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Datasheet for the decision of 7 June 2016

Case Number: T 2092/12 - 3.4.03

Application Number: 99931594.8

Publication Number: 1097475

IPC: H01L21/56

Language of the proceedings: EN

Title of invention:
MOULD, ENCAPSULATING DEVICE AND METHOD OF ENCAPSULATION

Applicant:
Besi Netherlands B.V.

Headword:

Relevant legal provisions:
EPC 1973 Art. 54(1)
EPC Art. 123(2)
RPBA Art. 13(1)

Keyword:
Novelty (no) - main and first auxiliary request
Second and third auxiliary request not admitted

Decisions cited:

Catchword:

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Case Number: T 2092/12 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 7 June 2016

Appellant: (Applicant)	Besi Netherlands B.V. Ratio 6 6921 RW Duiven (NL)
Representative:	Van den Heuvel, Henricus Theodorus Patentwerk B.V. P.O. Box 1514 5200 BN 's-Hertogenbosch (NL)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 19 March 2012 refusing European patent application No. 99931594.8 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	G. Eliasson
Members:	R. Bekkering
	T. Bokor

Summary of Facts and Submissions

I. The appeal is against the refusal of application No. 99 931 594 for lack of novelty, Article 54(1) EPC over both document:

D2: EP 0 730 937 A

and

D4: US 5 164 144 A.

II. On 10 September 2015, a summons to oral proceedings appointed for 7 June 2016 was issued by the board, provided with an annexed communication in which a provisional opinion of the board on the matter was given.

In particular, the appellant was informed that it appeared that the subject-matter of claim 1 of the sole request lacked novelty in the sense of Article 54(1) EPC 1973 over both document D2 and D4.

III. With letter of reply dated 20 May 2016, the appellant submitted amended claims according to a first to third "*optional alternative request*".

IV. At oral proceedings before the board, the appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the following:

Main request:

Claims 1 to 6 filed with the statement setting out the grounds of appeal dated 6 July 2012,

First auxiliary request:

Claims 1 to 7 titled "*First optional alternative request*" filed with letter of 20 May 2016,

Second auxiliary request:

Claims 1 to 7 titled "*Second optional alternative request*" filed with letter of 20 May 2016,

Third auxiliary request:

Claims 1 to 6 titled "*Third optional alternative request*" filed with letter of 20 May 2016.

V. Claim 1 according to the main request reads as follows:

"*Mould (1) for encapsulating electronic components mounted on a carrier, comprising:*
- at least two mould parts (2,3) displaceable relative to each other, the mould parts co-defining a mould cavity, the mould parts (2, 3) are positioned as an upper mould part (2) provided with recesses (14) and a lower mould part (3); and
- feed means (5) for encapsulating material having feed openings connecting to the recesses (14);
wherein the lower mould part (3) comprises a support plate (6, 7) defining a wall of the mould cavity, and comprising a plurality of suction runners (9) running there trough [sic] with apertures (8) for sucking the carrier flat against the support plate (6, 7) and the

suction runners (9) connecting at the opposite side to a side of the lower mould part (3) remote from the mould cavity, characterised in that
the apertures (8) of the suction runners (9) are arranged in groups located precisely at the positions where the recesses (14) for holding the electronic components to be filled with encapsulating material in the mould part (2) are formed, and
the support plate (9) of the lower mould part (3) is separated from the feed openings for encapsulating material that connect to the recesses (14) by the carrier."

VI. Claim 1 according to the first auxiliary request reads as follows (amendments with respect to the main request highlighted by the board):

"*Mould (1) for* ***simultaneously*** *encapsulating* ***a plurality*** *of electronic components mounted on a carrier, comprising:*
- at least two mould parts (2, 3) displaceable relative to each other, the mould parts ***(2, 3)*** *co-defining a* ***plurality*** *of mould* ***cavities,*** *the mould parts (2, 3) are positioned as an upper mould part (2) provided with recesses (14) and a lower mould part (3); and*
- feed means (5) for encapsulating material having feed openings connecting to the recesses (14),
wherein the lower mould part (3) comprises a support plate (6, 7) defining a wall of the ***plurality of*** *mould* ***cavities,*** *and comprising a plurality of suction runners (9) running there through with apertures (8) for sucking the carrier flat against the support plate (6, 7) and the suction runners (9) connecting at the opposite side to a side of the lower mould part (3) remote from the mould cavity,*
characterised in that

the apertures (8) of the suction runners (9) are arranged in groups located precisely at the positions where ***each of*** *the recesses (14) for holding the electronic components to be filled with encapsulating material in the mould part (2) are formed, and the support plate (9) of the lower mould part (3) is separated from the feed openings for encapsulating material that connect to the recesses (14) by the carrier.*"

VII. Claim 1 according to the second auxiliary request corresponds to claim 1 of the first auxiliary request, however with the first feature reading as follows (amendment with respect to the first auxiliary request highlighted by the board):

"*Mould (1) for simultaneously encapsulating a plurality of electronic components mounted on a* ***single*** *carrier".*

VIII. Claim 1 according to the third auxiliary request corresponds to claim 1 of the second auxiliary request with the following feature added at the end:

"*and the suction runners (9) are located at the circumference of the recesses (14).*"

IX. The appellant submitted in substance the following arguments:

In document D2, in the second embodiment, the substrate being placed in the mould was disclosed to be a lead frame. Due to the gaps between the leads and the fact that the apertures of the suction runners were placed at the periphery of the substrate, the sucking action of the suction means for holding the substrate was weak so that the substrate was not sucked flat against the

support plate as required by claim 1 of the main request. Moreover, the location of the suction runners differed. Furthermore, the support plate of the lower mould part was not separated from the feed openings for encapsulating material that connected to the recesses by the substrate ("*carrier*").

Accordingly, the subject-matter of claim 1 of the main request was new over document D2.

The auxiliary requests contained further amendments based on the application as originally filed and providing further distinctions over the prior art.

Reasons for the Decision

1. The appeal is admissible.

2. Main request

2.1 Amendments

Claim 1 as amended is based on claims 1 and 2 as originally filed and on the original description (cf page 2, last paragraph and page 6, second paragraph).

Accordingly, claim 1 as amended complies with Article 123(2) EPC.

2.2 Novelty

2.2.1 Document D2 discloses a mould for encapsulating electronic components mounted on a carrier. Reference

is in particular made to the second embodiment (cf column 20, line 8 to column 22, line 38; figures 35 to 42) with the alternative set-up in which the substrate 5 is held by the lower die 10b and the gate is provided in the upper die 10a (cf column 22, lines 1 to 6). It is noted that in this case, having regard to the arrangement shown in figure 35, the pocket section 126 with sucking holes 124a, 124b is provided in the lower mould part, and the cavity and the gate for filling the cavity with resin are provided in the upper mould part.

In particular, document D2 discloses, using the terminology of claim 1, a mould for encapsulating electronic components mounted on a carrier (substrate 5), comprising:

- at least two mould parts (24a/10a, 24b/10b) displaceable relative to each other, the mould parts co-defining a mould cavity, the mould parts (10a, 10b) are positioned as an upper mould part (10a) provided with recesses (cavities 11) and a lower mould part (10b); and

- feed means (gate) for encapsulating material having feed openings connecting to the recesses (cavities 11); wherein the lower mould part comprises a support plate (10b) defining a wall of the mould cavity, and comprising a plurality of suction runners (sucking holes 124a, 124b) running there through with apertures for sucking the carrier flat against the support plate and the suction runners (9) connecting at the opposite side to a side of the lower mould part remote from the mould cavity.

Accordingly, document D2 discloses a mould according to the pre-characterising portion of claim 1.

Moreover, in document D2,

- the apertures of the suction runners (124a, 124b) are arranged in groups located precisely at the positions where the recesses (cavities 11) for holding the electronic components to be filled with encapsulating material in the mould part are formed, and

- the support plate (10b) of the lower mould part is separated from the feed openings (gate) for encapsulating material that connect to the recesses (cavities 11) by the carrier (substrate 5).

2.2.2 The appellant argued that in document D2, in the second embodiment, the substrate (5) was disclosed to be a lead frame, as was clear from the description, column 22, lines 7 to 24. According to this passage of the description, the release film 30 acted as a dam-bar by closing the gaps between the wire patterns. The substrate (5) was, thus, a lead frame with gaps between the wire patterns. The figures in D2 were only schematic and did not allow drawing any conclusions on any details of the substrate (5).

As the gaps were provided at the periphery of the substrate, essentially coinciding with the location of the apertures for sucking the substrate against the mould plate, the suction action would be weak due to inevitable leakage through these gaps. Accordingly, in the mould known from document D2 the apertures were not for sucking the substrate ("*carrier*" in claim 1) flat against the support plate, as required by claim 1.

Moreover, the location of the apertures as defined in the characterising portion of claim 1 differed from document D2.

Furthermore, in D2 the support plate of the lower mould part was not separated from the feed openings for encapsulating material that connect to the recesses by the carrier, as defined in claim 1.

2.2.3 In the board's judgement, however, it is clear that the substrate in the second embodiment of D2 is not a lead frame, as argued by the appellant, but a substrate with a wire pattern formed thereon. Indeed, according to document D2 "[...] *the release film 30 is compressed by the clamping force of the molding dies, which clamp the substrate 5 together with the release film 30, so that the compressed release film 30 closes gaps between wire patterns, which have been formed on the substrate 5*" (cf. column 22, lines 12 to 17). As would be clear to the skilled reader, where document D2 states "*Since the inner faces of the molding sections of the molding dies are covered with the release film 30, the release film 30 acts as the dam-bar of the lead frame when the substrate 5 is clamped by the dies 10a and 10b, so that the substrate 5 can be mold without any protecting treatment, e.g., solder resist*", it is merely noted that the release film 30 acts as the dam-bar of a lead frame, as generally known and addressed in a preceding embodiment in D2, and not that the substrate 5 actually is a lead frame (cf. column 22, lines 7 to 12).

As the wire pattern is provided on the substrate, the backside of the substrate in contact with the support plate is flat and does not have any gaps.

Accordingly, there is no basis for the contention that in D2 the suction action would be weak due to gaps and that the substrate would not be sucked flat against the support plate.

Moreover, in the mould of D2, the apertures of the suction runners (124a, 124b) are arranged in groups located precisely at the positions where the recesses (cavities 11) for holding the electronic components to be filled with encapsulating material in the mould part are formed. As can be seen from figures 35 to 37, the apertures of the suction runners (124a, 124b) are located opposite the cavities (11), which corresponds to the arrangement in the application (cf figure).

Furthermore, as can be seen from figure 35, the substrate (5) separates the support plate (10a), and in particular the apertures of the suction runners, from the feed openings (gate 10c) for encapsulating material that connect to the recesses (cavities 11). In fact, it is clear that this is the case in the mould of document D2, as hereby the encapsulating material is prevented from being sucked into the apertures of the suction runners, which would impair the mould.

Accordingly, the subject-matter of claim 1 according to the main request is not new over document D2 in the sense of Article 54(1) EPC 1973.

2.3 The appellant's main request is, therefore, not allowable.

3. First to third auxiliary requests

3.1 The first to third auxiliary requests were filed after the oral proceedings were arranged.

According to Article 13(1) RPBA, any amendment to a party's case after it has filed its grounds of appeal or reply may be admitted and considered at the board's discretion. The discretion shall be exercised in view of *inter alia* the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy.

According to established jurisprudence of the boards of appeal, late-filed request which *prima facie* are not allowable are not admitted into the proceedings (cf "*Case Law of the Boards of Appeal of the EPO*", 7th edition, IV.E.4.4.2).

3.2 First auxiliary request

On a *prima facie* assessment, the board is satisfied that amended claim 1 according to the first auxiliary request meets the formal requirements, ie in particular has a basis in the originally filed application, and constitutes a fair attempt to address the lack of novelty objection raised against the main request.

Accordingly, the first auxiliary request is admitted into the proceedings.

3.2.1 Amendments

Claim 1 according to the first auxiliary request in substance further defines with respect to the main request that
- the mould (1) is for simultaneously encapsulating a plurality of electronic components mounted on a carrier,

- the mould parts (2, 3) co-define a plurality of cavities,
- the support plate (6, 7) defines a wall of the plurality of mould cavities, and
- the apertures (8) of the suction runners (9) are arranged in groups located precisely at the positions where each of the recesses (14) for holding the electronic components to be filled with encapsulating material in the mould part (2) are formed.

The amendments are based on the figure and the original description (cf page 5, third paragraph to page 6, second paragraph).

Accordingly, claim 1 as amended complies with Article 123(2) EPC.

3.2.2 Novelty

In document D2, the mould is for simultaneously encapsulating a plurality of electronic components mounted on a carrier. As is clear from figures 35 to 37 of D2, the mould parts co-define a plurality of cavities (11), the support plate (10b) defining a wall of the plurality of mould cavities. Moreover, the apertures of the suction runners (124a, 124b) are arranged in groups, as can be seen from figure 37, and are located precisely at the positions where each of the recesses (cavities 11) for holding the electronic components to be filled with encapsulating material in the mould part (10b) are formed (cf figure 35).

The above additional features are, thus, also known from document D2.

Accordingly, the subject-matter of claim 1 according to the first auxiliary request is also not new over document D2 in the sense of Article 54(1) EPC 1973.

3.2.3 The appellant's first auxiliary is, therefore, also not allowable.

3.3 Second auxiliary request

3.3.1 Amendments

Claim 1 according to the second auxiliary request further defines with respect to the first auxiliary request that the plurality of electronic components are mounted on a single carrier.

The appellant indicated in its written submission of 20 May 2016 that the amendment was based on the application as filed, among others on page 2, line 2 "*a carrier*"; page 2, line 6, claim 1: selection of "*at least one*".

The application as filed states in the above first cited passage "*The present invention has for its object to provide an improved mould, encapsulating device and method for encapsulating electronic components mounted on a carrier, with which damage to electronic components and contact wires can be prevented*"(cf page 2, lines 1 to 3). In the board's judgement it cannot be concluded from the expression "*a carrier*" in the above context, and in particular since the indefinite article is used, that the electronic components are mounted on a **single** carrier.

The above second passage of the description referred to by the appellant reads "*The invention provides for this*

purpose a mould of the type stated in the preamble, wherein at least one of the mould parts is provided with a runner which connects on one side to a wall of a mould part co-defining a mould cavity and connects on the other side to a side of the mould part remote from the mould cavity" (cf page 2, lines 5 to 8). Similar wording is used in claim 1 as originally filed. In the board's judgement, it is however clear that the expression "*at least one*" refers to the mould parts and has no bearing on the issue of whether a plurality of electronic components provided on a single carrier is disclosed.

No other basis of disclosure was provided by the appellant and also to the board it is not apparent from which part of the application as filed this amendment would be directly and unambiguously derivable. In particular, there is no mention of a "*single*" carrier in the description as filed. In the sole figure of the application the carrier is not shown.

Accordingly, *prima facie* the amendment would not appear to comply with Article 123(2) EPC.

3.3.2 Therefore, the board exercises its discretionary powers not to admit the second auxiliary request into the proceedings.

3.4 Third auxiliary request

3.4.1 Amendments

Claim 1 according to the third auxiliary request contains the same amendment concerning the electronic components being mounted on a "*single*" carrier as claim 1 of the second auxiliary request.

Accordingly, for the same reasons given for the second auxiliary request, *prima facie* this amendment would not appear to comply with Article 123(2) EPC.

Moreover, claim 1 according to the third auxiliary request further defines with respect to the second auxiliary request that the suction runners are located at the circumference of the recesses.

The appellant indicated in its written submission that the amendment was based on claim 2.

Claim 2 as filed defines a "*Mould as claimed in claim 1, wherein the runner takes a multiple form and at least one wall of a mould part co-defining the mould cavity is provided with a number of apertures onto which runners connect*".

In the board's judgement, it is clear that this does not provide a basis of disclosure for the suction runners being located at the circumference of the recesses.

It is not readily apparent to the board from which part of the application this amendment would be directly and unambiguously derivable. In fact, there is no mention in the description as filed of the "*circumference*" of the recesses. No other basis of disclosure was provided by the appellant in respect of this feature.

Accordingly, *prima facie* also this amendment would not appear to comply with Article 123(2) EPC.

3.4.2 The third auxiliary request is, therefore, also not admitted into the proceedings.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

S. Sánchez Chiquero G. Eliasson

Decision electronically authenticated