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Inventor(s)

LEE; Youngil et al.

### SUPPORT MANUFACTURING METHOD, SUPPORT, AND SUPPORT MANUFACTURING APPARATUS USING MOLD

#### Abstract

According to embodiments, provided is a support manufacturing method comprising the steps of: forming a first injection-molded product by using a first material; injecting a second material into at least a portion of the first injection-molded product; forming a second injection-molded product including a hollow by discharging the second material from the first injection-molded product; and forming a third injection-molded product by covering at least a portion of the outer surface of the second injection-molded product with a third material.

<b>Inventors:</b>	LEE; Youngil (Seoul, KR), NA; Siwang (Seoul, KR), KIM; Taeho (Seoul, KR), KIM; Taegeun (Seoul, KR), WOO; Jaechun (Seoul, KR), KIM; Sangsik (Seoul, KR)
<b>Applicant:</b>	LG ELECTRONICS INC. (Seoul, KR)
<b>Family ID:</b>	1000008612052
<b>Assignee:</b>	LG ELECTRONICS INC. (Seoul, KR)
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## **Background/Summary**

### TECHNICAL FIELD

[0001] The present disclosure relates to a method for manufacturing a support, the support, and an apparatus for manufacturing the support, and more particularly to a method for manufacturing a support through an injection method using a mold, a support manufactured using the mold, and a support manufacturing apparatus designed to use the mold.

### BACKGROUND ART

[0002] Electronic devices such as televisions (TVs), desktop personal computers (PCs), etc. have evolved into improved devices that are designed to include more functions while becoming thinner at the same time. Recently, as technology has been developed, not only the function of the electronic device but also the appearance of the electronic device have emerged as important factors.

[0003] Accordingly, the importance of the function and appearance of a device (hereinafter referred to as a support) for facilitating mounting (or holding) and/or supporting of electronic devices is also increasing.

[0004] The support is required to be stable in terms of function, for example, to mount/support an electronic device, and to be light in preparation for movement from one place to another place. In addition, the support is required to reflect pre-designed design elements in terms of appearance, for example, to be formed smoothly without leaving any rough traces of a fabrication process.

Furthermore, in order to facilitate mass production, the unit cost of the support needs to be reduced.

[0005] Meanwhile, an injection process using a mold is currently used to manufacture the support. For the injection process, for example, a general injection process, a water injection technology (WIT) process, a double injection process, etc. have been used.

[0006] However, for example, a general injection process or a double injection process may have problems in that the manufacturing efficiency of the support is deteriorated due to a long cooling time generated after the injection process. In addition, for example, the WIT process may have problems in that it has difficulty in controlling and maintaining pressure of injected water and shrinkage defects caused by thickness deviation of an injection target occur.

### DISCLOSURE

#### Technical Problem

[0007] An object of the present disclosure is to provide a method for manufacturing a support, the support, and an apparatus for manufacturing the support that substantially obviate one or more problems due to limitations and disadvantages of the related art.

[0008] Another object of the present disclosure is to provide a method for manufacturing a support that is lightweight and can shorten a cooling time, the support, and an apparatus for manufacturing the support.

[0009] Another object of the present disclosure is to provide a method for manufacturing a support, the support, and an apparatus for manufacturing the support, that can improve appearance defects of the support even when there is a thickness deviation in the support.

[0010] It will be appreciated by persons skilled in the art that the objects that could be achieved with the various embodiments of the present disclosure are not limited to what has been particularly described hereinabove and the above and other objects that the various embodiments of the present disclosure could achieve will be more clearly understood from the following detailed description.

#### Technical Solutions

[0011] In order to solve the above-described problems, the embodiments may provide a support manufacturing method including a composite injection process of combining a primary injection process and a secondary injection process, the support manufactured by the composite injection process, and an apparatus for manufacturing the support designed to use a composite injection process.

[0012] In accordance with an aspect of the present disclosure, a method for manufacturing a support may include: forming a first injection-molded product using a first material; injecting a second material into at least a portion of the interior of the first injection-molded product; forming a second injection-molded product having a hollow by discharging the second material; and forming a third injection-molded product by covering at least a portion of an outer surface of the second injection-molded product with a third material.

[0013] The second injection-molded product may include a hole. The forming the hollow may include injecting the second material into at least a portion of the interior of the first injection-molded product; and if at least a portion of the first injection-molded product overflows from the first injection-molded product according to injection of the second material, discharging at least a portion of the first material through the hole.

[0014] The second injection-molded product is formed such that a support portion supporting the second injection-molded product corresponds to a first mold. The forming the third injection-molded product may include: rotating the support portion formed with the second injection-molded product by a preset angle so as to allow the second injection-molded product to correspond to a second mold; and injecting the third material into the second mold so as to cover at least a portion of the outer surface of the second injection-molded product.

[0015] A rotation unit may be connected to a first mold corresponding to the second injection-molded product and a second mold corresponding to the third injection-molded product. The forming the third injection-molded product may include: rotating, by the rotation unit, the second injection-molded product corresponding to the first mold such that the rotated second injection-molded product corresponds to the second mold; and injecting the third material into the second mold to cover at least a portion of the outer surface of the second injection-molded product.

[0016] The first mold may be formed to correspond to the second injection-molded product, and the second mold may be formed to correspond to the third injection-molded product. The forming the third injection-molded product may include: inserting the second injection-molded product into the second mold; and injecting the third material into the second mold to cover at least a portion of the outer surface of the second injection-molded product.

[0017] The third material may be formed to cover at least a portion of the outer surface of the second injection-molded product including the hollow.

[0018] Injection of the second material may be performed at a first height with respect to the first injection-molded product; and discharge of the second material may be performed at a second height with respect to the third injection-molded product, wherein the first height and the second height are equal to each other.

[0019] The second material may be different from the first material and the third material, wherein the first material is the same as or different from the third material.

[0020] In accordance with another aspect of the present disclosure, a support may include: a first layer including a first resin, and configured to have a hollow therein; and a second layer including a second resin, and configured to surround at least a portion of an outer surface of the first layer.

[0021] The first layer may include a hole, one side of which is connected to the hollow and the other side of which is blocked by the second layer.

[0022] The first layer may include a plurality of protrusions, each of which has a preset size or less on at least a portion of a surface where the first layer and the second layer are in contact with each other;

[0023] A surface of a side where the second layer is not in contact with the first layer has a flatness equal to or greater than a preset value.

[0024] The support may further include an adhesive layer disposed between the first layer and the second layer so as to bond the first layer and the second layer to each other.

[0025] In a cross-section perpendicular to a direction of the hollow, the first layer has a first thickness at a first position, and the first layer has a second thickness at a second position, wherein the first thickness and the second thickness are equal to each other.

[0026] In accordance with another aspect of the present disclosure, an apparatus for manufacturing a support may include: a mold formed to include a first mold having a shape of the support having a first size and a second mold having a shape of the support having a second size larger than the first size; a first injection unit configured to inject a first material into the first mold; an injection unit configured to inject a second material into at least a portion of the interior of the first material at a first height and to discharge the second material from at least a portion of the interior of the first material at a second height equal to the first height; and a second injection unit configured to inject a third material into the second mold to surround at least a portion of an outer surface of the first material.

#### Advantageous Effects

[0027] As is apparent from the above description, embodiments may provide a support manufacturing method for efficiently manufacturing a support, the efficiently manufactured support, and an apparatus for manufacturing the support.

[0028] Embodiments may provide a method for manufacturing a light high-strength support, a support, and an apparatus for manufacturing the support.

[0029] Embodiments may provide a method for manufacturing a support with improved appearance defects, a support, and an apparatus for manufacturing the support.

[0030] The support manufactured according to the embodiments may have an aesthetically pleasing appearance.

[0031] Effects obtainable from the present embodiments are not limited by the above mentioned effects, and other unmentioned effects can be clearly understood from the above description by those having ordinary skill in the technical field to which the present disclosure pertains.

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## Description

### DESCRIPTION OF DRAWINGS

[0032] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings:

[0033] FIG. 1 is a schematic diagram illustrating an example of supporting a multimedia device using a support according to embodiments of the present disclosure.

[0034] FIG. 2 is a flowchart illustrating a method for manufacturing a support according to embodiments of the present disclosure.

[0035] FIGS. 3(a) to 3(c) are views illustrating examples of a process of forming a first injection-molded product and a second injection-molded product according to embodiments of the present disclosure.

[0036] FIGS. 4(a) to 4(c) are cross-sectional views illustrating examples of a first injection-molded product and a second injection-molded product formed according to embodiments of the present disclosure.

[0037] FIG. 5 is a view illustrating an example of forming a hollow included in the support according to embodiments of the present disclosure.

[0038] FIGS. 6(a) and 6(b) are cross-sectional views illustrating examples of a third injection-molded product formed according to embodiments of the present disclosure.

[0039] FIGS. 7(a) and 7(b) are views illustrating examples of a process of forming a third injection-molded product according to embodiments of the present disclosure.

[0040] FIG. 8 is a view illustrating an example of a process of forming a third injection-molded product according to embodiments of the present disclosure.

[0041] FIG. 9 is a view illustrating an example of a process of forming a third injection-molded product according to embodiments of the present disclosure.

[0042] FIGS. 10(a) and 10(b) are enlarged views of the portion “A” shown in FIG. 6 according to embodiments of the present disclosure.

#### BEST MODE

[0043] Description will now be given in detail according to exemplary embodiments disclosed herein, with reference to the accompanying drawings. For the sake of brief description with reference to the drawings, the same or equivalent components may be provided with the same reference numbers, and description thereof will not be repeated. In general, a suffix such as “module” and “unit” may be used to refer to elements or components. Use of such a suffix herein is merely intended to facilitate description of the specification, and the suffix itself is not intended to give any special meaning or function.

[0044] In the present disclosure, that which is well-known to one of ordinary skill in the relevant art has generally been omitted for the sake of brevity. The accompanying drawings are used to help easily understand various technical features and it should be understood that the embodiments presented herein are not limited by the accompanying drawings. As such, the present disclosure should be construed to extend to any alterations, equivalents and substitutes in addition to those which are particularly set out in the accompanying drawings.

[0045] It will be understood that although the terms first, second, etc. may be used herein to describe various elements, these elements should not be limited by these terms. These terms are generally only used to distinguish one element from another. It will be understood that when an element is referred to as being “connected with” another element, the element can be directly connected with the other element or intervening elements may also be present.

[0046] In contrast, when an element is referred to as being “directly connected with” another element, there are no intervening elements. A singular representation may include a plural representation unless it represents a definitely different meaning from the context. Terms such as “include” or “has” are used herein and should be understood that they are intended to indicate an existence of several components, functions or steps, disclosed in the specification, and it is also understood that greater or fewer components, functions, or steps may likewise be utilized.

[0047] The term “mold” (also referred to as a metallic pattern or a metallic mold) described in the present specification may refer to a frame required for mass-producing products with the same or similar specifications. The mold may be designed to use, for example, aluminum alloy, copper alloy, cast iron, etc. For example, the mold may be used for plastic injection molding. The term “mold” may be used interchangeably with a formwork, a frame, a metallic mold, or the like.

[0048] FIG. 1 is a schematic diagram illustrating an example of supporting a multimedia device using a support according to embodiments of the present disclosure.

[0049] Referring to FIG. 1, a reference number **1000** may be a support object held and/or supported by a support **2000** according to embodiments. In addition, a reference numeral **2000** may be a support for holding and/or supporting the support object **1000**.

[0050] The support object **1000** is, for example, an electronic device. The electronic device may be, for example, a smartphone, a laptop, a digital broadcasting terminal, a personal digital assistant (PDA), a portable multimedia player (PMP), a navigation system, a slate PC, a tablet, an ultrabook, a digital TV, a desktop computer, and the like.

[0051] In FIG. **1**, a display screen of a television (TV) is shown as an example of a support object **1000**. However, unlike what is shown in FIG. **1**, the support object **1000** is not limited to such electronic devices.

[0052] The support object **1000** may include all objects that are fixed, mounted (or held), and/or supported by the support **2000**, such as clothes or decorations. In addition, the support object **1000** may be another support having the same or similar function as the support **2000**. In this case, the support **2000** may function as a portion of a frame formed by combining the support **2000** with another support.

[0053] The support **2000** according to embodiments is a structure that fixes or supports the support object **1000** such as an electronic device.

[0054] The support **2000** may be coupled to or connected to the support object **1000** to be exposed to the outside. Accordingly, when designing the support **2000**, it is necessary to design the support **2000** from an aesthetic perspective. The support **2000** is an industrial product and may require mass production. Therefore, the support **2000** is required to be mass-produced quickly while reducing material costs. Additionally, the support **2000** is required to be relatively light for ease of manufacture and movement. In addition, the support **2000** is required to have high strength in order to stably fix, hold (or mount), and/or support the support object **1000**.

[0055] The support **2000** satisfying such demands is needed. Therefore, a method for manufacturing the support **2000**, the support **2000**, and an apparatus for manufacturing the support **2000** according to the embodiments of the present disclosure will hereinafter be described with reference to the attached drawings.

[0056] FIG. **2** is a flowchart illustrating a method for manufacturing a support according to embodiments of the present disclosure.

[0057] FIGS. **3(a)** to **3(c)** are views illustrating examples of a process of forming a first injection-molded product and a second injection-molded product according to embodiments of the present disclosure.

[0058] FIGS. **4(a)** to **4(c)** are cross-sectional views illustrating examples of a first injection-molded product and a second injection-molded product formed according to embodiments of the present disclosure.

[0059] FIG. **5** is a view illustrating an example of forming a hollow included in the support according to embodiments of the present disclosure.

[0060] FIGS. **6(a)** and **6(b)** are cross-sectional views illustrating examples of a third injection-molded product formed according to embodiments of the present disclosure.

[0061] FIG. **2** is a flowchart illustrating a method for manufacturing the support **2000** described in FIG. **1**.

[0062] Referring to FIG. **2**, the support manufacturing method may include forming a first injection-molded product **210** using a first material **110** (S**101**). FIG. **3(a)** shows the process of forming the first injection-molded product **210**. FIG. **3(a)** shows the step S**101** shown in FIG. **2**.

[0063] As shown in (a) of FIG. **3**, the forming the first injection-molded product **210** may include forming the first material **110** by injecting the first material **110** into the mold **300**.

[0064] At this time, the first material **110** is, for example, resin. The first material **110** is, for example, polypropylene (PP), ABS (acrylonitrile, butadiene, styrene), PA6/66 (polyamide6/66), POM, PPF, polyethylene (PE), polycarbonate (PC), polystyrene (PS), PMMA (polymethyl methacrylate), etc., or a mixture of two or more thereof.

[0065] FIG. **4(a)** is a cross-sectional view illustrating the first injection-molded product **210** formed through the above-described process. In this way, the support **2000** may be formed only through

step **S101**. However, in this case, there is a problem that the cycle time is long due to a long cooling time, and the efficiency of fabrication is deteriorated. In addition, the first injection-molded product **210** requires a large amount of the first material **110**, which increases material costs and is too heavy. Therefore, in order to address the above problem, embodiments may additionally perform the following processes.

[0066] As shown in FIG. 2, the support manufacturing method may include injecting the second material **120** into at least a portion of the interior of the first injection-molded product **210**. FIGS. 3(b) to 3(c) show the process of forming the second injection-molded product **220**. FIGS. 3(b) to 3(c) may correspond to the step **S102** shown in FIG. 2. FIG. 4(b) shows a cross-sectional view of a state in which the second material is injected into the first injection-molded product.

[0067] As shown in FIGS. 3(b) and 3(c), the forming the second injection-molded product **220** may include injecting the second material **120** into at least a portion of the interior of the first injection-molded product **210**. That is, the second injection-molded product **220** is manufactured by forming a hollow inside the first injection-molded product **210** through the second material **120**.

[0068] At this time, the second material **120** may be any material as long as it is different from the first material and the third material. The second material **120** may include, for example, gas, water, etc.

[0069] When the second material **120** is gas, the second injection-molded product **220** may be formed with reduced pressure imbalance. Additionally, the second injection-molded product **220** can minimize stress formed inside the second injection-molded product **220**. When the second material **120** is water, the cooling time after injection of the second injection-molded product **220** can be shortened and manufacturing costs can be reduced. At this time, when a push-back type is used as the second material **120**, manufacturing costs are further reduced. Hereinafter, for convenience of explanation, the case where the second material **120** is water will be described as an example.

[0070] As shown in FIG. 2, the support manufacturing method may include discharging (**S103**) the second material **120** from the first injection-molded product **210** to form the second injection-molded product **220** including the hollow **221**. FIGS. 4(b) to 4(c) may correspond to the step **S103** shown in FIG. 2. FIG. 4(c) shows a cross-sectional view of the second injection-molded product **220**.

[0071] As described in the step **S102** of FIG. 2, as the second material **120** is injected into the first injection-molded product **210**, at least a portion of the first material **110** included in the first injection-molded product **210** may overflow. In this case, at least a portion of the first material **110** included in the first injection-molded product **210** may be discharged from the first injection-molded product **210**.

[0072] At this time, as shown in FIG. 4(b), in order to assist discharge of the first injection-molded product **210**, the second injection-molded product **220** may include one or more holes **222**. The first material **110** pushed out by the second material **120** may be discharged to the outside of the second injection-molded product **220** through the hole **222** formed in the second injection-molded product **220**.

[0073] Through the above-described structure, the support **2000** formed by the support manufacturing method according to the embodiments may provide a support that has a high cooling rate and reduces the cycle time.

[0074] Meanwhile, as shown in FIG. 5, the second material **120** may be injected into the first injection-molded product **210** through an inlet **410**. At this time, the second material **120** may be injected at a first height (**h1**) with respect to the first injection-molded product **210**. Additionally, as shown in FIG. 5, the second material **120** may be discharged from the first injection-molded product **210** through an outlet **420**. At this time, the second material **120** may be discharged from a second height (**h2**) with respect to the first injection-molded product **210**.

[0075] For example, when a thickness of the first injection-molded product **210** is constant, the first

height (h1) is the height from the outer surface of the first injection-molded product **210** on the side where the inlet **410** is provided, toward the center point into which the second material **120** is injected. Additionally, the second height (h2) is the height from the outer surface of the second injection-molded product **220** on the side where the outlet **420** is provided, toward the center point from which the second material **120** is discharged. At this time, the first height (h1) and the second height (h2) are the same.

[0076] For example, the first height (h1) may be located higher than the second height (h2). In this case, the second material **120** is more smoothly discharged from the first injection-molded product **210** due to a difference in pressure between the inlet **410** side and the outlet **420**.

[0077] For example, if the first height (h1) and the second height (h2) are not the same, a pressure difference may occur between the inlet **410** and the outlet **420**. Depending on the pressure difference, the thickness of the second injection-molded product **220** on the side close to the inlet **410** and the thickness of the second injection-molded product **220** on the side close to the outlet **420** may be formed differently. In this case, there arises a problem in which a support having no pre-designed strength is formed.

[0078] According to the embodiments, the efficiency of water pressure control of the second material **120** can be increased because the first height (h1) and the second height (h2) are equally provided. Alternatively, for example, when the thickness of the first injection-molded product **210** is not constant, the height from the ground to the center point where the second material **120** is injected into the first injection-molded product **210** and the other height from the ground to the center point where the second material **120** is discharged from the first injection-molded product **210** may be the same. Through the above-described structure, the efficiency of controlling the water pressure of the second material **120** can be increased.

[0079] In addition, by adjusting the positions of the inlet **410** and the outlet **420** to be arranged horizontal, the support **2000** according to the embodiments may include a hollow **221** formed in the second injection-molded product **220** having error(s) within a constant or preset range.

Accordingly, the second injection-molded product **220** may have first thickness at a first position of the second injection-molded product **220**, and may have a second thickness at a second position of the second injection-molded product **220**. Here, the first thickness and the second thickness are the same, and the second injection-molded product **220** may have a pre-designed equal thickness at the first and second positions.

[0080] Meanwhile, when adjusting the height of the inlet **410** and the height of the outlet **420**, the inlet **410** or the outlet **420** may be exposed to the outside of the support **2000**, which may impair the aesthetics. Furthermore, when the thickness of the first injection-molded product **210** is not constant, there may arise a problem in which shrinkage occurs in a relatively thick portion during the process of forming the second injection-molded product **220** with the second material **120**. Additionally, when the thickness of the second injection-molded product **220** is not constant, a dichroic phenomenon may occur due to a difference in cooling speed between a relatively thick portion and a relatively thin portion. Therefore, in order to address this problem, embodiments may additionally perform the following processes.

[0081] As shown in FIG. 2, the method of manufacturing the support may include a forming (S104) a third injection-molded product **230** by covering at least a portion of the outer surface of the second injection-molded product **220** with the third material **130**. FIG. 6(a) is a cross-sectional view of the second injection-molded product **220** formed through steps S101 to S103 shown FIG. 2. In addition, FIG. 6(b) is a cross-sectional view of the third injection-molded product **230** formed by step S104 shown in FIG. 2.

[0082] As shown in FIG. 6, the third injection-molded product **230** may include a first material **110** with a hollow **221** formed therein, and a third material **130** formed to surround the outside of the first material **110**.

[0083] The third material **130** may be formed to cover the hole **222** included in the second



injection-molded product **220**. Accordingly, one side of the hole **222** included in the third injection-molded product **230** may be connected to the hollow **220**, and the other side of the hole **222** may be blocked by the third material **130**. Additionally, the third material **130** may be formed to cover at least a portion of the outer surface of the second injection-molded product **220** including the hollow **221** formed in the second injection-molded product **220**.

[0084] That is, the third injection-molded product **230** may solve defects or problems in the appearance of the second injection-molded product **220** through the third material **130**. For example, if the inlet **410** is visible on the exterior of the second injection-molded product **220**, or if there is a defect such as shrinkage or dichroic phenomenon on the outer surface of the second injection-molded product **220**, the third injection-molded product **230** according to the embodiments may provide a method of improving the appearance by covering the corresponding inlet **410** or the defect (or flaw) with the third material **130**. Accordingly, the embodiments can provide a high-quality appearance. At this time, the third material **130** is different from the second material **120**. Additionally, the third material **130** is the same as or different from the first material **110**. The third material **130** is, for example, resin. The third material **130** includes, for example, PP, ABS, PA6/66, POM, PPF, PE, PC, PS, PMMA, etc., or a mixture of two or more thereof.

[0085] The third injection-molded product **230** formed through FIGS. 2 to 6 is the same as or similar to the support **2000** described in FIG. 1. Since the support **2000** according to embodiments may include the third material **130**, no separate work is required to improve the appearance. Additionally, the support **2000** may be configured such that the inlet **410**, the outlet **420**, and the hole **221** can be arranged at necessary positions without considering the appearance thereof. Additionally, the support **2000** may include the hollow **221** as described above, thereby reducing the amount of consumed materials and reducing the weight of the support **2000**. Furthermore, when the support **2000** uses water as the second material **120**, the cooling time required during the manufacturing process can be effectively reduced.

[0086] Various methods for forming the third material **130** on the outer surface of the second injection-molded product **220** will hereinafter be described with reference to the drawings.

[0087] FIGS. 7(a) and 7(b) are views illustrating examples of a process of forming the third injection-molded product according to embodiments of the present disclosure.

[0088] FIG. 7 shows a process of using a double injection mold **310** to form a third material **130** on the outer surface of the second injection mold **220**. In more detail, FIG. 7(a) shows a process of forming the second injection-molded product **220**, and FIG. 7(b) shows a process of forming the third injection-molded product **230**.

[0089] As shown in FIGS. 7(a) and 7(b), the double injection mold **310** may include a first mold **311**, a support portion **312**, and a second mold **313**.

[0090] Referring to FIG. 7(a), the second injection-molded product **220** is formed between the first mold **311** and the support portion **312** when the first mold **311** and the support portion **312** correspond to each other. At this time, the hollow **221** included in the second injection-molded product **220** may be the second material **120** described in FIGS. 2 to 6. For example, the hollow **221** may be formed by injecting water into the mold. When the second injection-molded product **220** is formed, the support portion **312** may rotate together with the second injection-molded product **220** by a preset angle ( $\theta$ ).

[0091] As shown in FIG. 7(b), the rotated second injection-molded product **220** may correspond to the second mold **313**. The third injection-molded product **230** may be formed by injecting the third material **130** into the second mold **313**. At this time, the third material **130** may cover at least a portion of the outer surface of the second injection-molded product **230**.

[0092] The third injection-molded product **230** formed through the above-described processes may be the same as or similar to the support **2000** described in FIGS. 1 to 6.

[0093] FIG. 8 is a view illustrating an example of a process of forming the third injection-molded product according to embodiments of the present disclosure.

[0094] FIG. 8 schematically shows a process of using a core index mold to form the third material **130** on the outer surface of the second injection-molded product **220**.

[0095] Referring to FIG. 8, the core index mold **320** may include a first mold **321**, a second mold **322**, and a rotation unit **323** connected to the first mold **321** and the second mold **322**. The first mold **321** may correspond to the second injection-molded product **220**. The second mold **322** may correspond to the third injection-molded product **230**.

[0096] The second injection-molded product **220** may be formed by injecting the first material **110** and the second material **120** into the first mold **321**. The second injection-molded product **220** may include a hollow **221**. At this time, the hollow **221** included in the second injection-molded product **220** may be the second material **120** described in FIGS. 2 to 7. For example, the hollow may be formed by injecting water into the mold.

[0097] The rotation unit **323** may rotate the second injection-molded product **220** at a position corresponding to the first mold **321** by a preset angle ( $\alpha$ ). The rotation unit **323** may enable the rotated second injection-molded product **220** to correspond to the second mold **322**. The third injection-molded product **230** may be formed by injecting the third material **130** into the second mold **322**. At this time, the third material **130** may cover at least a portion of the outer surface of the second injection-molded product **220**.

[0098] The third injection-molded product **230** formed through the above processes may be the same as or similar to the support **2000** described in FIGS. 1 to 6 or 7.

[0099] FIG. 9 is a view illustrating an example of a process of forming the third injection-molded product according to embodiments of the present disclosure.

[0100] FIG. 9 schematically shows a process of using an insert mold to form the third material **130** on the outer surface of the second injection-molded product **220**.

[0101] Although not shown in FIG. 9, the first mold may correspond to the second injection-molded product **220**. Additionally, as shown in FIG. 9, the insert mold **330** may include a moving unit **331** and a second mold **332**. The second mold **332** may correspond to the third injection-molded product **230**.

[0102] The second injection-molded product **220** may be formed by injecting the first material **110** and the second material **120** into the first mold **321**. The second injection-molded product **220** may include a hollow **221**. At this time, the hollow **221** included in the second injection-molded product **220** may be the second material **120** described in FIGS. 2 to 8. For example, the hollow **221** may be formed by injecting water into the mold.

[0103] The formed second injection-molded product **220** may move onto the moving unit **331**. The moving unit **331** may insert the second injection-molded product **220** into the second mold **332**. The third injection-molded product **230** may be formed by injecting the third material **130** into the second mold **332**. At this time, the third material **130** may cover at least a portion of the outer surface of the second injection-molded product **220**.

[0104] FIGS. 7 to 9 are merely examples of a method of forming the third material **130** on the outer surface of the second injection-molded product **220**, and can be applied to any method in which the third material **130** is formed on the outer surface of the second injection-molded product **220**.

Therefore, for example, the third material **130** may be formed on the outer surface of the second injection-molded product **220** through a turn table method, a spin form method, or the like.

[0105] FIGS. 10(a) and 10(b) are enlarged views of the portion “A” shown in FIG. 6 according to embodiments of the present disclosure.

[0106] FIG. 10 shows a method for more stably bonding or adhering the third material **130** to the second injection-molded product **220**.

[0107] FIG. 10(a) shows an example of a rough appearance of the second injection-molded product **220**.

[0108] Referring to FIG. 10(a), the surface (p1) on one side of the second injection-molded product **220** is not flat. At this time, the surface (p1) on one side of the second injection-molded product **220**

**0** may refer to the surface (p1) on the third material **130** side from among the surfaces of the second injection-molded product **220**. The second injection-molded product **220**) may include a plurality of protrusions **140** of a preset size (d) or less on at least a portion of the surface (p1) on one side of the second injection-molded product **220**. The second injection-molded product **220** may be a surface in contact with the third material **130** and may include a plurality of protrusions **140** of a preset size (d) or less on at least a portion of the surface (p1) on one side of the second injection-molded product **220**. At this time, the preset size (d) may be calculated considering the performance, length, thickness and size of the support **2000**, and the sizes of the molds of the first to third injection-molded products **210** to **230**.

[0109] At this time, each of the protrusions **140** may include all of a protruding portion, a scratch, a hatched portion, an uneven portion, etc. and may be formed to roughen the surface (p1) of the second injection-molded product **220**.

[0110] The second injection-molded product **220** may include the protrusions **140** to improve adhesion or coupling force with the third material **130**. The second injection-molded product **220** may increase the area in contact with the third material **130** through the protrusions **140**, thereby increasing adhesion or coupling force with the third material **130**.

[0111] Meanwhile, as shown in FIG. **10(a)**, the surface (p2) on one side of the second injection-molded product **220** is flat. At this time, the surface (p2) on one side of the second injection-molded product **220** may refer to one surface of the third injection-molded product **230** from among the surfaces of the third injection-molded product **230**. Here, the one surface may not contact the second material **120**. The surface (p2) on one side of the third injection-molded product **230** may have a flatness value equal to or greater than a preset value. At this time, the preset value may be calculated considering the appearance of the support **2000** to be designed.

[0112] FIG. **10(b)** shows an example structure formed to further include an adhesive layer **150** between the second injection-molded product **220** and the third material **130**.

[0113] Referring to FIG. **10(b)**, the third injection-molded product **230** may further include an adhesive layer **150** that adheres and/or bonds the first material **110** to the third material **130**. The adhesive layer **150** may be made of, for example, synthetic resin such as polyurethane, polyester and polyvinyl acetate (PVA), glass, organic ceramic, etc. The adhesive layer **150** may be formed by being coated on the second injection-molded product **220**. Alternatively, the adhesive layer **150** may be formed by being injected onto the second injection-molded product **220**. Alternatively, the adhesive layer **150** may be attached to the second injection-molded product **220** in the form of a film.

[0114] The second injection-molded product **220** and the third material **130** may be more strongly coupled or adhered to each other through the adhesive layer **150**.

[0115] Although not shown, the embodiments of the present disclosure may provide an apparatus for manufacturing the support described in FIGS. **1** to **11**. The manufacturing apparatus may include a mold, a first injection unit, an injection unit, and a second injection unit.

[0116] The mold may be formed in a support shape. The mold may include a first mold and a second mold. The first mold may have a first size, the second mold may have a second size, and the second size may be larger than the first size. At this time, the first mold may correspond to the size and shape of the first injection-molded product **210** or the second injection-molded product **220**, and the second mold may correspond to the size and shape of the third injection-molded product **230**.

[0117] The first injection unit may inject the first material **110** into the first mold. Accordingly, the first injection-molded product **210** may be formed.

[0118] The injection unit may inject the second material **120** into the first injection-molded product **210**. Additionally, the injection unit may enable the second material **120** to be discharged from the first material **120**. As a result, the second injection-molded product **220** may be formed. The second injection-molded product **220** may include a hole **221** prepared for overflow; an inlet **410** for

injecting the second material **120**, and an outlet **420** for discharging the second material **120**. At this time, the hole, the inlet, and the outlet are the same as or similar to those described in FIGS. **2** to **6**. [0119] At this time, the first mold may further include protrusions so that the outer surface of the second injection-molded product **210** has a rough surface. The protrusions may roughen the outer appearance of the second injection-molded product **210**. The second injection-molded product **210** may improve adhesion or coupling force with the third material **130** to be described later, through the protrusions.

[0120] Alternatively, the manufacturing apparatus may further include an adhesive layer injection unit. The adhesive layer injection unit may form an adhesive layer on at least a portion of the outer surface of the second injection-molded product **210** before the third material **130** is formed on the second injection-molded product **220**. The adhesive layer may improve the adhesion or coupling force between the third material and the second injection-molded product **220**.

[0121] The second injection unit may inject the third material **130** into the second mold. The second injection unit may inject the third material **130** into the second mold to cover at least a portion of the outer surface of the second injection-molded product **220**. Through this, the third injection-molded product **230** is formed.

[0122] At this time, the manufacturing apparatus may further include an opening/closing unit. The opening/closing unit may prevent the third material **130** from entering the second injection unit through the hole, inlet, and outlet. Alternatively, the opening/closing unit may assist movement of the second material and/or the first material through the hole, inlet and outlet.

[0123] The third injection-molded product **230** formed through the manufacturing apparatus according to the embodiments is the same as or similar to the support **2000** described in FIGS. **1** to **11**.

[0124] According to embodiments, a support with improved appearance, a method for manufacturing the support, and an apparatus for manufacturing the support are provided.

[0125] Additionally, the embodiments may provide a support having an improved appearance through two composite injection processes, a method for manufacturing the support, and an apparatus for manufacturing the support.

[0126] In addition, the embodiments may provide a support that is manufactured by forming an injection-molded product with a short cooling time and reduced material costs through a single injection process and forming an injection molded product with an improved appearance through two injection processes, and may also provide a method and apparatus for manufacturing the support.

[0127] In addition, the embodiments may provide a method and apparatus for efficiently manufacturing the support that is formed by combining a process in which the WIT (Water Injection Technology) process and a double injection process are used with another double injection process including a core index process, an insert process, and the like.

[0128] The detailed description of the support manufacturing method, the support, and the support manufacturing apparatus according to the embodiments of the present disclosure has been given to enable those skilled in the art to implement and practice the invention. Although the support manufacturing method, the support, and the support manufacturing apparatus according to the embodiments have been described with reference to the preferred examples, those skilled in the art will appreciate that various modifications and variations can be made in the present disclosure without departing from the spirit or scope of the present disclosure described in the appended claims. Accordingly, the present disclosure should not be limited to the specific examples described herein, but should be accorded the broadest scope consistent with the principles and novel features disclosed herein.

[0129] A person skilled in the art may practice unspecified embodiments by combining or substituting the disclosed embodiments, without departing from the scope of the present disclosure. It will be apparent to those skilled in the art that various modifications and variations can be made

in the present disclosure without departing from the spirit or scope of the invention. Thus, it is intended that the present disclosure cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

## Claims

1. A method for manufacturing a support comprising: forming a first injection-molded product using a first material; forming a hollow by injecting a second material into at least a portion of the interior of the first injection-molded product; forming a second injection-molded product by discharging the second material; and forming a third injection-molded product by covering at least a portion of an outer surface of the second injection-molded product with a third material.
2. The method according to claim 1, wherein: the second injection-molded product includes a hole, and the forming the hollow includes: injecting the second material into at least a portion of the interior of the first injection-molded product; and if at least a portion of the first injection-molded product overflows from the first injection-molded product according to injection of the second material, discharging at least a portion of the first material through the hole.
3. The method according to claim 1, wherein: the second injection-molded product is formed such that a support portion supporting the second injection-molded product corresponds to a first mold, and the forming the third injection-molded product includes: rotating the support portion formed with the second injection-molded product by a preset angle so as to allow the second injection-molded product to correspond to a second mold; and injecting the third material into the second mold so as to cover at least a portion of the outer surface of the second injection-molded product.
4. The method according to claim 1, wherein: a rotation unit is connected to a first mold corresponding to the second injection-molded product and a second mold corresponding to the third injection-molded product, and the forming the third injection-molded product includes: rotating, by the rotation unit, the second injection-molded product corresponding to the first mold such that the rotated second injection-molded product corresponds to the second mold; and injecting the third material into the second mold to cover at least a portion of the outer surface of the second injection-molded product.
5. The method according to claim 1, wherein: the first mold is formed to correspond to the second injection-molded product, and the second mold is formed to correspond to the third injection-molded product, and the forming the third injection-molded product includes: inserting the second injection-molded product into the second mold; and injecting the third material into the second mold to cover at least a portion of the outer surface of the second injection-molded product.
6. The method according to claim 1, wherein: the third material is formed to cover at least a portion of the outer surface of the second injection-molded product including the hollow.
7. The method according to claim 1, wherein: injection of the second material is performed at a first height with respect to the first injection-molded product; and discharge of the second material is performed at a second height with respect to the third injection-molded product, wherein the first height and the second height are equal to each other.
8. The method according to claim 1, wherein: the second material is different from the first material and the third material, wherein the first material is the same as or different from the third material.
9. A support comprising: a first layer including a first resin, and configured to have a hollow therein; and a second layer including a second resin, and configured to surround at least a portion of an outer surface of the first layer.
10. The support according to claim 9, wherein the first layer includes: a hole, one side of which is connected to the hollow and the other side of which is blocked by the second layer.
11. The support according to claim 9, wherein the first layer includes: a plurality of protrusions, each of which has a preset size or less on at least a portion of a surface where the first layer and the second layer are in contact with each other.

- 12.** The support according to claim 11, wherein: a surface of a side where the second layer is not in contact with the first layer has a flatness equal to or greater than a preset value.
- 13.** The support according to claim 9, further comprising: an adhesive layer disposed between the first layer and the second layer so as to bond the first layer and the second layer to each other.
- 14.** The support according to claim 9, wherein in a cross-section perpendicular to a direction of the hollow, the first layer has a first thickness at a first position, and the first layer has a second thickness at a second position, wherein the first thickness and the second thickness are equal to each other.
- 15.** An apparatus for manufacturing a support comprising: a mold formed to include a first mold having a shape of the support having a first size and a second mold having a shape of the support having a second size larger than the first size; a first injection unit configured to inject a first material into the first mold; an injection unit configured to inject a second material into at least a portion of the interior of the first material at a first height and to discharge the second material from at least a portion of the interior of the first material at a second height equal to the first height; and a second injection unit configured to inject a third material into the second mold to surround at least a portion of an outer surface of the first material.
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