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**Datasheet for the decision
of 3 June 2019**

Case Number: T 0664/15 - 3.2.05

Application Number: 07018109.4

Publication Number: 1862292

IPC: B29C45/78, B29C45/28

Language of the proceedings: EN

Title of invention:

Method and apparatus for adjusting the temperature of molten material in a mold cavity

Patent Proprietor:

Mold-Masters (2007) Limited

Opponent:

Priamus System Technologies AG

Headword:

Relevant legal provisions:

EPC 1973 Art. 56

Keyword:

Inventive step (yes)

Decisions cited:

Catchword:



Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 0664/15 - 3.2.05

D E C I S I O N
of Technical Board of Appeal 3.2.05
of 3 June 2019

Appellant: Priamus System Technologies AG
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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
28 January 2015 concerning maintenance of
European Patent No. 1862292 in amended form.**

Composition of the Board:

Chairman M. Poock
Members: P. Lanz
T. Karamanli

Summary of Facts and Submissions

- I. The appeal by the opponent is against the interlocutory decision of the opposition division of the European Patent Office posted on 28 January 2015 concerning maintenance of European Patent No. 1 862 292 in amended form.
- II. During the opposition proceedings, the opponent had raised the grounds for opposition according to Article 100(a) EPC (lack of novelty and lack of inventive step) and 100(c) EPC (extension beyond the content of the earlier application as filed).
- III. Oral proceedings were held before the board of appeal on 3 June 2019.
- IV. The appellant (opponent) requested that the decision under appeal be set aside and that the European patent be revoked.
- V. The respondent (patent proprietor) requested that the appeal be dismissed, or as an auxiliary measure, that the decision under appeal be set aside and that the European patent be maintained in amended form on the basis of the claims of the auxiliary request filed by letter dated 12 October 2015.
- VI. Reference is made to the following documents:

D1: DE 2 358 911;

D3: CA 2 412 802;

D4: EP 0 909 628.

VII. The independent claims of the main request read as follows:

"1. An injection molding apparatus (80) comprising: a manifold having a manifold channel for receiving a melt stream of molten material under pressure and delivering the melt stream to a nozzle channel of a nozzle, said nozzle having a heater for heating the melt stream passing therethrough; a mold cavity (88) for receiving the melt stream from said nozzle, said nozzle channel communicating with said mold cavity (88) through a mold gate (82); a thermocouple for measuring a temperature of the molten material, the thermocouple is located at the mold gate (82) so that the temperature of the molten material is measured as it flows into the mold cavity (88); and a controller; characterized in that a second thermocouple (90) is provided, the second thermocouple (90) is coupled to said mold cavity (88) at a predetermined distance from the mold gate (82), to provide additional temperature measurement of the molten material in the mold cavity (88) wherein the controller is in communication with the second thermocouple (90), said controller receiving a temperature output from the second thermocouple (90); wherein the controller is in communication with the heater of the nozzle, comparing said temperature output to a predetermined target temperature and adjusting a heater output of the heater of the nozzle as required to adjust the temperature of the molten material entering the mold cavity (88) and align the temperature of the molten material in the mold cavity (88) with said predetermined target temperature."

"3. A method of molding a part comprising: delivering a melt stream of molten material from a manifold channel of a manifold under pressure to a mold cavity (88) via

a mold gate (82), the melt stream entering the mold cavity (88) through a respective nozzle being heated by a nozzle heater coupled thereto; measuring a temperature of the molten material as it flows into said mold cavity (88) using a thermocouple located at the mold gate (82); measuring an additional temperature of the molten material in the mold cavity (88) using a second thermocouple (90), the second thermocouple (90) is coupled to said mold cavity (88) at a predetermined distance from the mold gate (82) through which the melt stream enters the mold cavity (88); providing said additional temperature of said molten material in the mold cavity (88) to a controller, comparing the temperature of the molten material in the mold cavity (88) with a predetermined target temperature stored by said controller; and adjusting an output of the nozzle heater of the nozzle as required to adjust said temperature of the molten material entering said mold cavity (88) and align the temperature of the molten material in the mold cavity (88) with said predetermined target temperature."

VIII. The arguments of the appellant can be summarised as follows:

Main request, inventive step

Document D3 represented the closest prior art. The claimed subject-matter differed from document D3 in the features of the characterising portion of apparatus claim 1 and the corresponding features of method claim 3. The objective technical problem could be seen in improving the melt temperature control during the injection moulding process. The features of the characterising portion were known from document D1, which suggested that thermocouples be provided in the

mould cavity at a predetermined distance from the gate (see D1, Figure 1, and page 8, last two paragraphs) in order to control the melt temperature via a heating controller (see D1, page 9, line 8). The fact that document D1 related to a cold runner mould did not alter its technical teaching, which could be applied to both cold and hot runner moulds. The skilled person was aware of both mould types. Moreover, document D1 had been regularly used as prior art against hot runner moulds in other proceedings before the EPO, e.g. in case with respect to EP 2 212 086. The subject-matter of the independent claims was not inventive in view of a combination of documents D3 and D1. Furthermore, the subject-matter of the independent claims was rendered obvious by a combination of document D3 with the skilled person's common general knowledge. It was generally known before the priority date of the contested patent that the failure safety of a system could be improved by providing a functional redundancy of sensors, in particular at different locations (for example "hot spare redundancy"). The fact that, according to the patent, the first and second thermocouples respectively measured the melt temperature at the gate and in the cooled mould did not change their nature as redundant sensors. For these reasons, the subject-matter of the independent claims was not based on an inventive step.

IX. The respondent argued essentially as follows:

Main request, inventive step

Document D3 had to be regarded as the closest prior art. The injection moulding apparatus and method of document D3 differed from the claimed subject-matter in that a second thermocouple was provided, wherein the

second thermocouple was coupled to the mould cavity at a predetermined distance from the mould gate, in providing additional temperature measurement of the molten material in the mould cavity, in communicating said additional temperature output to the controller for comparing it to a predetermined target temperature, in adjusting a heater output as required to adjust the temperature of the molten material entering the mould cavity and in aligning the temperature of the molten material in the mould cavity with the predetermined target temperature. In view of the wording of the contested claims, which explicitly related to controlling the nozzle heater, the objective technical problem had to be specifically directed to improving the temperature control of the nozzle heater during the injection moulding process. As to the obviousness of the claimed solution, it had to be taken into account that document D1 did not disclose an injection moulding apparatus comprising a hot runner manifold and a heated nozzle with a thermocouple at the mould gate, but an injection moulding system of the conventional cold runner type. The skilled person would therefore not consider a combination of documents D3 and D1 for improving the control of the heating of the hot runner nozzle. Moreover, according to document D1, the data provided by thermocouples in the mould cavity were not used for controlling the nozzle heater. This document could therefore not render obvious the claimed subject-matter.

Regarding the further line of attack based on document D3 in combination with the common general knowledge, it was not generally known at the priority date of the contested patent that the failure safety of a system could be improved by the provision of redundant sensors. Moreover, the first and second thermocouples

measured the melt temperature at different locations; they could therefore not be considered as being redundant. For the common general knowledge, reference was made to document D4.

For these reasons, the subject-matter of claims 1 and 3 was based on an inventive step.

Reasons for the Decision

1. The appeal is admissible.
2. *Main request, inventive step*
 - 2.1 It is common ground between the parties that document D3 represents the closest state of the art for the claimed subject-matter. Moreover, both parties are in agreement that the claimed subject-matter differs from document D3 essentially in the features of the characterising portion of apparatus claim 1 and the corresponding features of method claim 3.
 - 2.2 While the appellant argues that, based on these differences, the objective technical problem was to improve the melt temperature control during the injection moulding process, the respondent refers to the wording of the contested claims and insists that the technical problem had to be specifically directed to improving the temperature control of the nozzle heater during the injection moulding process.

In this respect, the board refers to the established case law of the boards of appeal (see Case Law of the Boards of Appeal of the European Patent Office, 8th edition 2016, I.D.4.3.1), which requires that the technical problem addressed by an invention has to be

formulated in a way which does not contain pointers to the solution or partially anticipate the solution, in order to avoid an *ex-post facto* view being taken on inventive step.

In the present case, the characterising portion of contested claim 1 (as well as the corresponding features of method claim 3) specifies not only the purpose of the claimed arrangement (i.e. adjusting the temperature of the molten material entering said mould cavity and aligning the temperature of the molten material in the mould cavity with the predetermined target temperature), but also the means for achieving this purpose, namely a controller, which is in communication with the second thermocouple and which adjusts the output of the nozzle heater of the nozzle as required for the above purpose. Therefore, the feature of controlling the nozzle heater forms an element of the claimed solution. According to the case law cited above, it must not, as such, be reflected in the formulation of the objective technical problem.

For these reasons, and taking into account the technical effect included in the features characterising the invention in the independent claims at issue, the objective technical problem is to improve the melt temperature control during the injection moulding process.

- 2.3 Turning to the claimed solution, the appellant makes reference to document D1. The board observes that this prior art (see in particular Figure 1) relates to a cold runner type equipment, i.e. a mould without heated manifold and heated nozzles at the respective cavity gates. Already for this reason, it is, from an objective point of view, not apparent, why the skilled

person would consider document D1 when seeking to improve the melt temperature control of the hot runner nozzle of document D3. Moreover, document D1 discloses thermocouples (reference signs 10, 11, 12) located in the mould cavity for measuring the speed of the flow front (thermocouples 11 and 12) and the melt temperature in mould cavity (thermocouple 10) for controlling the injection speed of the screw and, via a heating controller (see page 9, line 8), the output of the heater bands (reference sign 2) on the injection barrel (see page 9, lines 8 to 15). In view of that, if considering documents D3 and D1 in combination, the skilled person could possibly be inspired to control the injection speed of the screw or the heater bands based on the output of thermocouples in the mould cavity. However, the skilled person would not be able to deduce from document D1 any concrete teaching regarding the temperature control of a hot runner nozzle as disclosed in document D3 and in particular to foresee a second thermocouple specifically for that purpose. For these reasons, documents D3 and D1 do not render obvious the subject-matter of independent claims 1 and 3.

Regarding the appellant's further submission that, in view of the skilled person's common general knowledge, it was obvious to equip the hot runner nozzle of document D3 with a second thermocouple located in the mould cavity in order to provide a redundant system with improved failure safety, the board notes that the independent claims are silent on how the temperature signal produced by the (first) thermocouple is used. Consequently, the claimed subject-matter is not, as such, directed to a redundant system, which would require that both thermocouples have the same function. Rather, and contrary to the appellant's view, the

second thermocouple is not a mere duplication of the (first) thermocouple, since the latter measures the melt temperature at the entry into the cavity, while the former captures the temperature of the melt further downstream in the cooled mould cavity at a certain distance from the gate. The board does therefore not accept the appellant's assertion that the subject-matter of the independent claims was obvious in view of a combination of document D3 and the common general knowledge.

For these reasons, the subject-matter of claims 1 and 3 is based on an inventive step, Article 56 EPC 1973.

3. It follows from the above, that the appeal has to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



N. Schneider

M. Poock

Decision electronically authenticated