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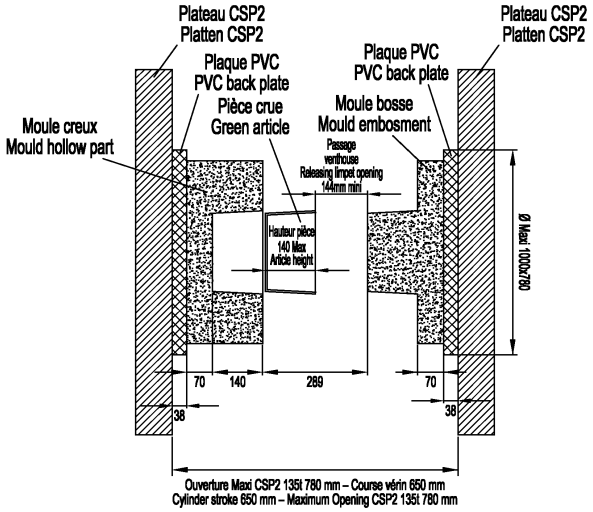
(54) PRESSURE CASTING MOULD FOR CERAMICS

(57) The present invention relates to a pressure casting mould for moulded objects (e.g. ceramics), said mould exhibiting improved demoulding of the moulded objects (e.g. the ceramics), improved cleaning of the mould and increased mould lifetime.



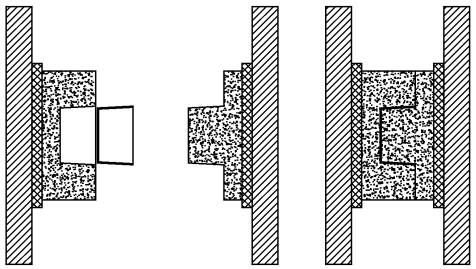


Figure 4 Scheme of press CSP2 Cerinnov

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Description

[0001] The present invention relates to a pressure casting mould, in particular a pressure casting mould for ceramics. The present invention also relates to a process for manufacturing a pressure casting mould for ceramics. The present invention also relates to the use of this mould in a pressure casting machine for improving the demoulding of moulded objects (e.g. the ceramics), for improving the cleaning of the mould and for increasing the mould lifetime.

[0002] Moulds for the non-pressurised casting of ceramics were historically made from gypsum plaster. Gypsum plaster moulds have now been replaced by porous resin moulds which allows to work under pressure and to meet the productions rates required by the ceramic industry, said porous resin moulds being characterised by higher strength and longer lifetime. In specific embodiment, moulds comprise channels for blowing compressed air into the porous resin to spurt the water and air from the moulding surface of the mould, and thus facilitating the demoulding of the ceramic object.

[0003] Despite appropriate selection of porous resins for manufacturing the moulds together with selection of geometries of blowing channels inside the porous resins, the Applicants have found that the demoulding of the ceramic article, the cleaning of the moulds and the mould lifetime would still benefit from improvements which is the object of the present invention.

Invention

[0004] The present invention relates to a porous resin mould for pressure casting of moulded objects (in particular ceramic objects) comprising

- at least two mould parts of porous resin, said mould parts comprising an active face comprising at least one internal active surface defining the shape of the moulded object, and
- channels for air and/or water inside the porous resin mould, said channels consisting in a closed end starting at a distance of the internal active surface of the mould and channel walls going through an external face of the mould,

wherein the closed end is porous and the channel walls are less porous than the porous resin mould.

[0005] In an embodiment of the present invention said porosity difference can advantageously be characterised by

- the apparent porosity of the channels walls is less than the apparent porosity of the porous resin mould; and/or
- the average pore diameter of the channels walls is less than the average pore diameter of the mould.

[0006] Whilst not wishing to be limited to this theory, the Applicants believe that this difference in porosity and/or average pore diameter between the walls of the channels and the mould allows to increase the outlet pressure or flow rate of air/water at the active surface of the mould independently of the inlet air/water pressure, which improves the demoulding and cleaning capability of the moulds in an industrial environment and also increases the lifetime of the mould, as explained in detail in the following description.

Porous resin mould

[0007] There is no restriction regarding the type of porous resin which can be used for manufacturing the mould according to the present invention as long as its properties satisfy the moulded object (e.g. the ceramics) manufacture requirements.

[0008] In an embodiment according to the present invention, the porous resin mould can be prepared from different resins: their main ingredients are preferably acrylic resins, more preferably polymethyl methacrylates, which can advantageously be mixed with inter alia surfactants and water.

[0009] In an embodiment according to the present invention polymethyl methacrylate ("PMMA")-based porous mould materials are used, said porous materials being produced by the polymerization of water-in-oil emulsions with various compositions of emulsion constituents and particle sizes of the filler PMMA beads. Pore morphology, porosity and water permeability of the final materials strongly depend of mixture formulation and PMMA bead sizes.

[0010] Typical commercial resins which can advantageously be used for preparing the porous resin moulds according to the present invention are: Mammutt 2000, Microplast Fine, Microplast BV Fine, Plastipor 85, Plastipor Eco, Sanipor eco, Sanipor k3, Microplast San.

[0011] In an embodiment according to the present invention, the porous resin mould is characterised by one or more of the following properties

- an apparent porosity value comprised between 20 and 40%, for example between 27 and 33%; wherein the porosity can advantageously be measured according to ASTM C373-88 or by mercury intrusion porosimetry (e.g. from apparent density as measured according to UOP578 - 11), and/or
- an average pore diameter of the mould comprised between 4 and 30 microns, for example between 5 and 22 microns, wherein the average pore diameter can advantageously be measured according to mercury intrusion porosimetry (e.g. from apparent density as measured according to UOP578 - 11), and/or
- a Compressive Strength comprised between 20 and 40 N/mm^2, and/or
- a Bending Tensile Strength comprised between 10 and 20 N/mm^2, and/or

- a Water absorption comprised between 28 % and 38 %, preferably between 30 % and 36 %, which can advantageously be measured by the water absorption test according to ASTM C373-88, and/or
- a Contraction value inferior to 0.5 %, and/or
- a Bulk specific gravity (dry) comprised between 0.8 and 0.9 g/cm^3.

[0012] Most of these measurements can be performed directly on the mould manufactured, e.g. by coring a sample in the mass of the mould. However, as this is a destructive method, alternative appropriate sampling can also advantageously be used. For example, when the mould is manufactured, a distinct sample-piece can be simultaneously prepared in parallel, under the same manufacturing conditions as the mould, such that said sample-piece can be used for physico-chemical properties measurements purpose; indeed, by using said alternative samplings, no significant differences were identified when comparing measurement results respectively performed on the mould core or on the sample-piece.

[0013] There is no restriction regarding the number and the dimensions of the mould parts constituting the mould manufactured according to the present invention as long as said dimensions satisfy the moulded object (e.g. the ceramics) manufacture requirements.

[0014] The shape, length, width, thickness, minimum distance between active surface and lateral edges, minimum distance between active surface and external (preferably opposite) surface of the mould parts manufactured according to the present invention can be adapted in order to meet the corresponding moulded object (e.g. the ceramics) manufacture requirements. For illustrative and non-limiting purpose we will describe hereafter an example of a mould consisting in two mould parts. Figure 1 is a schematic representation of such a mould part; the corresponding mould is preferably a rectangular parallelepiped which consists in two mould parts, each of said parts comprising only one active surface face; said active surface face being the face represented in Figure 1; in this representation, the two mould parts are about identical, with the proviso that the shape of their active surfaces could be identical or different depending on the shapes of the moulded object (e.g. the ceramic objects) to be manufactured (thanks to the cavities and/or elevations inside the mould parts). For the purpose of the present invention and appended claims, the active face of a mould part will correspond to the face comprising the active surfaces, the other faces (five faces in the case of a rectangular parallelepiped) being named external faces.

[0015] In Figure 1, the active surface of the mould part is represented by the oval shape and by the dimensions A and B. Thus, in Figure 1 the oval shape corresponds to a single cavity mould wherein the corresponding moulded object (e.g. the ceramic object) will be shaped. Multi-cavities moulds are obviously also contemplated for the purpose of the present invention and appended claims.

[0016] In an embodiment according to the present invention, for a single cavity mould as illustrated in Figure 1, the following dimension characteristics will apply

$$B+30mm < Y < B+H*4$$

(H is the height of the article)

$$A+30mm < X < A+H*4$$

(H is the height of the article)

wherein A and X represent respectively the maximum length of the active surface and the length of the mould part, and
wherein B and Y represent respectively the maximum width of the active surface and the width of the mould part, and
wherein H represents the maximum height of the total ceramic object cavity.

[0017] Similar conditions will advantageously be applicable to multi-cavities moulds. In an embodiment according to the present invention, the minimum distance between any point of the external perimeter of any active surface of a mould part and any point of the external perimeter of the said mould part will preferably be superior to 15mm.

[0018] In an embodiment according to the present invention, all the different mould parts constituting the final mould are of the same porous resin.

[0019] As indicated hereinabove, there is no restriction regarding the number and the dimensions of the mould parts constituting the mould manufactured according to the present invention as long as said dimensions satisfy the moulded object (e.g. the ceramics) manufacture requirements. In a preferred embodiment according to the present invention, the porous resin mould consists in two mould parts of porous resin, preferably two mould parts of the same porous resin, the respective active surfaces (and corresponding cavities and/or elevations) defining the shapes of the final moulded objects (e.g. the ceramic objects).

[0020] In a preferred embodiment according to the present invention, the channels for air and/or water inside the porous resin mould are present on each and every mould part.

Channels

[0021] As explained hereinabove, the porous resin mould comprises channels for injecting air and/or water inside the porous resin mould towards the active surfac-

es, said channels starting at a distance of the internal active surfaces of the active face of the mould and going through an external face of the mould. In an embodiment, said distance is of at least 1 mm, preferably at least 5 mm of the internal active surfaces of the active face of the mould and going through an external face of the mould, preferably the external face opposite to the active face, and said channels being characterised by a porosity of the channels walls which is less than the porosity of the porous resin of the mould and/or an average pore diameter of the channels walls which is less than the average pore diameter of the mould. For the purpose of the present invention and appended claims, the characteristic of "distance of the internal active surfaces of the active face of the mould" means that the corresponding channels never go through said active surface and are never located at a lower distance than the defined distance from any point of the active surface of the mould part; there is thus always some porous resin present between the said active surface and the closest extremity of any of said channels. The channels claimed according to the present invention preferably consist in one closed end (preferably made of resin mould) towards the active surface(s), one open end going through an external face of the mould and channel walls.

[0022] In an embodiment of the present invention, the channel cross sections are circular. For example, these channels can be made by drilling the porous resin mould from its external face (preferably the external face opposite to its active face) down to a distance sufficient from any point of the said internal active surface of the mould without going through. The shape of the cross section of the channels is not important as long as the surface of the cross section fulfils the requirements; for example, square, hexagonal, octanol, or other shapes could also be used according to the present invention.

It is critical to maintain a sufficient distance of porous resin between the channel and the active surface of the mould; indeed, smaller distances may result in irreversible cracks in the mould structure which could reduce drastically its lifetime. In a preferred embodiment of the present invention, the said distance is of at least 10 mm, for example at least 12 mm; for efficiency reasons, the said distance will be preferable kept below 50 mm, preferably below 30 mm, for example below 20 mm.

[0023] In an embodiment according to the present invention, the said claimed channels are present in all porous resin mould parts. In an embodiment according to the present invention, all the claimed channels are directed towards the active surfaces of their mould part; in other words, in an embodiment according to the present invention, the mould does not comprise channels as claimed which would not be directed towards non-active surfaces of their mould part. The following description is given for a porous resin mould comprising two porous resin mould parts; it will be obvious for the man skilled in the art that the corresponding teaching and description can be easily adapted for multiple porous resin mould parts.

[0024] Figure 2 is an external face mould view illustrating the positioning of channels for the manufacture of a ceramic object corresponding to the object illustrated in Figure 3, e.g. a soup plate with a flat bottom and 45 degree edges.

[0025] In Figure 2, the cross sections of the channels are the same, the channels are cylindrical and perpendicular to the flat bottom of the object; in this illustrative representation, the holes are placed as explained below:

- the distance between each hole is 20mm for a flat surface (distance A on Figure 2); and
- the distance between the holes is reduced to 10mm to increase blowing on sloping surfaces (distance B on Figure 2).

[0026] Besides the main characterising features of lower porosity and/or of smaller average pore diameter of the channels walls, the present invention also provides additional solutions contributing to the improvement of the demoulding of the moulded object (e.g. the ceramic article), of the cleaning of the moulds and/or of the mould lifetime.

[0027] In an embodiment according to the present invention, the surface and volume occupied by the claimed channels of a mould part will be adapted to the shape of the moulded object (e.g. the ceramic object) manufactured, for example as depicted in Figure 2.

[0028] For example, and this is an embodiment of the present invention (e.g. for manufactured objects which are not 100% flat like discs), the total surface of the cross sections of the claimed channels which are oriented towards a part "p" of the active surface "ASp" of a mould part may advantageously be a function of the angle formed between said active surface part ASp and the said channels; e.g. may be controlled and defined by the angle formed between the said channels and the corresponding part of the moulded object (e.g. the ceramic object) manufactured.

For example, when the claimed channels are perpendicular to the external face of the mould part which is opposite to the active face of the mould, and when the active surface "ASp" of a mould part corresponding to a uniform part of the manufactured object is flat (e.g. active surface corresponding to the flat bottom of the ceramic object), the corresponding angle will be about 90 degrees (preferably equal to 90 degrees) and the total surface of the cross sections of the corresponding channels will be S90 for the said ASp-90; however, when the uniform part of the ceramic object and thus the corresponding active surface "ASp" forms an angle of 45 degrees with the corresponding channels (e.g. as depicted in Figure 2 for the side edge of the soup plate), the total surface of the cross sections of the corresponding channels will be S45 for the said ASp-45.

If "ASp-proj" corresponds to the surface of an active sur-

face part when projected on a theoretical flat active face of the mould part, the ratio S45/ASp-proj-45 will be preferably higher than the ratio S90/Asp-proj-90.
In a corresponding alternative embodiment according to the present invention, the density of the holes corresponding to the claimed channels going through the external face of the mould part will be controlled and defined by the angle formed between said channels and the moulded object (e.g. the ceramic object).

[0029] There is no restriction regarding the number and the dimensions of the claimed channels of the mould manufactured according to the present invention as long as said number/dimensions satisfy the moulded object (e.g. the ceramics) manufacture requirements.
In an embodiment according to the present invention, the cross section of a single channel will preferably be comprised between 3 and 5000 mm2, preferably between 15 and 1000 mm2, for example between 19 and 200 mm2.
In an embodiment according to the present invention, the total surface of the cross sections of the claimed channels will preferably be equal to or lower than 60% of the projected surface of the corresponding active surface. In an embodiment according to the present invention, the total surface of the cross sections of the claimed channels will preferably be equal to or higher than 5% of the projected surface of the corresponding active surface, for example higher than 10%.
The present invention also covers many additional embodiments which could benefit from its findings and implementation. The following examples are given for illustrative purpose:

- claimed channels with different orientations in order to favour perpendicular angles between channels and parts of manufactured object (i.e. corresponding parts of active surface); and/or
- claimed channels with different cross sections; and/or
- claimed channels with different lengths; and/or
- claimed channels with a porosity value and/or an average pore diameter value of its closed end preferably identical to the corresponding values of the mould part; and/or
- claimed channels having gradients of porosity values and/or of average pore diameter values; for example, values of about zero for the channel walls at the vicinity of the open end of the claimed channels, up to values of porosity and/or of average pore diameter corresponding to the closed end of the said claimed channels.

[0030] According to an embodiment of the present invention, the apparent porosity of the channels walls is less than the apparent porosity of the porous resin mould and/or the average pore diameter of the channels walls is less than the average pore diameter of the mould.

[0031] In an alternative embodiment according to the present invention, there is no need for comparing the apparent porosity and/or the average pore diameter values between the channel walls and the mould.

[0032] Indeed, the present invention can also be characterised by the following conditions:

1) the channels are characterised by a closed end which is porous and at least the half of the channel walls which go through the external face of the mould part (also designated as the upper part) which is airtight and watertight,

a) and preferably also characterised by having the other half of the said channel walls which is porous at its bottom (i.e. for some length of porous channel walls connected to the closed end) up to a distance lower than half its height,

i) and preferably wherein the said length of porous bottom channel walls is lower than 0.4 the height of the channel walls, preferably less than 0.2,
ii) and preferably wherein the said length of porous bottom channel walls is higher than 0.01 the height of the channel walls, preferably higher than 0.05.

[0033] In another alternative embodiment according to the present invention (for which there is again no need for comparing the apparent porosity and/or the average pore diameter values between the channel walls and the mould), the present invention can also be characterised by the following conditions wherein

- the ratio between the average apparent porosity of the closed end of the channel and the average porosity of the channel wall, and/or
- the ratio between the average pore diameter of the closed end of the channel and the average pore diameter of the channel wall

is higher than 1, preferably higher than 10.

[0034] In another alternative embodiment according to the present invention (for which there is again no need for comparing the apparent porosity and/or the average pore diameter values between the channel walls and the mould), when dividing the total surfaces of a channel having a length L between its closed end, a lower part (starting at the closed end) of its channel wall corresponding to L/2 and an upper part of its channel wall corresponding to the remaining L/2 (ending at the open end), the following equation will advantageously apply

- the average apparent porosity of the closed end of the channel will be higher than the average apparent porosity of the lower part of the channel which will be higher than the average apparent porosity of the upper part of the channel; and/or
- the average pore diameter of the closed end of the

channel will be higher than the average pore diameter of the lower part of the channel which will be higher than the average pore diameter of the upper part of the channel.

[0035] There is no restriction regarding the angle formed between the closed end (which is preferably a flat surface) of a channel and its channel wall; indeed, this angle which is preferably perpendicular for the channels directed towards flat active surface (e.g. the flat bottom of the soup plate of Figure 2) could advantageously be different for other parts of the active surface (e.g. at 45 degrees for the side edge of the soup plate of Figure 2). For example, and this is an embodiment of the present invention (e.g. for manufactured objects which are not 100% flat like discs), when claimed channels are oriented towards a part "p" of the active surface "ASp" of a mould part, the angle formed between the closed end of said channels and its channel wall surface will be a function of the angle formed between said active surface part ASp and the said channels; e.g. may be controlled and defined by the angle formed between the said channels and the corresponding part of the moulded object (e.g. the ceramic object) manufactured.

[0036] Any appropriate method can be used in order to obtain the desired porosity and/or average pore diameters of the channel walls. For example, and this is an embodiment of the present invention, a portion of the walls of the channels can advantageously be paint. This method will block the pores of the channel walls and concentrate the action of the air/water at the desired location, i.e. in the direction of the active surface of the mould; care will of course be taken not to block the extremity of the channel, i.e. its porous closed end. There is no restriction regarding the type of paint used as long as they meet the desired effect on porosity and average pore diameter values. For example, said paints can advantageously be selected amongst polyurethane paints, e.g. Acryl polyurethane PU6250 and Hardener NJ3600, and/or Acrylic Polyurethane Acrolon 218 HS B65-650 and Hardener B65V600.

[0037] The present invention also claims a process for manufacturing the claimed pressure casting mould for moulded object (e.g. the ceramics) by painting the channel walls.

[0038] An alternative method can be to introduce appropriate tubes directly into the mould.

[0039] The present invention also relates to the use of the claimed moulds in a pressure casting machine for improving the demoulding of the moulded object (e.g. the ceramics), for improving the cleaning of the mould and/or for increasing the mould lifetime. In an embodiment according to the present invention, said demoulding and/or cleaning steps are characterised by the following conditions:

- more than fifty percent of the air introduced into the channels, and/or
- more than fifty percent of the water introduced into the channels,

go through the closed end of the said channels.

[0040] In an embodiment according to the present invention, all the claimed channels are connected to at least one air supply and/or water supply. The number of corresponding supply pipes will essentially depend on the size of the mould; 1 to 8 supply pipes are usually covering most of the needs.

In an embodiment according to the present invention, all the open ends of the claimed channels are connected to grooves which are themselves connected to the supply pipes. These grooves can advantageously be covered by a platen and the mould fixed on this platen; air and water may then be injected through this platen to the grooves and to the claimed channels. The air pressure networks of the industrial ceramics casting plants is usually delivering pressure values which are not exceeding 7 bars; an advantage of the mould claimed according to the present invention is that it allows to considerably reduce the pressure drop at the desired locations which in turn greatly enhances the demoulding performances.

Nozzles

[0041] In an embodiment according to the present invention, the porous resin mould comprises at least one nozzle which goes through the active surface of the mould in order to feed the mould (e.g. with the ceramic slurries defined hereunder) and manufacture the moulded object (e.g. the ceramic object); there is thus preferably at least one nozzle per active surface.

[0042] Illustrative and non-limiting examples of nozzles have 1 to 100 mm diameter.

Mould paint of inactive surfaces

[0043] In an embodiment according to the present invention, with the proviso of the active surfaces, all the faces of the mould parts are treated to reduce or even block their porosity. Said treatment can be made e.g. by painting the said faces.

Ceramics

[0044] All ceramics compositions can advantageously be used for the manufacture of the ceramic objects according to the present invention. For example, the following can be illustratively cited clay, kaolin clay, bone china, hydrated aluminum silicate, silicate, talc, oxides, hydrates, aluminum oxide, zirconium oxide, magnesium oxide, silica, cordierite, aluminum titanium oxide, alkaline metal and alkaline earth metal oxides, rare earth oxide, silicates, carbonates, phosphates, carbides, silicon carbides, tungsten carbide, mixed carbides, nitride, silicon nitride, silicon aluminum oxinitride, or mixtures of two or more thereof. These ceramic compositions can for ex-

ample advantageously be prepared as ceramic slurries which are composed of:

- the ceramics composition described above, in quantity varying from 40vol% to 70vol% ; and
- water or organic solvent(s) or mixture thereof, in quantity varying from 30vol% to 60vol%.

[0045] Optional additives can also be used, e.g. organic auxiliaries as binders, plasticizers, rheological agents, dispersants, anti-foaming agent, lubricant, surfactants, drainage agent, antifungal agent, or mixtures of two or more thereof, in quantity varying from 0vol% to 10vol%.

Casting conditions

[0046] Illustrative and non-limiting casting conditions are described hereafter.

[0047] High pressure casting mould is used in a press machine with 2 platens (as illustrated in Figure 4). A standard cycle for pressure casting process is described in Figure 5. The first step is used to fill the mould and make a first thickness, the second step is to increase thickness of the cake (piece casted).

[0048] Pressure of the first step is usually around 6 bars and time around about 10 to 40 seconds, for example around about 20 seconds.

[0049] Pressure of the second step is usually comprised between about 20 and 40 bars.

[0050] The following terms and expressions contained herein are defined as follows:
As used herein, the term "about" refers to a range of values from ± 5% of a specified value.

[0051] It should be obvious to those skilled in the art that the present invention enables embodiments under numerous other specific forms without leaving the field of application of the invention as claimed. Consequently, the present embodiments must be considered as illustrations, but may be modified in the defined field by the scope of the attached claims, and the invention must not be limited to the details given above.

[0052] In particular, and this represents an alternative embodiment of the present invention, the present invention might benefit to the manufacture of objects which are not necessary defined as ceramics. For example, the claimed porous resin mould can also be advantageously used for pressure casting of waste slurries; corresponding cakes may be manufactured from said waste slurries.

Claims

1. Porous resin mould for pressure casting of moulded objects comprising

   - at least two mould parts of porous resin, said mould parts comprising an active face comprising at least one internal active surface defining the shape of the moulded object, and
   - channels for air and/or water inside the porous resin mould, said channels consisting in a closed end starting at a distance of the internal active surface of the mould and channel walls going through an external face of the mould,

   wherein the closed end is porous and the channel walls are less porous than the porous resin mould.

2. Porous resin mould according to claim 1 wherein

   - the apparent porosity of the channels walls is less than the apparent porosity of the porous resin mould; and/or
   - the average pore diameter of the channels walls is less than the average pore diameter of the mould.

3. Porous resin mould according to any of the preceding claims wherein all the mould parts constituting the final mould are of the same porous resin.

4. Porous resin mould according to any of the preceding claims wherein the channels for blowing air and/or water inside the porous resin mould are present on all mould parts.

5. Porous resin mould according to any of the preceding claims wherein the channel consists in a closed end and channel walls and wherein the distance between the closed end and the active surface is at least 5 mm.

6. Porous resin mould according to claim 5 wherein said distance is below 50 mm.

7. Porous resin mould according to any of the preceding claims wherein the closed end is made of the same resin as the resin mould.

8. Porous resin mould according to any of the preceding claims wherein the total surface of the cross sections of the channels which are oriented towards a part "p" of an active surface "ASp" of a mould part are a function of the angle formed between said active surface part ASp and the said channels.

9. Porous resin mould according to any of the preceding claims wherein when dividing the total surfaces of a channel having a length L between its closed end, a lower part (starting at the closed end) of its channel wall corresponding to L/2 and an upper part of its channel wall corresponding to the remaining L/2 (ending at the open end), the following equation applies

   - the average apparent porosity of the closed

end of the channel will be higher than the average apparent porosity of the lower part of the channel which will be higher than the average apparent porosity of the upper part of the channel; and/or
- the average pore diameter of the closed end of the channel will be higher than the average pore diameter of the lower part of the channel which will be higher than the average pore diameter of the upper part of the channel.

10. Porous resin mould according to any of the preceding claims wherein when the channels are oriented towards a part "p" of the active surface "ASp" of a mould part, the angle formed between the closed end of said channels and its channel wall surface will be a function of the angle formed between said active surface part ASp and the said channels.

11. Porous resin mould according to any of the preceding claims wherein the channels are **characterised by** a closed end which is porous and at least the half of the channel walls which go through the external face of the mould part (also designated as the upper part) which is airtight and watertight.

12. Porous resin mould according to claim 11 wherein the other half of the said channel walls is porous at its bottom (i.e. for some length of porous channel walls connected to the closed end) up to a distance lower than half its height.

13. Porous resin mould according to claim 12 wherein the said length of porous bottom channel walls is lower than 0.4 the height of the channel walls, preferably less than 0.2.

14. Porous resin mould according to any of claims 12 to 13 wherein the said length of porous bottom channel walls is higher than 0.01 the height of the channel walls, preferably higher than 0.05.

15. Process for manufacturing the claimed pressure casting mould for moulded objects according to any of the preceding claims by painting the channel walls.

16. Use of a porous resin mould according to any of claims 1 to 14 in a pressure casting machine for improving the demoulding of the moulded object (e.g. the ceramics), for improving the cleaning of the mould and/or for increasing the mould lifetime, wherein

- more than fifty percent of the air introduced into the channels, and/or
- more than fifty percent of the water introduced into the channels,

go through the closed end of the said channels.

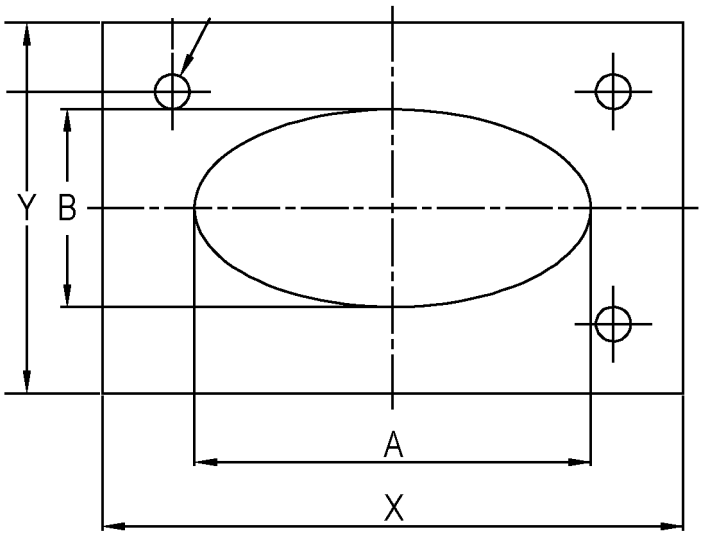

Figure 1 - Active face of a single cavity mould

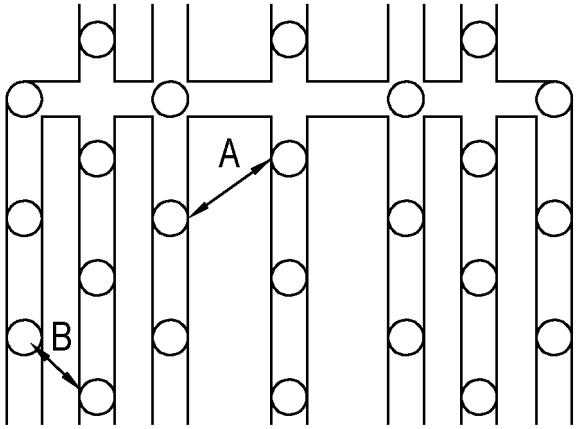

Figure 2 Distances between holes

Figure 3 Profile of the piece casted
(corresponding to holes of Figure 2)

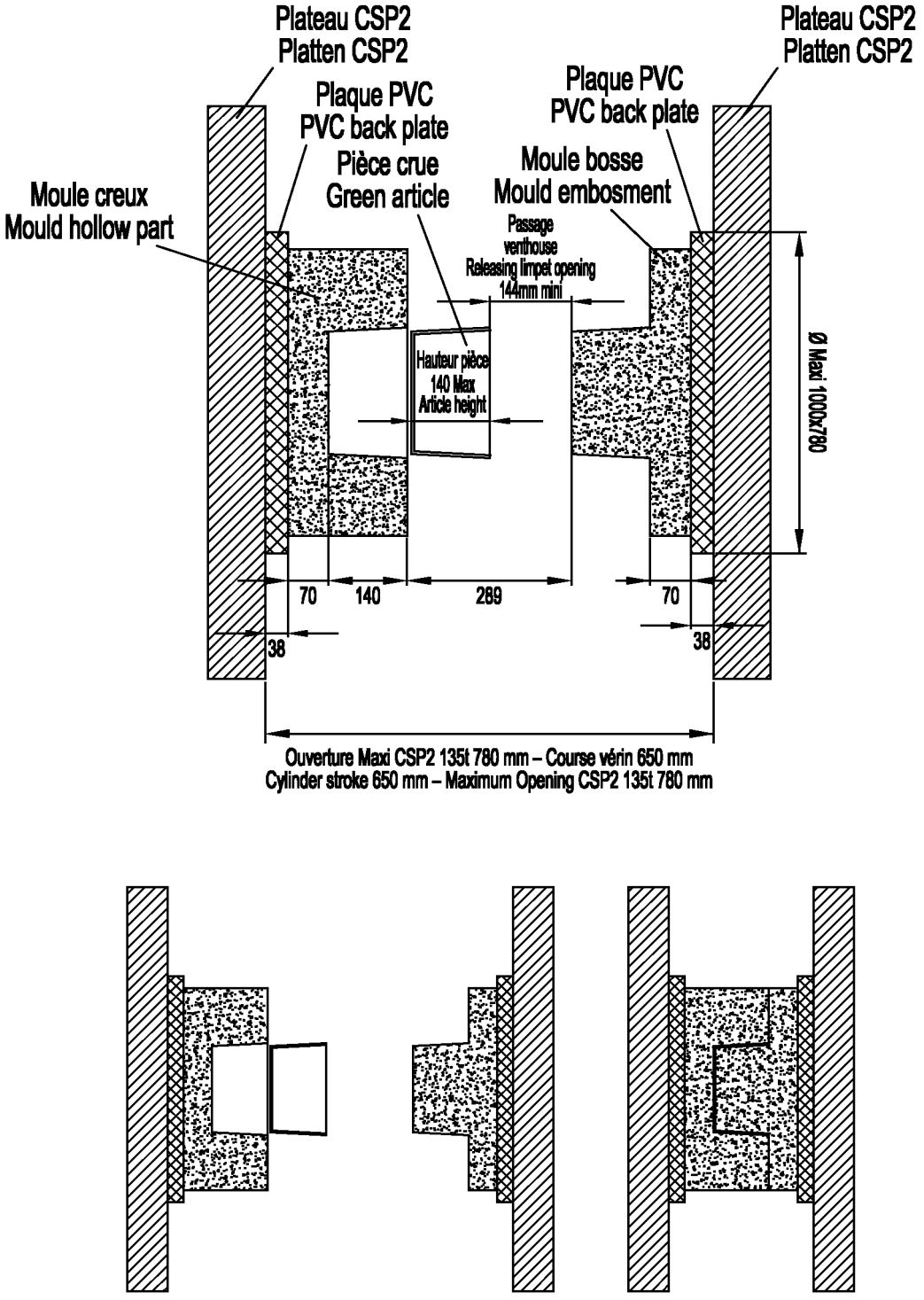

Figure 4 Scheme of press CSP2 Cerinnov

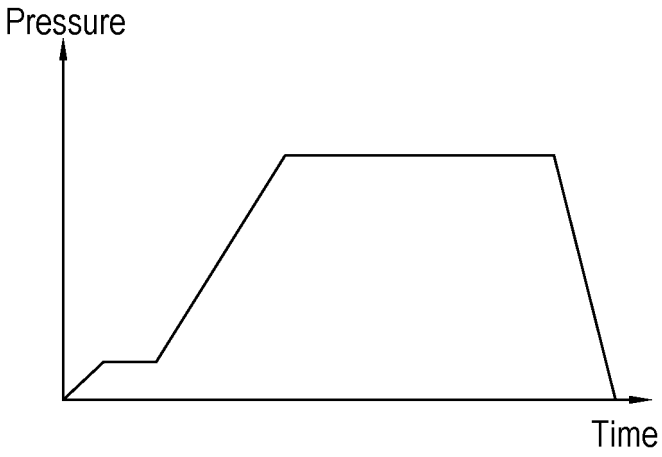

Figure 5 High pressure casting cycle

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EUROPEAN SEARCH REPORT

Application Number
EP 18 16 7697

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	26 October 2018	Voltz, Eric

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