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D E C I S I O N
of 19 September 1995

Case Number: T 0343/94 - 3.2.5

Application Number: 85905670.7

Publication Number: 0201606

IPC: B29C 45/76

Language of the proceedings: EN

Title of invention:
Injection molding machine capable of monitoring molding process

Patentee:
FANUC LTD.

Opponent:
Battenfeld GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 52(1), 56

Keyword:
"Inventive step Main Request (no)"
"Late filed Auxiliary Request (not allowable)"

Decisions cited:
T 0095/83

Catchword:
-



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Case Number: T 0343/94 - 3.2.5

D E C I S I O N
of the Technical Board of Appeal 3.2.5
of 19 September 1995

Appellant:
(Opponent)

Battenfeld GmbH
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Representative:

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Respondent:
(Proprietor of the patent)

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Representative:

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Decision under appeal:

Decision of the Opposition Division of the
European Patent Office dated 7 March 1994
rejecting the opposition filed against European
patent No. 0 201 606 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: C. V. Payraudeau
Members: C. G. F. Biggio
W. D. Weiß

Summary of Facts and Submissions

- I. European patent No. 201 606, based on application No. 85 905 670.7 filed 8 November 1985 claiming the priority of patent application No. 235 256 84 filed on 9 November 1984 in Japan, was granted on 9 May 1990 and opposed on 9 February 1991.
- II. By its decision dated 7 March 1994, the Opposition Division rejected the opposition pursuant to Article 102(2) EPC.

The decision was based on the patent as granted, whose Claim 1 reads as follows:

"An injection molding machine which allows process monitoring, comprising detecting means for detecting the actual value of at least one variable pertinent to a molding cycle, and a display unit (18) for displaying the value detected by the detecting means, characterised by:

first detecting means (T1, T2) for detecting a cycle time (TS) and a mixing time (TM)

second detecting means (SP) for detecting an injection time (TI), a peak injection pressure (PP) and a switched pressure (PC);

third detecting means (P1) for detecting a cushion amount (MC);

current value memory means (14) for storing data corresponding to a plurality of current variables including the cycle time (TS), the mixing time (TM), the injection time (TI), the peak injection pressure (PP), the switched pressure (PC) and the cushion amount (MC) for a current molding cycle;

past value memory means (14) for storing data corresponding to a plurality of past variables including the cycle time (TS), the mixing time (TM), the injection time (TI), the peak injection pressure (PP), the switched pressure (PC) and the cushion amount (MC) for at least two preceding molding cycles, said past value memory means including a first memory section for storing the data corresponding to the plurality of past variables for the first preceding cycle and a second memory section for storing the data corresponding to the plurality of past variables for a second preceding cycle;

display control means (16) for reading data from said current value memory means (14) and said past value memory means (14), and for causing data representing the current variables for the current molding cycle and the past variables for at least two preceding cycles to be simultaneously displayed on said display unit (18); and

updating control means (11) for automatically transferring the data stored in said current value memory means (14) to said past value memory means (14) after the current molding cycle ends, so as to automatically start and execute updating of the data in said past value memory means without manual intervention by an operator, said updating control means (11) being

operable to transfer the data stored in said current value memory means and said first memory section of said past value memory means to said first and second memory sections of said past value memory means, respectively, after each molding cycle ends".

III. The following prior art documents were considered during the opposition procedure:

- D1: DE-A-2 615 445 (acknowledged in the patent),
- E2: "Neufassung Nr. 2 der Auftragsbestatigungen vom 22 Mai 1984 und 5 Juni 1984" Battenfeld vom 20 Juni 1984,
- E3: Pamphlet "CNC 80/85 REGELUNGSSYSTEME FÜR SPRITZGIESSMACHINEN",
- E4: Pamphlet "Injection moulding Machines series BA (from 700kN)", and
- D2: Sworn affidavit by Mr Holzschuh, submitted with Opponent's letter dated 6 July 1993.

In his grounds of appeal the Appellant cited for the first time the document

- E5: pamphlet "English Information" A-71-KEL-12 83, pages 1 to 4.

IV. The Appellant (Opponent) filed a Notice of Appeal on 8 April 1994 and paid the Appeal Fee the same day.

The grounds for appeal were filed on 13 July 1994.

The Appellant requested that the decision under appeal be set aside, the patent be revoked in its entirety and, subsidiarily, oral proceedings be summoned.

V. The Respondent's (Patentee's) submissions were filed on 11 January 1995.

He requested that the appeal be dismissed and, subsidiarily, oral proceedings be summoned.

VI. Oral proceedings were held on 19 September 1995.

Together with the summons to the oral proceedings, the Board sent to the parties a communication indicating, as its provisional opinion, that the subject-matter of independent Claim 1 was novel, but did not appear to involve an inventive step in view of the considered prior art documents.

VII. In writing and at the oral proceedings, the Appellant made the following submissions.

The closest prior art is represented by the prior use of the moulding machine referred to in document E2 and comprising the elements specified in the sworn affidavit by Mr Holzschuh (document D2).

The decision under appeal had considered that the subject-matter of the patent at issue differed from this state of the art essentially in the following features:

- (a) it displays the "switched pressure";
- (b) it simultaneously displays the stored variables of the present cycle and of at least the two preceding cycles;
- (c) it comprises updating control means operable to automatically update the memory means after each cycle.

The prior art admittedly did not refer to the "switched pressure" (feature (a)). This value, however, was only one point on the recorded pressure curve as shown for

example in Figure 2 of the document D1. There was no contention in the patent at issue that this particular value had a special interest which had not been detected by the prior art, but it was merely mentioned as an information amongst others. Even if, therefore, the mention of this value rendered the subject-matter of the claim novel, it could not justify an inventive step.

The second feature (b) was only one of the various options offered by computers, the decision of whether the data should be displayed successively or simultaneously being a matter of choice at the discretion of the user. In case the data were not simultaneously displayed on the screen, it was always possible to obtain the same result by printing out the successive series of values.

The third feature (c) was an obvious feature of a computer to organise a memory means on the FIFO basis so as to eliminate, after each cycle, the oldest information when entering the most recent one.

Therefore, even if novelty of the subject-matter of Claim 1 could be admitted, it would lack an inventive step.

VIII. In writing and at the oral proceedings, the Respondent made the following submissions.

It was not disputed that the closest prior art was represented by the moulding machine referred to by document E2 and comprising the elements specified by the sworn affidavit by Mr Holzshuh (document D2).

The subject-matter claimed by Claim 1, however, was a combination of features providing for an overall effect which was not predictable in view of the state of the art.

In particular, the obviousness of the invention should not be considered retrospectively, but in view of the state of the art which was available at the priority date of the patent in suit. This state of the art did only disclose the simultaneous display of information relating to the last 15 cycles of one parameter or to its cumulative values, as shown for example in the figures of the document E3. No incentive was given by this state of the art to the person skilled in the art to combine the information in a simultaneous display, for comparison purpose, of all the pertinent parameters relating to a certain number (at least 3) of cycles. Such a display was first rendered possible by the special organisation of the memory and control means suggested by the invention.

Moreover, the "switched pressure", and the display of the value of this parameter, was not only novel but also contributed to the inventiveness of the subject-matter of the claim.

- IX. At the end of the oral proceedings the Parties maintained their requests as submitted in writing (see Items IV and V). In addition, the Respondent submitted the auxiliary request that the appealed decision be set aside and the patent be maintained on the basis of a new Claim 1, resulting from the combination of granted Claims 1 and 2.

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Reasons for the Decision

1. *Admissibility*

The appeal complies with Articles 106 to 108 and Rule 64 EPC and is therefore admissible.

2. *State of the art*

Since the Appellant has not proven that document E5 was available to the public before the priority date of the patent in suit, this document cannot be considered as to be part of the state of the art.

Therefore, the state of the art is constituted by prepublished documents D1, E3 and E4, and the publicly used machine which was sold, according to the sworn affidavit by Mr Holzschuh, to the Firm N. P. Ekco Ltd; this machine differing from the type disclosed in the document E3 only in that it was provided with a colour screen.

This machine was equipped with a computer which allowed to monitor the values of various parameters adopted during the last fifteen cycles. The order form relating to this specific machine (document E2) gives a list of the parameters which were monitored during the operation of the publicly used machine. This document, in combination with the sworn affidavit by Mr Holzschuh, is a proof establishing the list of the various parameters which are monitored, i.e.: the injection time, the mixing time, the cushion amount, the backward final position of the screw, the cycle time, the maximal hydraulic pressure during the injection or the maximal internal pressure in the injection tool.

3. Respondent's Main Request

3.1 Novelty

The closest prior art is represented by the publicly used moulding machine according to the documents E2 and D2.

3.1.1 This prior use discloses an injection moulding machine which allows process monitoring and comprises detecting means for detecting the actual value of at least one variable pertinent to a moulding cycle, and a display unit for displaying the value detected by the detected means; said moulding machine further comprising:

- first detecting means for detecting a cycle time and a mixing time;
- second detecting means for detecting an injection time and a peak injection pressure;
- third detecting means for detecting a cushion amount;
- current value memory means for storing data corresponding to a plurality of current variables including the cycle time, the mixing time, the injection time, the peak injection pressure and the cushion amount for a current molding cycle;
- past value memory means for storing data corresponding to a plurality of past variables including the cycle time, the mixing time, the injection time, the peak injection pressure and the cushion amount for at least two preceding moulding cycles, said past value memory means including a first memory section for storing the data

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corresponding to the plurality of past variables for the first preceding cycle and a second memory section for storing the data corresponding to the plurality of past variables for a second preceding cycle;

- display control means for reading data from said current value memory means and said past value memory means, and for causing data representing the current variables for the current moulding cycle and the past variables for at least two preceding cycles to be displayed on said display unit; and
- updating control means for automatically transferring the data stored in said current value memory means to said past value memory means after the current molding cycle ends.

3.1.2 The injection moulding machine according to Claim 1 differs from this known machine in that:

- (a) it detects, stores and displays the "switched pressure";
- (b) it simultaneously displays the stored current and past values of the variables considered;
- (c) it comprises updating control means as specified in and operating according to Claim 1, i.e. operating according to the "First In First Out" principle.

3.1.3 Document D1 discloses only the features of the preamble of Claim 1 and also the other cited documents do not go beyond what is known from the prior use. The subject-matter of Claim 1 is, consequently, novel. During the oral proceeding before the Board, the Appellant also no longer contested the novelty either.

3.2 Problem and Solution

In the introductory portion of the patent at issue (see column 1, lines 23 to 35), two prior art documents are acknowledged, namely:

- DE-A-2 615 445, which represents the preamble of Claim 1 and which discloses a process for controlling an injection moulding machine in which the pressure profile in the injection tool is monitored, stored and displayed on a screen throughout each operation cycle, and
- DE-A-3 407 040, which discloses a control system of an injection moulding machine having a display unit for displaying current values of several parameters pertaining to the injection process.

The patent in suit (see column 1, lines 8 to 21) states that this kind of prior art moulding machines comprises the following features:

- only the parameters of the preceding moulding cycle are displayed,
- no comparative reference is available for determining whether or not the injection moulding process is proceeding correctly, and
- this determination must depend on the skill of an operator.

These features result in the drawback that, even if one of the prior art injection moulding machines currently executes abnormal processing, it cannot be detected immediately and a moulded product of high quality cannot be obtained.

The problem to be solved by the invention according to the patent at in suit is, accordingly, to remedy said drawback.

According to Claim 1, said problem is solved by providing an injection moulding machine comprising means for storing various data and notably "switched pressure" for several moulding cycles and for simultaneously displaying the data for the present cycle and for at least the two preceding cycles on a screen, so that an abnormality in the injection process can be determined at an early stage.

Since the machine according to the prior use (E2 and D2) differs from the subject-matter of Claim 1 only by the features (a) to (c) indicated under point 3.1.2 above, it has to be examined, if these features, in view of the basic problem defined above, make a contribution to the known machine which involves an inventive step.

3.3 Inventive step

3.3.1 Feature (a)

It is not contested by the Respondent that, according to Claim 1 and to the whole disclosure of the patent at issue, the means for detecting and storing the values of the "switched pressure" are standard, well known means for detecting and storing any other value of the pressure occurring in the moulding tool during a moulding cycle.

It is, moreover, to be noted that the whole disclosure of the patent at issue does not mention either any peculiar importance or any peculiar effect which the "switched pressure" would provide, in respect of the final quality of the obtained moulded product.

The "switched pressure" is merely mentioned as an example value which is of no higher importance than its neighbouring values. In fact, the state of the art equally provides for the option to freely choose 20 pressure values along the whole pressure curve as set points and to display the respective values actually achieved in the form of a bar diagram.

It is, further, to be noted that neither Claim 1, nor the disclosure of the patent at issue, do specify any particular structural feature of the memory means mentioned in Claim 1, which would render the said memory means specifically adapted to store the detected data concerning the "switched pressure".

Consequently, said memory means mentioned in Claim 1 is merely standard hardware exerting its inherent function.

For these reasons and, since the "switched pressure" may be easily detected and stored - if it is considered as a useful information - from the pressure curve in the tool which is already measured in the known machines according to the state of the art, the fact that the claimed injection moulding machine comprises "means for detecting and storing the switched pressure" may not be considered as representing any contribution to an inventive step.

3.3.2 Feature (b)

In the control technique, it is common use to record the data relating to various parameters of a controlled process, in order to be able to determine the time dependence of all those parameters, which may influence the quality of the products obtained by the controlled

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process. Such a production data sheet has been made either by handwriting or printing the measured values or by temporary storing the information in electronic registers of adequate capacity.

All these constructional measures are equivalent in allowing the operator to compare the current values with some reference. This well-known fact is even acknowledged by the patent in suit itself (see column 1, lines 30 to 31), when stating that document DE-A-2 615 445 already disclosed to display an ideal pressure profile for purpose of comparison.

The injection moulding machine according to the prior use is conceived, like the machine according to the present invention, to store the information relating to all the mentioned parameters (except the "switched pressure") but, according to the screens represented in document E3, it only displays at a time the information relating to one of these parameters for the last fifteen cycles. Consequently, the person skilled in the art using this machine and wanting to compare all the important data for these cycles, would have to make successive print-outs of the various screen, for all the concerned parameters.

In order to avoid this drawback in the presentation of the pertinent information, the person skilled in the art would have immediately envisaged, instead of displaying the cumulated values of at least two parameter as shown in the figures of document E3, to simultaneously display some or all the parameter values for a given number of cycles. The number of parameters and of cycles which may be displayed simultaneously is, in fact, only restricted by a capacity of the screen and of its memory selected

after balancing cost and benefit. Once the choice is made, the programming of a computer and its display unit, in order to simultaneously display the information relating to various parameters, is a standard procedure for a skilled programmer.

For these reasons, the fact that the claimed injection moulding machine comprises "means for simultaneously displaying the stored current and past values of the variables considered" may not be considered as representing any contribution to the inventive step involved by the subject-matter claimed by Claim 1.

3.3.3 Feature (c)

The well known "First In First Out" principle is chosen whenever the most effective data comparison is called for.

It is worth mentioning that the teaching from the machine according to the prior use, i.e. the data to be stored are those pertaining to the last 15 cycles, implies that data pertaining to any cycle "older" than the last 15 ones have to be discarded. This implies that the updating means of this machine must logically operate according either to the "First In First Out" principle or, at least, according to a very analogous one.

For these reasons, the fact that the claimed injection moulding machine comprises "updating control means as specified in and operating according to Claim 1, i.e. operating according to the "First In First Out" principle," may not be considered as representing any contribution to the inventive step involved by the subject-matter claimed by Claim 1.

As a matter of completeness, it is also noted that the patent in suit defines the updating control means by mere functional features and does not specify any particular new means which would be specially adapted to the execution of these functions. Therefore, the claimed means, used to fulfil the mentioned functions, are to be considered as those known for this purpose in the state of the art.

3.4 According to the above, the Respondent's main request is not allowable, since the subject-matter of Claim 1, as granted, does not involve an inventive step pursuant to Article 56 EPC.

4. *Respondent's Auxiliary Request*

At the end of the Oral Proceedings, the Respondent auxiliarily requested that the patent be maintained on the basis of a new Claim 1 resulting from the combination of all the features mentioned in Claims 1 and 2 as granted.

It is a constant jurisprudence of the Boards of Appeal of not admitting into the proceedings new claims which are late filed, if they do not represent a bona fide attempt to answer the grounds of opposition (see, for instance, T 95/83, OJ EPO, 1985, 75).

In the present case, the new auxiliary request has been filed at the latest possible moment and the Respondent has neither presented any submission for explaining the lateness of the filing of this request nor presented any argument for justifying the inventiveness of the subject-matter of the newly proposed claim, in view of the considered prior art.

Moreover, according to the submission of the Respondent himself during the opposition proceedings before the Opposition Division, the features of Claim 2 of the granted patent essentially differ from those of the prior art in that not only the maximum values of given variables are displayed but also their minimum and average values are calculated and displayed.

These additional features represent a quite usual measure and can not be considered as such to justify an inventive step.

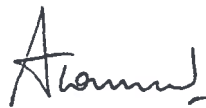
For the above reasons, the Respondent's auxiliary request is also not allowable.

Order

For these reasons it is decided that:

- 1. The decision under appeal is set aside.
- 2. The patent is revoked.

The Registrar:



A. Townend

The Chairman:



C. Payraudeau