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**D E C I S I O N**  
**of 18 May 2000**

**Case Number:** T 0894/96 - 3.2.5

**Application Number:** 88308671.2

**Publication Number:** 0309182

**IPC:** B29C 45/17

**Language of the proceedings:** EN

**Title of invention:**

Method, system and device utilized therein for injection molding and plastic article produced thereby

**Patentee:**

Melea Limited

**Opponent:**

Battenfeld GmbH  
Cinpres Limited

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 123(3), 56

**Keyword:**

"Main request, auxiliary requests 1 and 2: Extension of the protection after amendment"  
"Auxiliary request 3: inventive step (yes)"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 0894/96 - 3.2.5

**D E C I S I O N**  
**of the Technical Board of Appeal 3.2.5**  
**of 18 May 2000**

**Appellant:** Melea Limited  
(Proprietor of the patent) Suites 2 & 3, Main Street  
Gibraltar Heights  
Gibraltar (GI)

**Representative:** Rehders, Jochen  
Velten Franz Mayer & Jakoby  
Kaistrasse 20  
D-40221 Düsseldorf (DE)

**Respondent:** Battenfeld GmbH  
(Opponent) Scherl 10  
D-58540 Meinerzhagen (DE)

**Representative:** -

(Opponent) Cinpres Limited  
Ninian Park  
Ninian Way  
Tamworth  
Staffordshire B77 5ES (GB)

**Representative:** Bayliss, Geoffrey Cyril  
BOULT WADE TENNANT  
27 Furnival Street  
London EC4A 1PQ (GB)

**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 1 August 1996  
revoking European patent No. 0 309 182 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** A. Burkhart  
**Members:** W. R. Zellhuber  
J. H. P. Willems

## Summary of Facts and Submissions

I. The appellant (proprietor) lodged an appeal against the decision of the Opposition Division revoking European Patent No. 0 309 182.

Oppositions were filed against the patent as a whole based on Article 100(a) EPC (lack of novelty and inventive step).

II. The Opposition Division held that the ground of opposition of lack of inventive step prejudiced the maintenance of the patent having regard to the documents

E1: EP-A 0 127 961 and

E8: JP-A 61-59-899 with English translation.

III. Oral proceedings were held before the Board of Appeal on 18 May 2000, in the course of which

(i) the appellant submitted a new claim 2 replacing claims 2 of the main and first and second auxiliary requests filed with telefax received on 14 April 2000 and a single claim as a third auxiliary request and requested that the decision under appeal be set aside and the patent be maintained in amended form on the basis of

- claims 1 to 4 according to the main request  
or

- claims 1 to 4 according to the first  
auxiliary request or

- claims 1 and 2 according to the second auxiliary request or
  - the single claim according to the third auxiliary request,
- (ii) the respondents I and II (opponents 01 and 02) requested that the appeal be dismissed because
- the amended claims according to the main and auxiliary requests did not meet the requirements of Articles 84 and 123(3) EPC and
  - the subject-matter of the claims according to the main and auxiliary requests did not involve an inventive step in view of the prior art as disclosed in documents E1 and E8.

IV. Independent claim 2 according to the main and first and second auxiliary requests reads as follows:

"2. An injection molding system for the injection of plastic articles comprising:

an injection molding machine (20) including an injection nozzle (18) for injection of molten plastic through the nozzle (18),

a mold (90) having a resin injection aperture for receiving the molten plastic at an upstream position, a cavity (92,94) defining the shape of the molded article at a downstream position and a plastic flow path (16) for fluidly communicating the injection aperture and

the cavity (92,94) between the upstream and downstream positions;

fluid charge means (42, 44, 50) for pressurizing a charge of fluid at a predetermined level;

valve means (54, 56, 82) for controlling communication of the charge of pressurized fluid to the flow path (16) and for venting the fluid from within the plastic article to atmosphere and

a fluid passage (26) interconnecting the flow path (16) and the fluid charge means (42, 44, 50) between the upstream and downstream positions at an orifice (30) opening to the flow path (16) for introducing the fluid charge into the flow path (16) simultaneously with or after plastic injection, so that the fluid charge distributes the molten plastic in the mold cavity (92, 94); **characterised** wherein the mold (90) includes a sprue (10), the sprue (10) having the injection aperture and at least part of the flow path (16) wherein the fluid passage (26) is contained within the sprue (10) and wherein the sprue (10) includes a bushing (12) having the orifice (30) and the fluid passage (26) extending thereto and wherein the injection nozzle (18) communicates with the bushing (12) and the fluid charge is communicated to the orifice (30) in the bushing (12) through the fluid passage (26) wherein the orifice (30) is dimensioned to be sufficiently small between 0.13 to 1.0 mm, depending on the viscosity of the plastic, to effectively resist entry of the relatively viscous molten resin;

said fluid passage (26) opening to the flow path (16) downstream of first and second paths (16a, 16b) in the

bushing (12) for preventing the introduced fluid charge from travelling from the flow path (16) through the injection aperture and into the nozzle (18) by introducing the fluid charge into the flow path at a fluid injection position (30), the resin having a greater resistance to fluid charge travel between the fluid injection position and the upstream position than between the fluid injection position and the downstream position, and said valve means (54; 56, 82) comprising means (84) for venting pressurized fluid to atmosphere at a controlled rate after molding said article."

V. The single claim according to the third auxiliary request reads as follows:

" A method for the injection molding of a plastic article in an injection molding system (20) including a resin injection nozzle (18) and a mold (90) having an injection aperture for receiving molten resin from the nozzle (18) at an upstream position and a mold cavity at a downstream position and a resin flow path (16) for fluidly communicating the injection aperture and the mold cavity (92, 94) between the upstream and downstream positions, the method comprising the steps of:

a) pressurizing a charge of fluid at a predetermined pressure level less than a nominal plastic injection pressure;

b) injecting a quantity of molten plastic from the injection nozzle (18) through the injection aperture and the flow path (16) and into the mold cavity (92, 94) at said nominal plastic injection pressure;

c) communicating the charge of pressurized fluid during the plastic injection to an orifice (30) of sufficiently small dimension to resist entry of the relatively viscous molten resin, said orifice (30) opening to the resin flow path (16) in the mold (90) between the upstream and downstream positions at a fluid injection position (30), the resin having a greater resistance to fluid charge travel between the fluid injection position and the upstream position than between the fluid injection position and the downstream position, whereby the introduced fluid charge is prevented from travelling from the flow path (16) through the injection aperture and into the injection nozzle (18);

d) introducing the fluid charge into the flow path (16) from the orifice (30) after the quantity of molten plastic is introduced into the flow path (16) and upon substantial completion of the plastic injection in response to a reduction of the pressure in the flow path below the predetermined level to distribute the molten plastic within the mold cavity;

e) containing the fluid under pressure within the article until it has set up in the mold cavity (92, 94); and

f) venting the fluid to ambient at a controlled rate."

VI. The respondents argued with regard to the main request and first and second auxiliary requests essentially as follows:

Claim 2 according to these requests was amended in such a way as to extend the protection conferred in that the

feature "fluid circuit means (26) including means (16a, 16b) for preventing the introduced fluid charge from travelling ..." was replaced by the feature "fluid passage (26) opening to the flow path (16) downstream of first and second paths (16a, 16b) in the bushing (12) for preventing the introduced fluid charge from travelling ...". As a result of that replacement, the fluid circuit means did not necessarily include the means for preventing the introduced fluid charge from travelling as claimed in claim 3 of the patent as granted. The scope of protection therefore had been extended and the requirements of Article 123(3) EPC were not met.

Moreover, claim 2 did not specify means which might be suitable for achieving the desired result, i.e. preventing the introduced fluid charge from travelling from the flow path (16) through the injection aperture and into the nozzle (18). Therefore, claim 2 was unclear and the requirements of Article 84 EPC were not met.

VII. The appellant argued with regard to the main request and first and second auxiliary requests essentially as follows:

In the claims as filed with telefax, received on 14 April 2000, the term "fluid circuit means (26) including means (16a, 16b) for preventing the introduced fluid charge from travelling ..." had been used which appeared to be incorrect. The amendments made in claim 2 should clarify what was meant by that term.

These amendments in claim 2 were supported by the



description and the appellant was of the opinion that the amendments did not result in an extension of the protection conferred by the claims as granted.

VIII. The respondents argued with regard to the third auxiliary request essentially as follows:

The subject-matter of the single claim according to third auxiliary request did not involve an inventive step with regard to the prior art as disclosed in documents E1 and E8.

The closest prior art was represented by document E1 which described a method for the injection molding of a plastic article. The claimed method differed from the method disclosed in document E1 only in features which were obvious for the person skilled in the art, if not even necessary to properly carry out the method disclosed in document E1:

- In view of the high plastic injection pressures, which normally were applied in plastic injection molding processes (e.g. 1500 bar), it was obvious for the person skilled in the art to pressurize the charge of fluid at a pressure level less than the plastic injection pressure. Moreover, the use of a piston for the introduction of the fluid in the method according to document E1 showed that, at least at the starting point, the fluid was pressurized at a lower pressure level.
  
- The person skilled in the art also would know that the fluid orifice needed to be sufficiently small to prevent plastics entering and blocking the orifice.

- Furthermore, it was also obvious to introduce the fluid charge into the flow path after the quantity of molten plastic had been introduced into the flow path. If the fluid charge was introduced during the plastic injection, the fluid charge would hinder the introduction of the plastic into the mold and the plastic article might not be correctly produced.

Moreover, introduction of fluid at high pressures would burst the wall of the surrounding plastics. It would therefore be obvious to introduce the fluid in response to a reduction of the pressure in the flow path below a predetermined level.

- The feature of venting the fluid at a controlled rate was already known from document E8 and a person skilled in the art obviously would apply that feature in a method as disclosed in E1, as already pointed out by the opposition division.

IX. The appellant argued with regard to the third auxiliary request essentially as follows:

Document E1 might be regarded as closest prior art. However, the method according to the patent in suit differed from the method disclosed in document E1, in particular, in that the entry of the fluid charge into the mold cavity was self-executing in response to the pressure drop at the end of the injection stroke.

The prior art as disclosed in documents E1 and E8 did not suggest such a self-executing fluid introduction, in particular, it did not suggest the features of

- pressurizing a charge of fluid at a predetermined pressure level less than a nominal plastic injection pressure,
- communicating the charge of pressurized fluid during the plastic injection to an orifice of sufficiently small dimension to resist entry of the relatively viscous molten resin and
- introducing the fluid charge into the flow path from the orifice after the quantity of molten plastic is introduced into the flow path and upon substantial completion of the plastic injection in response to a reduction of the pressure in the flow path below the predetermined level.

The method as claimed in the claim according to the third auxiliary request therefore would involve an inventive step.

### **Reasons for the Decision**

1. *Main request, first and second auxiliary requests*

- (i) Claim 3 of the patent as granted relates to an injection molding system, comprising

"fluid circuit means (26) interconnecting the flow path and the fluid charge means between the upstream and downstream positions at an orifice (30, 30',30'') opening to the flow path (16) for introducing the fluid charge into the flow path (16) simultaneously with or after plastic injection", cf. column 16, lines 49 to 54 of the

patent specification,

"said fluid circuit means including means ... for preventing the introduced charge from travelling from the flow path (16) through the injection aperture and into the nozzle"; cf. column 17 lines 7 to 14.

- (ii) Claim 2 according to the main request and first and second auxiliary requests, which is intended to replace claim 3 of the patent as granted, relates to an injection molding system, comprising

"a fluid passage (26) interconnecting the flow path (16) and the fluid charge means (42, 44, 50) between the upstream and downstream positions at an orifice (30) opening to the flow path for introducing the fluid charge into the flow path simultaneously with or after plastic injection ...

said fluid passage (26) opening to the flow path (16) downstream of first and second paths (16a, 16b) in the bushing (12) for preventing the introduced fluid charge from travelling from the flow path (16) through the injection aperture and into the nozzle (18) by introducing the fluid charge into the flow path at a fluid injection position (30)..."

- (iii) As a result of that amendment, claim 2 according to the main request and first and second auxiliary requests, does not comprise the feature that the **fluid passage or fluid circuit means**

**includes means** for preventing the introduced fluid charge from travelling from the flow path (16) through the injection aperture and into the nozzle (18).

Thus, the claims of the European patent have been amended in such a way as to extend the protection conferred (Article 123(3) EPC).

Consequently, claim 2 of the main request and the first and second auxiliary requests is not admissible.

## 2. *Third auxiliary request*

### 2.1 Admissibility

The subject-matter of the single claim according to the third auxiliary request is based, among others, on claims 1 and 3 as originally filed and the part of the description headed "General Method of Operation", column 7, line 16 to column 8, line 16 of the A2-publication.

Claim 1 comprises all the features of claim 1 as granted and additional features which result in a restriction of the protection conferred.

Therefore, the requirements of Article 123 EPC are met.

The claim and the description, which had been amended to bring it in line with the subject-matter of the claim, do not give rise to any objection with regard to Article 84 EPC.

2.2 Prior art

Document E1, cf. especially Figures 1 and 5, description pages 18 and 19 and claims 1 and 2, discloses a method for the injection molding of a plastic article in an injection molding system including a resin injection nozzle 14 and a mold 12 having an injection aperture for receiving molten resin from the nozzle at an upstream position and a mold cavity at a downstream position and a resin flow path 18 for fluidly communicating the injection aperture and the mold cavity 12 between the upstream and downstream positions. The known method comprises the steps of:

- (a) pressurizing a charge of fluid at a predetermined pressure level;
- (b) injecting a quantity of molten plastic from the injection nozzle through the injection aperture and the flow path and into the mold cavity at a nominal plastic injection pressure;
- (c) when the flow of plastics has immersed the orifice, communicating the charge of pressurized fluid to an orifice opening to the resin flow path 18 in the mold between the upstream and downstream positions at a fluid injection position, and introducing the fluid charge into the flow path by actuating a ram 39 to allow the fluid to pass into the plastics and to flow therewith into the mold cavity to distribute the molten plastic within the mold cavity;
- (d) containing the fluid under pressure within the article until it has set up in the mold cavity

(92, 94); and

(e) venting the fluid to ambient.

Document E1 explicitly teaches that the fluid flows "simultaneously with the plastic material between the mould surfaces" and that "the rate of introduction of plastics material and the rate of injection of the fluid are controlled one relative to the other whereby the pressure of fluid injected fluctuates with the pressure of the plastics material, whilst remaining higher than that pressure, to ensure a uniform injection of the fluid throughout the period of injection"; cf. claims 1 and 2, page 10, line 19 to page 11, line 5 and page 19, lines 15-21.

Document E8 describes a method for injection molding wherein pressurized fluid is introduced into the mold cavity after the injection of the molten resin, wherein "at the same time when the injection of a synthetic resin into the cavity is complete, an electromagnetic valve V-1 is opened to force the gas into the synthetic resin 5 in the mold cavity from the piston type hydropneumatic accumulator ACC-1 via an inner nozzle and a fluid inlet 4", cf. page 6 bottom of the English translation and Figures 1, 2 and 5.

## 2.2 Novelty

None of the cited documents discloses a method comprising in combination all the features of the single claim. In particular, neither document E1 nor document E8 disclose a method for the injection molding of a plastic article, wherein a charge of pressurized fluid is communicated **during the plastic injection to**

**an orifice of sufficiently small dimension to resist entry of the relatively viscous molten resin** and introduced into a flow path from the orifice **after** the quantity of molten plastic is introduced into the flow path.

Therefore, the subject matter of the single claim is novel.

### 2.3 Inventive step

#### 2.3.1 Closest prior art

As accepted by all parties, document E1 is considered to represent the most relevant state of the art.

#### 2.3.2 Problem underlying the present invention

The problem associated with the method of document E1 may be seen in that the equipment and process control parameters required to implement fluid injection contribute to the cost and complexity of the injection molding process and therefore should be reduced, see also column 1, lines 26-29 of the patent in suit.

#### 2.3.3 Solution

According to the single claim, the problem is solved by a method comprising in particular the following steps:

(a) pressurizing a charge of fluid at a predetermined pressure level **less than a nominal plastic injection pressure;**

(c) **communicating the charge of pressurized fluid**



during the plastic injection to an orifice of sufficiently small dimension to resist entry of the relatively viscous molten resin;

- (d) introducing the fluid charge into the flow path from the orifice (30) **after the quantity of molten plastic is introduced into the flow path and upon substantial completion of the plastic injection in response to a reduction of the pressure in the flow path below the predetermined level** and
- (f) venting the fluid to ambient **at a controlled rate.**

#### 2.3.4 Non-obviousness

This solution is not suggested by the cited prior art documents as shown below:

- (i) Document E1 explicitly discloses pressurizing the charge of fluid at a pressure level higher than the injection pressure of the plastics material (cf. page 10, line 19 to page 11, line 8 and claim 2) and introducing the fluid during the injection of plastic material (cf. page 19, lines 15 to 21 and claim 1).

Furthermore, document E1 is silent about the dimension of the orifice and does not disclose in combination the features of communicating the fluid pressure **during the plastic injection** to the orifice, but introducing the fluid charge into the fluid path from the orifice **after** the

quantity of molten plastic is introduced in the flow path and **in response to** a reduction of the pressure in the flow path below the predetermined level.

- (ii) Document E8 does not relate to a method wherein the fluid is injected in a resin flow path at an injection position downstream of the nozzle and upstream of the mold cavity.

Moreover, document E8 does not suggest the feature of communicating a charge of pressurized fluid **during the plastic injection** to an orifice of sufficiently small dimension to resist entry of the relatively viscous molten resin and introducing the fluid charge into a flow path from the orifice **in response to a reduction of the pressure in the flow path below a predetermined level.**

- (iii) Consequently, the cited prior art documents do not suggest a method wherein the entry of the fluid charge into the mold cavity is self-executing in response to the pressure drop at the end of the injection stroke and also a combination of the teachings of documents E1 and E8 does not result in a method as claimed according to the third auxiliary request.

The other documents cited in the opposition and appeal procedure are not considered more relevant than the above cited documents E1 and E8.

- (iv) The respondents argued that a person skilled in the art would know that the introduction of the

pressurized fluid had to be performed after the injection of the resin and at a pressure level below the injection pressure. A person skilled in the art therefore would understand document E1 in that way and he would obviously come to the solution proposed in the patent in suit.

However, there is no evidence that, at the priority date of the patent in suit, a person skilled in the art would recognize that the method described in document E1 cannot be carried out in the way as explicitly described in that document.

Furthermore, even if a person skilled in the art did recognize the disadvantages of a simultaneous introduction of fluid and plastic, neither document E1 nor document E8, alone or in combination, suggest the solution specified in the claim according to the third auxiliary request which allows the entry of the fluid charge to be self-executing.

(v) The subject-matter of the single claim according to the third auxiliary request therefore involves an inventive step.

3. The document DE-A-39 36 298 and the affidavit of Mr James W. Hendry, both submitted by the appellant in the course of the oral proceedings held before the Board of Appeal, were not introduced into the proceedings, because they are not regarded as relevant with regard to the decision to be taken.

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent as amended in the following version:

**Claim:** The claim according to the third auxiliary request filed during the oral proceedings of 18 May 2000.

**Description:** Pages: 2 to 9 filed during the oral proceedings of 18 May 2000.

**Drawings:** Figures 1 to 8 (sheets 1/5 to 5/5) as granted.

The Registrar:

The Chairman:

A. Townend

A. Burkhart