values 2 and 8, but it should also be read together with the general teaching that the number of ultrasonic horns and anvils and the angles at which they are arranged depend on the desired product length.

On that basis the Board does not see any reason to consider that "more or less" than four would be read by a skilled person in the context of the application as filed as excluding odd numbers or a range.

3.3 Rotating - horizontal - parallel

3.3.1 Appellant 2 argues that in the description of the application as originally filed there is only a basis for claiming that the ultrasonic horn unit and the rotary anvil rotate along a respective horizontal axis,

as this is what is disclosed on page 21, lines 14-15, of the original description.

The description and the drawings give no indication at all of the possibility that the axes of the ultrasonic horn unit and the rotary anvil might be vertical or inclined.

There is, therefore - still according to appellant 2 - neither a basis for claiming a generic "rotating axis", as now done in claims 1 and 14, nor for referring to axes generically extending "in parallel", as now specified in claim 2.

3.3.2 The Board disagrees again.

Original claim 21 discloses an end-sealing system based on ultrasonic technology and including simply a rotary anvil and a rotating horn operating in conjunction.

This provides a basis for not specifying the orientation (horizontal) of the rotating axes.

Further, the passage to which appellant 2 refers (page 21, lines 14-15) does not relate to the embodiment of lines 4-9, which was identified (see point 3.2.1 above) as providing a basis for the feature "at least two".

Hence, the Board considers that this feature ("at least two") is not disclosed as being structurally or functionally linked so as to need - in order to fulfil the requirements of Article 123(2) EPC - to have the former feature ("horizontal") included in claims 1 and 14 once the latter has been introduced.

In addition figures 1, 3 and 11 provide a basis for claiming that these axes are parallel, as parallelism is for the skilled person immediately derivable there, especially because he would not come to the idea that the horn sealing edges and the raised edges of the anvil lie on conical surfaces instead of cylindrical surfaces, as alleged by appellant 2.

3.4 Missing features

3.4.1 Appellant 2 argues that claims 1 and 14 of the main request extend beyond the contents of the original application by not containing the following features of original claim 21: said ultrasonically activated end-sealing horn and rotary anvil operating in conjunction to ultrasonically end-seal said food product packaging passing between said ultrasonically activated end-sealing horn and rotary anvil.

3.4.2 The Board disagrees again, because it is clear from claims 1 and 14 that the ultrasonically activated end-sealing horn unit and the rotary anvil inevitably operate in conjunction to ultrasonically end-seal the food product packaging, which is necessarily positioned between the horn unit and the rotary anvil unit.

3.4.3 For the sake of completeness the Board notes that the embodiment described on page 21, lines 4-9, is described as only differing from the previously described, depicted embodiment (see figure 1 and page 17, line 10) in the number of sealing horns and anvil edges. As a consequence, the features of claim 1 of a direct on-item-packaging forming box, forming a partially sealed food product packaging directly around a food product with an ultrasonic food product packaging fin-sealing unit (see page 17, lines 10-22)

are also to be considered to be originally disclosed in combination with said range of "at least two".

3.5 Distance of anvils and horns from the centre

3.5.1 Appellant 2 further argues that claims 6 and 7 of the main request also contravene the requirements of Article 123(2) EPC because there is no basis for claiming that the ultrasonic sealing horns and the anvil edges of the rotary anvil are arranged at the same radius with respect to the centre point of the ultrasonic horn unit and of the rotary anvil respectively.

This is because figures 3 and 12, being perspective views, do not make it possible to measure the distance of the horns and the anvil edges from the respective centres.

3.5.2 The Board disagrees. The contested features are not explicitly mentioned in the original description, but are, in the eyes of a skilled person, implicitly disclosed therein. This is because if the distances of the ultrasonic sealing horns and of the anvil edges from their respective centre points were not the same, edge-sealing would occur, for each pair of co-operating horn and anvil, in a different plane, and this is not what a skilled person would derive from the original figures (see the configuration depicted in figures 1, 3 and 12).

4. *Inventive step*

Appellant 2 has argued that the subject-matter of claims 1 and 14 of the main request does not involve an inventive step starting from either E3 or A2 as the

closest prior art and in view of the skilled person's common general knowledge or the teaching of E1 or E6. The Board shares appellant 2's view that either E3 or A2 can be regarded as plausible closest prior art for discussing whether the subject-matter of claims 1 and 14 involves an inventive step, as the system and the method disclosed in E3 or A2 aim at continuously forming a sealed sheet package directly around an article like in said claims 1 and 14 (see E3, claim 1; A2, claims 1 and 16).

4.1 Starting from E3

4.1.1 E3 discloses a system (see figure 1) for sealing a food product packaging (5), said system including:

a direct on-item-packaging forming box (8) forming a food product packaging (7) directly around a food product (3; see also column 5, lines 3-10) in a sealing system to form a partially packaged food product;

a food product packaging fin-sealing unit (formed by sealing rollers (11); see figure 1) for fin-sealing said partially packaged food product to form a partially sealed food product packaging (tube 9; see again column 5, lines 3-10) around said food product (3); and

a food product packaging end-sealing unit (referred to as "cross seal shafts" (12); see column 5, starting from line 9) for end-sealing said partially sealed food product (3) packaging to form a completely sealed food product packaging (5) around said food product.

The product packaging end-sealing unit of E3 (12) comprises a rotating heat seal unit (the upper shaft

12) having at least two heat sealing horns (15; see figure 2) and a rotary anvil (the lower shaft 12) having at least two anvil sealing edges (15), wherein the rotary anvil (12) and the rotating horn unit (12) are adapted to rotate around a rotating axis, respectively.

E3 also discloses a method for sealing food product packaging formed directly around a food product (see figure 1, and column 5, lines 1-28), said method including the steps of:

forming a food product packaging (7) directly around a food product (3) in a sealing system to form a partially packaged food product (the tube 9);

fin-sealing said partially packaged food product to form a partially sealed food product packaging (9) around said food product (3); and end-sealing said partially sealed food product packaging to form a completely sealed food product packaging (5) around said food product, wherein a rotating horn unit (12) having at least two sealing horns (15) and a rotary anvil (12) having at least two anvil sealing edges (15) are provided, which rotate around a rotating axis respectively (see figures 1 and 2), to end-seal the partially sealed food product.

4.1.2 Distinguishing features

Appellant 2 argues that, as already stated in the appealed decision, the only difference between the subject-matter of claims 1 and 14 of the main request and the system and method disclosed in E3 is that all the seals are performed using ultrasound technology instead of heat-seal technology.

This is because E3 already discloses a thermal sealing horn unit, having at least two sealing horns.

The Board disagrees. By not mentioning ultrasonic sealing, E3 also fails to disclose **a rotating ultrasonic horn unit having at least two ultrasonic sealing horns**.

The thermal sealing horn unit of E3 is not only different from the one which is claimed in terms of the source of energy applied for the sealing (electric versus ultrasonic), but also in terms of the structure.

The sealing horns of E3 (tools 15; see figure 3 and column 6, lines 30-39) are hence not suitable to perform ultrasonic welding.

This is because the term "ultrasonic" implies the presence of all the features which are necessary to perform ultrasonic welding, like, for example, a source of ultrasonic vibration.

4.1.3 Technical effect - problem to be solved

The effect achieved by using a rotating ultrasonic horn unit instead of the thermal sealing unit of E3 is that the end-sealing of the package is done by ultrasonic sealing instead of thermal sealing.

Ultrasonic sealing is, when compared with the thermal sealing process disclosed in E3, faster (see paragraph [16] of the patent in suit).

As in the appealed decision, and in agreement with appellant 2, the Board considers that the problem to be

solved is (see paragraph [23] of the patent in suit) to improve the speed and the efficiency of the food product packaging system and method of E3 (see impugned decision, page 5, tenth paragraph).

4.1.4 Inventiveness

(a) Combination with the knowledge of a skilled person

The Board concurs with the appealed decision and with appellant 2 on the point that ultrasonic sealing technology is a very well-known technology, used to join or weld sheet materials such as those mentioned in E3 in a fast and efficient way, and notes that this assessment has not been contested by appellant 1.

The Board also notes that this knowledge is presented in the introductory portion of the description of document E6 (see from page 2, line 16, to page 6, line 2).

Appellant 2 argues that, based on this knowledge, the skilled person would consider ultrasonic welding to be a valid technical solution for increasing the speed of the system and method disclosed in E3, and apply it to the rotating **thermal** sealing horn unit disclosed therein, which already has at least two sealing horns, to **convert** it into a rotating **ultrasonic** horn unit having at least two ultrasonic sealing horns.

This would be possible because, according to appellant 2, ultrasonic sealing is a well-known technology, often based on rotary tools (as explained on page 4, lines 22-31 of E6, referring to the background art).

The Board disagrees.

Even if, as discussed above, the skilled person knows that ultrasonic sealing technology can be used to join or weld sheet materials such as those mentioned in E3 in a fast and efficient way, and that ultrasonic rotary tools can, as shown in E6, be built and used for that purpose, that is still not enough guidance to convert the heat sealing horn unit of E3 into an ultrasonic sealing unit as claimed without inventive skill.

As a matter of fact, the claimed ultrasonic horn unit having at least two ultrasonic sealing horns is not a tool available "off the shelf" that the skilled person could simply select and implement in the system and method of E3. Appellant 2 has not provided any evidence that such a tool would exist. The skilled person would therefore first have to develop it in an undisclosed and unknown manner. No guidance is available to the skilled person on how to modify the sealing horns (15) of E3, figure 3 (column 6, lines 30-35), in order to implement ultrasonic horns instead. Hence, the skilled person would not arrive at the claimed ultrasonic horn unit in an obvious manner using his common general knowledge.

(b) Combination with the teaching of E6

As noted by appellant 2, a skilled reader of E6 understands (see in particular page 6, line 14, "high speed bonding") that ultrasonic welding is a fast and suitable technology to seal the food packaging materials used in the system and method of E3.

Based on that, appellant 2 considers that the subject-matter of claim 1 of the main request does not involve

an inventive step when, starting from E3, account is taken of the content and teaching of document E6.

The Board disagrees again.

E6 neither discloses nor suggests all the distinguishing features identified in point 4.1.2 above.

Figure 1 (see also page 8, lines 1-3) shows a rotating ultrasonic horn unit with a cylindrical shape, i.e. not a rotating horn unit having at least two ultrasonic sealing horns (see also background of E6, page 3, lines 11-13, and page 4, lines 5-26, where ultrasonic rotating horns are also mentioned).

As a consequence, even if a person skilled in the art would apply to the system and the method of document E3 the teachings of document E6 on ultrasonic welding, he would not resort to an ultrasonic end-sealing unit comprising a rotating ultrasonic horn unit having at least two ultrasonic sealing horns. As a matter of fact, such a disclosure and teaching are missing from E6.

(c) Combination with the teaching of E1

Appellant 2 argues that, by applying the teaching of E1 to the system and method of E3, the skilled person would arrive at the subject-matter of claim 1 of the main request without exercising any inventive skill.

This is because E1 discloses a packaging machine whose sealing devices are completely ultrasonic, both for the longitudinal seal (column 3, lines 15-17) and for the end seal (lines 24-29).

In this context appellant 2 considers that E1 teaches the use of a rotating anvil (48) co-operating with an ultrasonic rotating horn unit (see column 4, lines 38-43, where the rotation of the horn is explicitly mentioned), having, as shown in figure 2, two ultrasonic sealing horns corresponding to the protrusions of the horn (52) facing the sealing lands (63) of the anvil (48); see also column 3, line 30.

An indication to apply the teaching of this document to the system and method of E3 is given in column 1, line 48, to column 2, line 2, where it is said that in a system and method very similar to those disclosed by E3 it is possible and advantageous (see column 6, line 9: "increases production") to form both the fin seal and the end seals by ultrasonic sealing.

The Board disagrees.

E1 discloses (column 1, lines 59-62) a packaging machine whose sealing devices are completely ultrasonic, both for the longitudinal seal (column 3, lines 15-17) and for the end seal (lines 24-29). E1 teaches the use of a rotating anvil (48) co-operating with an ultrasonic horn (52; lines 38-41). As a matter of fact, E1 also teaches (see column 1, line 48, to column 2, line 2) that in a system and method very similar to those disclosed by E3 it is possible and advantageous (see column 6, line 9: "increases production") to form both the fin seal and the end seals by ultrasonic sealing.

E1 explains, however, that the mounting assembly of the sealing horn (52) does not provide for rotational movement, but rather results in a "simulated rotary

motion" (see column 3, lines 32-41, and column 4, lines lines 17-49).

As the movement of the horn (52) of E1 is in fact not a rotation (see figures 4 and 5, and column 4, lines 17-49), E1 fails to disclose a rotating horn unit.

E1 also fails to disclose an ultrasonic unit having two ultrasonic sealing horns.

Indeed, the Board cannot share appellant 2's view that the protrusions facing the sealing lands (63) of the anvil - see column 3, line 30 - are two distinguishable ultrasonic sealing horns. Indeed, said protrusions form a single horn (52) since they seal at the very same time. In fact, the ultrasonic horn (52) of E1 has a single slot (61) on its surface.

Appellant 2 argues that even if the single horn (52) of E1 does not carry out a purely rotational movement, that would still not be a problem for applying ultrasound technology to the rotating unit of E3 because purely rotational movement of the welding unit is already known from E3, and the skilled person would therefore only take from E1 the teachings which make it possible to improve the process efficiency.

In addition, appellant 2 argues that if the skilled person is able to bring ultrasonic energy to the tool of E1, which moves according to a complex movement (linear plus pivotal), he would immediately think of combining the two disclosures and find it easier to bring the same energy to a tool moving according to a simple (rotating) movement. This would then be a mere issue of engineering design to implement (at least) two

horns, as disclosed in E1, in the rotating sealing unit (12) of E3.

As already discussed above, the Board has doubts that a person skilled in the art would think of combining the teachings of E3 and E1, not only because of the structural and functional differences between the sealing units used in these documents, but also because the movement pattern of the ultrasonic horn unit (52) of document E1 (pivotal movement) and of the cross-seal shafts (12) of document E3 (rotating) are not compatible.

Consequently, the Board considers that the skilled person would not think of combining the teachings of E1 with those of E3.

Appellant 2 further argues that, as ultrasonic sealing is a very well-known technique, a skilled person would have no difficulties in applying this technique, shown in E1 in a relatively complex context, to the system and method of E3, where a simple rotational movement is involved.

The Board cannot accept this argument, because it is unsubstantiated and also because, as already discussed, it has not been shown how, in a straightforward manner, at least two ultrasonic sealing horns of the type disclosed in E1 could be installed in the rotating cross-seal shafts (12) of E3 to replace the seal tools (15) of the sealing unit of E3.

In particular, as the ultrasonic converter (84) and the booster (90) of E1 are arranged as an extension of the ultrasonic horn (52) and pivot together with it, it is not possible, without major modifications, to install

the disclosed arrangement in the rotating cross-seal shafts (12) of E3 to replace the seal tools (15) of the sealing unit of E3. The skilled person is left in the dark as to how to perform such implementation. Doing so would require a complete redesign of the sealing units of E3 in an undisclosed and unknown manner.

4.2 Starting from A2

4.2.1 A2 discloses a system and a method (see in particular figure 1) for sealing a food product packaging (column 1, lines 5-6), said system including:

a direct on-item-packaging forming box forming a food product packaging (column 3, lines 1-39) directly around a food product (2) in a sealing system (column 3, lines 6-7) to form a partially packaged food product (called tubular wrapping 5).

A2 also discloses a sealing unit for sealing said partially packaged food product to form a partially sealed food product packaging around said food product (column 3, lines 10-21).

A2 further discloses a food product packaging end-sealing unit (7; column 3, lines 22-39) for end-sealing said partially sealed food product packaging to form a completely sealed food product packaging around said food product.

The product packaging end-sealing unit (7) of A2 (see figure 1) comprises a rotating unit (9) having at least two sealing horns (15) and a rotary anvil (10) having at least two anvil sealing edges (15), wherein the rotary anvil and the rotating horn unit are adapted to rotate around a rotating axis (12, 13), respectively.

Appellant 2 argues that the horns (15; see figure 1) of the rotating unit of A2 are suitable to perform ultrasonic end-sealing because they protrude, in particular in a strong manner, from the central portion of the unit (9).

The Board disagrees for the following reasons.

A protruding element cannot be regarded as suitable for being used as an ultrasonic horn merely because it protrudes. An ultrasonic horn has to be shaped such that there is mechanical resonance at the desired ultrasonic frequency of operation. This implies that its length should correspond to one or a multiple of half the wavelength of ultrasound in the horn material, and that the dependence of the sound's speed on the horn’s cross-section is also taken into account. In a common assembly, the ultrasonic horn is rigidly connected to an ultrasonic transducer.

In any case, as already mentioned above in the discussion starting from E3, elements would have to be present in an undisclosed and unknown manner in the rotating unit (9) of A2 so as to provide a rotating horn unit as claimed.

As none of these elements are mentioned in A2, the thermal sealing horns disclosed therein are not suitable for ultrasonic sealing.

4.2.2 Distinguishing feature

The above analysis shows that A2 is comparable to E3 as closest prior art, because it also fails to disclose a

rotating ultrasonic horn unit having at least two ultrasonic sealing horns.

4.2.3 Technical effect - problem to be solved

The effect of this difference, as well as the problem to be solved, correspond to those already identified when E3 was considered as the closest prior art.

4.2.4 Inventiveness

As already discussed (see point 4.1.4 above), none of the available prior-art documents teaches or suggests these distinguishing features, nor do they belong to the skilled person's common general knowledge, and on this basis the presence of an inventive step has to be acknowledged.

5. *Adapted description*

At the oral proceedings appellant 1 filed a description adapted to its main request, to which neither appellant 2 nor the Board had objections.

**Order**

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

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to maintain the patent in amended form in the following version:

claims 1 to 18 according to the main request filed by letter dated 13 September 2017,

description: page 5 as amended during the oral proceedings on 13 October 2017, pages 1 to 4 and pages 6 to 13 of the patent specification,

drawings: figures 1 to 12 according to the patent specification.

The Registrar: The Chairman:

G. Nachtigall G. Patton

Decision electronically authenticated