

DESCRIPTION

Title of Invention: MANUFACTURING APPARATUS

Technical Field

5 [0001] The present invention relates to a manufacturing apparatus, and in particular to a manufacturing apparatus for electronic components.

Background Art

[0002] JP 2022-13023A (Patent Document 1) discloses a resin molding
10 apparatus. This resin molding apparatus includes a resin supply module, a plurality of compression molding modules, and a conveying module. In this resin molding apparatus, the resin supply module, the compression molding modules, and the conveying module are arranged in one direction in the stated order, and a display part is provided in the conveying module. This resin molding apparatus is operated via
15 the display part provided in the conveying module (see Patent Document 1).

Citation List

Patent Documents

[0003] Patent Document 1: JP 2022-13023A
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Summary of Invention

Technical Problem

[0004] With the above-described resin molding apparatus disclosed in Patent Document 1, if the necessity arises to operate the resin molding apparatus when an
25 operator is in the vicinity of the resin supply module, for example, the operator has to move from the vicinity of the resin supply module to the vicinity of the conveying module. That is, the operator may need to move a long way in order to operate the

resin molding apparatus. However, the above Patent Document 1 does not disclose means for resolving such a problem.

[0005] The present invention has been made in order to resolve such a problem, and an object thereof is to provide a manufacturing apparatus for electronic components that is capable of shortening the distance an operator has to move in order to operate the manufacturing apparatus.

Solution to Problem

[0006] A manufacturing apparatus according to the present invention is the manufacturing apparatus for electronic components. The electronic components are manufactured through a plurality of processes. The manufacturing apparatus includes a plurality of mechanisms, a casing, a first observation window, and a reception part. The plurality of mechanisms are each configured to perform a process included in the plurality of processes. The casing covers each of the plurality of mechanisms. The first observation window is provided in the casing and is switchable between a transmissive state and a non-transmissive state. The reception part is configured to receive an operating instruction for the manufacturing apparatus. The plurality of mechanisms are arranged in a predetermined direction. The first observation window and the reception part are spaced apart from each other in the predetermined direction. The first observation window receives the operating instruction, when the first observation window is in the non-transmissive state.

Advantageous Effects of Invention

[0007] According to the present invention, a manufacturing apparatus for electronic components that is capable of shortening the distance an operator has to move in order to operate the manufacturing apparatus can be provided.

Brief Description of Drawings

[0008] FIG. 1 is a schematic front view of a resin molding apparatus.

FIG. 2 is a schematic plan view of an interior of the resin molding apparatus.

5 FIG. 3 is a partial schematic view of a cross-section taken along III-III in FIG. 1.

FIG. 4 is a partial schematic view of a cross-section taken along IV-IV in FIG. 3.

10 FIG. 5 is a diagram for describing state transition of an observation window.

FIG. 6 is a flowchart showing operation procedures of the observation window and lighting apparatuses.

FIG. 7 is a flowchart showing operation procedures of a locking mechanism and the lighting apparatuses.

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Description of Embodiments

[0009] Hereinafter, an embodiment (hereinafter, also “the present embodiment”) according to one aspect of the present invention will be described in detail using the drawings. Note that portions that are the same or equivalent in the diagrams are
20 given the same reference numerals and description thereof will not be repeated. Also, the diagrams are drawn schematically with objects being omitted or emphasized as appropriate for ease of understanding.

[0010] [1. Configuration of Manufacturing Apparatus]

FIG. 1 is a schematic front view of a resin molding apparatus 100
25 according to the present embodiment. The resin molding apparatus 100 is configured to manufacture resin molded products (e.g., semiconductor devices) by applying a resin seal to a substrate W (see FIG. 2) on which electronic components such as

semiconductor chips are mounted. In the resin molding apparatus 100, a component mounting surface of the substrate W on which electronic components are mounted is resin-sealed.

[0011] Examples of the substrate W include a semiconductor substrate such as a silicon wafer, a lead frame, a printed wiring board, a metal substrate, a resin substrate, a glass substrate, a ceramic substrate, and the like. The substrate W may be a carrier used in FOWLP (Fan Out Wafer Level Packaging) and FOPLP (Fan Out Panel Level Packaging). The substrate W may already be wired or may not yet be wired.

[0012] As shown in FIG. 1, the resin molding apparatus 100 includes a substrate supply/storage module A (hereinafter, also simply “module A”), two resin molding modules B (hereinafter, also simply “modules B”), and a resin material supply module C (hereinafter, also simply “module C”). The module A, the two modules B, and the module C are disposed in the stated order in an X-axis direction. Each of the modules A to C is detachable from the other modules and is exchangeable. Also, in the resin molding apparatus 100, each of the modules A to C can be increased or decreased in number.

[0013] In the resin molding apparatus 100, resin molded products are manufactured through a plurality of processes. As will be described in detail later, each of the modules A to C includes a mechanism that performs at least one of the processes. The resin molding apparatus 100 is entirely covered by a casing 15, and casings 15A to 15C, which are part of the casing 15, respectively cover the mechanisms of the modules A to C.

[0014] A front surface of the module A is provided with a reception part 10. The reception part 10 is constituted by a display device such as a liquid crystal monitor or an organic EL (Electro Luminescence) monitor, for example, and has a touch panel function. A person (operator) who operates the resin molding apparatus 100 is able to operate each of the modules A to C through the reception part 10, for example.

[0015] A front surface of the casing 15 of each of the modules A to C is provided with a rectangular door 20. A front surface of each door 20 is provided with a handle 40. The doors 20 are single hinged doors or double hinged doors (French doors). The rotation axis of the doors 20 extends in a Z-axis direction. The operator is able to open the doors 20 by pulling the handle 40.

[0016] Each door 20 is equipped with an observation window 30. As will be described in detail later, the observation window 30 is switchable between a transmissive state and a non-transmissive state. When the observation window 30 is in the transmissive state, the operator is able to observe the interior of the casing 15 through the observation window 30. On the other hand, when the observation window 30 is in the non-transmissive state, an operating screen of the resin molding apparatus 100 is displayed on the observation window 30. When the observation window 30 is in the non-transmissive state, the operator is able to give operating instructions to the resin molding apparatus 100 through the observation window 30. Note that the doors 20 are spaced away from the reception part 10 in the X-axis direction.

[0017] FIG. 2 is a schematic plan view of the interior of the resin molding apparatus 100 according to the present embodiment. As shown in FIG. 2, the resin molding apparatus 100 includes the module A, the two modules B, the module C, and a controller 200.

[0018] The module A includes a substrate supply part 1, a substrate storage part 2, a substrate placement part 3, and a substrate conveying mechanism 4. The substrate supply part 1 is configured to supply the substrate W before resin-sealing (hereinafter, also “pre-sealing substrate”) onto the substrate placement part 3. The substrate storage part 2 is configured to store the substrate W (resin molded product) after resin-sealing (hereinafter, also “sealed substrate”). The substrate placement part 3 is configured to move in a Y-axis direction between a position corresponding to the

substrate supply part 1 and a position corresponding to the substrate storage part 2. The substrate conveying mechanism 4 is configured to move in the X-axis direction and the Y-axis direction in the module A and the modules B. The substrate conveying mechanism 4 conveys the pre-sealing substrate W to the modules B while holding the pre-sealing substrate W on the substrate placement part 3, and places the sealed substrate W on the substrate placement part 3.

[0019] Each module B includes a compression molding part 5. The compression molding part 5 is configured to manufacture the sealed substrate W (resin molded product) by compression molding. In this compression molding, a granular resin material P having thermosetting properties is used. Note that the resin material P may be a resin material having thermoplastic properties. The resin material P may also be a liquid resin. The compression molding part 5 includes a molding die 50 and a clamping mechanism 53. The molding die 50 includes an upper die 52 and a lower die 51. The upper die 52 and the lower die 51 are disposed opposing each other in the Z-axis direction. An observation window 30B (FIG. 1) is disposed in front (forward side) of the molding die 50. Clamping of the molding die 50 is carried out by the clamping mechanism 53 raising the lower die 51.

[0020] A cavity 51C is formed in an upper surface of the lower die 51. A film (release film) on which the resin material P is placed is disposed in the cavity 51C. The substrate W is disposed on a lower surface of the upper die 52. Clamping of the molding die 50 is carried out in a state where the film on which the resin material P is placed is disposed in the cavity 51C of the lower die 51 and the substrate W is disposed on the lower surface of the upper die 52. The component mounting surface of the substrate W is thereby resin-sealed.

[0021] The module C includes a moving table 6, a resin material housing part 7, a resin material supply mechanism 8, a release film supply part (not shown), and a resin material conveying mechanism 9. The moving table 6 is configured to move in the

X-axis direction and the Y-axis direction in the module C.

[0022] The resin material housing part 7 includes a film and a frame-like member (not shown) disposed on an upper surface of the film. A space (recessed portion 71) corresponding to the size of the cavity 51C in the lower die 51 is formed in the resin material housing part 7. The resin material housing part 7 is placed on the moving table 6. The resin material supply mechanism 8 is configured to supply the resin material P to the resin material housing part 7 from above the resin material housing part 7. The resin material P that drops from the discharge port of the resin material supply mechanism 8 is spread evenly in the recessed portion 71 of the resin material housing part 7, due to the moving table 6 moving relative to the discharge port of the resin material supply mechanism 8.

[0023] The resin material conveying mechanism 9 is configured to move in the X-axis direction and the Y-axis direction in the module C and the modules B. The resin material conveying mechanism 9 is configured to convey the resin material housing part 7 housing the resin material P to the lower die 51 and supply the resin material P to the cavity 51C in the lower die 51. In the resin molding apparatus 100, the one or more mechanisms included in each module are arranged in the X-axis direction.

[0024] The controller 200 is configured to perform overall control of the resin molding apparatus 100. The controller 200 controls each of the module A, the two modules B, and the module C, for example. The controller 200 includes a CPU (Central Processing Unit), which is a hardware processor, a RAM (Random Access Memory), and a ROM (Read Only Memory), and is configured to execute information processing based on programs and various data. Note that the controller 200 may be disposed at any location within the resin molding apparatus 100 or may be constituted by a plurality of controllers.

[0025] FIG. 3 is a partial schematic view of a cross-section taken along III-III in

FIG. 1. Referring to FIG. 3, the peripheral structure of the door 20 is substantially the same in each of the modules A to C. Herein, the peripheral structure of a door 20B included in the modules B will be representatively described.

[0026] As described above, the door 20B can be opened and closed. With the casing 15B, a locking mechanism 65 is provided at a position opposing the distal end surface of the door 20B in a state where the door 20B is closed. The locking mechanism 65 is, for example, configured to switch between a locked state and an unlocked state of the door 20B in accordance with a control signal that is transmitted from the controller 200 (see FIG. 2). The door 20B cannot be opened when the door 20B enters the locked state, and the door 20B can be opened when the door 20B enters the unlocked state. When the door 20B is in the unlocked state, the door 20B is opened by the operator pulling the handle 40.

[0027] Inside the casing 15B are provided lighting apparatuses 60A and 60B that illuminate the observation window 30 from the inner side of the casing 15B. The lighting apparatuses 60A and 60B are respectively provided in the vicinity of the side opposite a side SD1 and in the vicinity of the side SD1 out of the four sides of the door 20. The side SD1 is, for example, the side on which a hinge connecting the door 20B to the casing 15B is provided, and the side that is taken as the rotation axis of the door 20B out of the four sides of the door 20B. Each lighting apparatus 60 is, for example, constituted by LED (Light Emitting Diode) lighting. For example, if the observation window 30 is in the non-transmissive state, the lighting apparatuses 60 emit light and illuminate the observation window 30. Difficulty in viewing the display screen due to the reflection of ambient light on the outer surface of the observation window 30 can thereby be suppressed. Control of the lighting apparatuses 60 will be described in detail later.

[0028] FIG. 4 is a partial schematic view of a cross-section taken along IV-IV in FIG. 3. As shown in FIG. 4, the observation window 30 includes a touch panel 31, a

display 32, and a thermal insulation plate 33. The touch panel 31 is configured to receive operating instructions of the resin molding apparatus 100 from the operator. The display 32 is constituted by a display device switchable between a transmissive state and a non-transmissive state. The display 32 can be realized by various known
5 display devices. The thermal insulation plate 33 is constituted by a plate that is transparent and can insulate against heat generated by the mechanisms of the resin molding apparatus 100 in the casing 15, such as an acrylic plate, for example.

[0029] The touch panel 31, the display 32, and the thermal insulation plate 33 are disposed in the observation window 30 in the stated order from the outer side to the
10 inner side of the resin molding apparatus 100. In this way, the thermal insulation plate 33 is disposed on the inner side of the display 32 in the observation window 30. With the resin molding apparatus 100, the thermal insulation plate 33 is disposed between the display 32 and the mechanism disposed in the casing 15, and thus degradation of the display 32 can be suppressed even when the temperature of the
15 mechanism rises and the inside of the casing 15 reaches a high temperature.

[0030] The touch panel 31 and the display 32 are, for example, fixed to each other at peripheral portions thereof by an adhesive 35. A bezel BZ1 is a frame member that covers the observation window 30 from the side, and includes a first portion BZ10 constituting a front surface of the bezel BZ1 and a second portion BZ11 extending
20 rearward from the first portion BZ10. An opening H1 that passes through in a front-back direction (Y-axis direction (see FIG. 1)) is formed in the center of the bezel BZ1. The operator operates the resin molding apparatus 100 via the touch panel 31 exposed through the opening H1. A boss BS1 is welded to a back surface of the first portion BZ10. The bezel BZ1 and a clamper CL1 are connected to each other by inserting a
25 bolt (not shown) into the boss BS1. The observation window 30 is fixed to the casing 15 by sandwiching a peripheral portion of the observation window 30 with the bezel BZ1 and the clamper CL1 via cushions CS1 and CS2. Note that, in the example

shown in FIG. 4, the touch panel 31 and the display 32 are fixed with the adhesive 35 such that there is space therebetween, but the touch panel 31 and the display 32 may be fixed such that there is no space therebetween.

[0031] As described above, the thermal insulation plate 33 is located further on the inner side of the resin molding apparatus 100 than the display 32. The thermal insulation plate 33 is fixed to the second portion BZ11 of the bezel BZ1, without touching the surface of the display 32. In this way, the thermal insulation effect can be further enhanced by providing space between the thermal insulation plate 33 and the display 32 (and touch panel 31).

[0032] Referring again to FIG. 3, a control substrate SS1 is disposed in a position on the inner side of the casing 15B and in the vicinity of the side SD1 of the door 20B. A control apparatus CP1 is mounted on the control substrate SS1. The control apparatus CP1 includes a CPU, a RAM, a ROM, and the like and is configured to control the touch panel 31 and the display 32. The control apparatus CP1 is configured to communicate with the controller 200, for example. The touch panel 31 and the display 32 are electrically connected to the control substrate SS1 by a wiring group L1. The wiring group L1 is concentrated in the vicinity of the side SD1 out of the four sides of the door 20B. Accordingly, with the resin molding apparatus 100, the change in distance between the observation window 30B and the control substrate SS1 is relatively small even with the door 20B open, and thus the length of the wirings can be shortened, compared to the case where the wirings are concentrated in the vicinity of a side other than the side SD1 out of the four sides of the door 20B, for example.

[0033] [2. Operation through the Observation Window]

As described above, the resin molding apparatus 100 according to the present embodiment includes the module A, the two modules B, and the module C. The module A, the two modules B, and the module C are arranged in the X-axis

direction, and the resin molding apparatus 100 is long in the X-axis direction. Suppose that, in the resin molding apparatus 100, each observation window 30 is constituted by a mere acrylic plate, and operating instructions for the resin molding apparatus 100 cannot be given via the observation window 30. In this case, if the
5 necessity arises to operate the resin molding apparatus 100 when the operator is in the vicinity of the module C, the operator must move from the vicinity of the module C to the vicinity of the module A. That is, the operator needs to move a long way in order to operate the resin molding apparatus 100.

[0034] With the resin molding apparatus 100 according to the present embodiment,
10 the observation window 30 receives operating instructions for the resin molding apparatus 100, when the observation window 30 is in the non-transmissive state. Accordingly, with the resin molding apparatus 100, if, for example, the operator of the resin molding apparatus 100 is observing the manufacturing state of electronic components such as resin molded products through the observation window 30 in the
15 transmissive state, the operator is able to give operating instructions for the resin molding apparatus 100 by switching the observation window 30 from the transmissive state to the non-transmissive state. That is, with the resin molding apparatus 100 according to the present embodiment, the operator is able to give operating instructions for the resin molding apparatus 100, without having to move to the position of the
20 reception part 10.

[0035] FIG. 5 is a diagram for describing state transition of the observation window 30. Referring to FIG. 5, when the observation window 30 is in the transmissive state, the operator is able to observe the inside of the casing 15 through the observation window 30. When the operator touches the observation window 30
25 (touch panel 31) with a finger and slides the finger upward (swipe up), for example, with the observation window 30 in the transmissive state, the observation window 30 switches from the transmissive state to the non-transmissive state (non-transmissive

state A).

[0036] One or more windows WD1, for example, are displayed on the observation window 30 in the non-transmissive state A. The windows WD1 display information relating to the current state of the resin molding apparatus 100, for example.

5 Examples of information displayed in the windows WD1 include the flow velocity and flow rate of the resin material P during dispersion, and the temperature, pressure, and vacuum pressure of the molding die 50, and the temperature of a heater that heats the molding die 50. An operating panel described later may also be displayed on the observation window 30 in the non-transmissive state A.

10 [0037] When the operator touches the observation window 30 (touch panel 31) with a finger and slides the finger to the left (left swipe) with the observation window 30 in the non-transmissive state A, the observation window 30 switches from the non-transmissive state A to a non-transmissive state B. The observation window 30 in the non-transmissive state B displays one or more windows WD1, for example. The
15 windows WD1 display the operating panel of the resin molding apparatus 100, for example. The operator is able to operate the resin molding apparatus 100 by touching the operating panel. The observation window 30 in the non-transmissive state B may display information relating to the current state of the resin molding apparatus 100 described above. Also, two screens (non-transmissive states A and B) need not
20 necessarily be provided with respect to the non-transmissive state, and a configuration may be adopted in which only one screen is provided with respect to the non-transmissive state, or three or more screens are provided with respect to the non-transmissive state.

[0038] Also, an image for advertising the resin molding apparatus 100 (such as an
25 image showing at least one of device name, model number, and manufacturer name of resin molding apparatus 100) may be displayed on the window WD1 displayed on the observation window 30 in the non-transmissive states A and B. With the resin

molding apparatus 100 according to the present embodiment, an image for advertising the resin molding apparatus 100 is displayed on the observation window 30, and, thus, the resin molding apparatus 100 can, for example, be advertised to potential users who are inspecting the resin molding apparatus 100.

5 [0039] Also, information relating to a name and a photograph of the operator of the resin molding apparatus 100, the type of resin molded products in production or the type of substrate W, the frame size and resin type, notes, a calendar, shift work, production schedules, production results, and cleaning times, and the like may be displayed on the window WD1 that is displayed on the observation window 30 in the
10 non-transmissive states A and B. Heretofore, this information was shared by means such as pasting handwritten notes to the apparatus. By displaying this information on the window WD1 displayed on the observation window 30 in the non-transmissive states A and B, the time and effort involved in pasting handwritten notes to the apparatus and the like can be eliminated.

15 [0040] When the operator touches the observation window 30 (touch panel 31) with a finger and slides the finger to the right (swipe right), for example, with the observation window 30 in the non-transmissive state B, the observation window 30 switches from the non-transmissive state B to the non-transmissive state A. When the operator touches the observation window 30 (touch panel 31) with a finger and
20 slides the finger downward (swipe down), for example, with the observation window 30 in the non-transmissive state A or the non-transmissive state B, the observation window 30 switches from the non-transmissive state to the transmissive state. Note that the screen displayed on the observation window 30 in the non-transmissive states A and B is an example of the “operating screen”. Also, the operating methods for
25 transitioning the state of the observation window 30 are merely examples.

[0041] [3. Operations of Manufacturing Apparatus]

FIG. 6 is a flowchart showing operation procedures of the observation

window 30 and the lighting apparatuses 60. The processing shown in this flowchart is executed by the controller 200 in a predetermined cycle when the observation window 30 is in the transmissive state.

[0042] Referring to FIG. 6, the controller 200 determines whether an instruction to switch the observation window 30 from the transmissive state to the non-transmissive state has been received (step S100). Specifically, the controller 200 determines whether a signal indicating that the touch panel 31 has received a swipe-up operation by the operator has been received from the control apparatus CP1. When it is determined that an instruction to switch the observation window 30 from the transmissive state to the non-transmissive state has not been received (NO in step S100), the controller 200 repeats the processing of step S100 until an instruction to switch the observation window 30 from the transmissive state to the non-transmissive state is received.

[0043] On the other hand, when it is determined that an instruction to switch the observation window 30 from the transmissive state to the non-transmissive state has been received (YES in step S100), the controller 200 transmits, to the control apparatus CP1, a signal for instructing the control apparatus CP1 such that the display 32 switches from the transmissive state to the non-transmissive state and the operating screen is displayed on the display 32 (step S110). Also, the controller 200 controls the lighting apparatuses 60 such that the lighting apparatuses 60 are on.

[0044] Thereafter, the controller 200 determines whether an instruction to switch the observation window 30 from the non-transmissive state to the transmissive state has been received (step S120). Specifically, the controller 200 determines whether a signal indicating that the touch panel 31 has received a swipe-down operation by the operator has been received from the control apparatus CP1. When it is determined that an instruction to switch the observation window 30 from the non-transmissive state to the transmissive state has not been received (NO in step S120), the controller

200 repeats predetermined processing until an instruction to switch the observation window 30 from the non-transmissive state to the transmissive state is received. Herein, the predetermined processing refers to processing for switching the state of the observation window 30 between the non-transmissive states A and B according to operations received from the operator.

[0045] On the other hand, when it is determined that an instruction to switch the observation window 30 from the non-transmissive state to the transmissive state has been received (YES in step S120), the controller 200 transmits, to the control apparatus CP1, a signal for instructing the control apparatus CP1 such that the display 32 switches from the non-transmissive state to the transmissive state (step S110). Also, the controller 200 controls the lighting apparatuses 60 such that the lighting apparatuses 60 turn off.

[0046] In the resin molding apparatus 100 according to the present embodiment, the lighting apparatuses 60 turn off in response to the observation window 30 being switched from the non-transmissive state to the transmissive state. Accordingly, with the resin molding apparatus 100, the lighting apparatuses 60 do not emit light toward the operator when the observation window 30 is in the transmissive state, and thus deterioration of visibility inside the casing 15 can be suppressed, compared to the case where the lighting apparatuses 60 emit light toward the operator when the observation window 30 is in the transmissive state.

[0047] FIG. 7 is a flowchart showing operation procedures of the locking mechanism 65 and the lighting apparatuses 60. The processing shown in this flowchart is executed by the controller 200 in a predetermined cycle, when the door 20 is in the locked state and the observation window 30 is in the non-transmissive state.

[0048] Referring to FIG. 7, the controller 200 determines whether an instruction to switch the door 20 from the locked state to the unlocked state has been received (step S200). Specifically, the controller 200 determines whether an unlock

instruction by the operator has been received via the reception part 10 or the observation window 30. When it is determined that an instruction to switch the door 20 from the locked state to the unlocked state has not been received (NO in step S200), the controller 200 repeats the processing of step S200 until an instruction to switch the door 20 from the locked state to the unlocked state is received.

[0049] On the other hand, when it is determined that an instruction to switch the door 20 from the locked state to the unlocked state has been received (YES in step S200), the controller 200 controls the locking mechanism 65 to switch from the locked state to the unlocked state, and controls the lighting apparatuses 60 such that the lighting apparatuses 60 turn off (step S210).

[0050] Thereafter, the controller 200 determines whether an instruction to switch the door 20 from the unlocked state to the locked state has been received (step S220). Specifically, the controller 200 determines whether a lock instruction by the operator has been received via the reception part 10 or the observation window 30. When it is determined that an instruction to switch the door 20 from the unlocked state to the locked state has not been received (NO in step S220), the controller 200 repeats the processing of step S220 until an instruction to switch the door 20 from the unlocked state to the locked state is received.

[0051] On the other hand, when it is determined that an instruction to switch the door 20 from the unlocked state to the locked state has been received (YES in step S220), the controller 200 controls the locking mechanism 65 to switch from the unlocked state to the locked state, and controls the lighting apparatuses 60 such that the lighting apparatuses 60 turn on (step S230).

[0052] In the resin molding apparatus 100 according to the present embodiment, the lighting apparatuses 60 turn off in response to the door 20 being switched from the locked state to the unlocked state, when the observation window 30 is in the non-transmissive state. Accordingly, with the resin molding apparatus 100, the lighting

apparatuses 60 do not emit light toward the operator when the door 20 is open, and thus deterioration of visibility inside the casing 15 can be suppressed, compared to the case where the lighting apparatuses 60 emit light toward the operator when the door 20 is open.

5 [0053] [4. Features]

As described above, in the resin molding apparatus 100 according to the present embodiment, the observation window 30 receives operating instructions for the resin molding apparatus 100, when the observation window 30 is in the non-transmissive state. Accordingly, with the resin molding apparatus 100, if, for
10 example, the operator of the resin molding apparatus 100 is observing the manufacturing state of electronic components such as resin molded products through the observation window 30 in the transmissive state, the operator is able to give operating instructions for the resin molding apparatus 100 by switching the observation window 30 from the transmissive state to the non-transmissive state.
15 That is, with the resin molding apparatus 100, the operator is able to give operating instructions for the resin molding apparatus 100, without having to move to the position of the reception part 10.

[0054] [5. Other Embodiments]

The ideas of the above embodiments are not limited to the embodiments
20 described above. Hereinafter, examples of other embodiments to which the ideas of the above embodiments can be applied will be described.

[0055] <5-1>

In the above embodiments, a technique that enables operating instructions for an apparatus to be given on an observation window is applied to a resin molding
25 apparatus for compression molding. However, the application range of this technique is not limited thereto. For example, this technique may be applied to a resin molding apparatus for transfer molding or injection molding or to a cutting apparatus. The

cutting apparatus segments a package substrate into a plurality of electronic components (package components), by cutting the package substrate (object to be cut), for example. In the package substrate, the substrate or lead frame on which semiconductor chips are mounted is resin-sealed. Note that the object to be cut does
5 not necessarily have to be a package substrate, and may, for example, be a substrate that is not resin-sealed (including a wafer). “Electronic component” also includes a substrate segmented by cutting a substrate that is not resin-sealed. Also, this technique may be applied to a wafer cleaning apparatus, a coater/developer, an annealing apparatus, a film thickness measurement apparatus, a wafer visual
10 inspection apparatus, an exposure apparatus, a film deposition apparatus, a bonding apparatus, and the like.

[0056] <5-2>

In the above embodiments, the reception part 10 is constituted by a display device such as an LCD monitor or an organic EL monitor. However, the
15 configuration of the reception part 10 is not limited thereto. The reception part 10 may, for example, be constituted by the observation window 30. In this case, the operator is able to observe the manufacturing state of electronic components such as resin molded products through the reception part 10 in the transmissive state, and is able to give operating instructions for the resin molding apparatus 100 via the reception
20 part 10 in the non-transmissive state.

[0057] <5-3>

In the above embodiments, the resin molding apparatus 100 is constituted by a plurality of modules. However, the resin molding apparatus 100 need not necessarily be constituted by a plurality of modules. The mechanisms included in the
25 modules A to C may be included in a single casing.

[0058] <5-4>

In the above embodiments, the observation window 30 provided in each

module includes the touch panel 31 and the display 32. However, the configuration of the observation window 30 provided in each module is not necessarily limited thereto. For example, the observation window 30 provided in some modules may be constituted by only an acrylic plate. The touch panel 31 and the display 32 need only
5 be included in at least one of the plurality of observation windows 30 provided in the resin molding apparatus 100.

[0059] <5-5>

In the above embodiments, the reception part 10 or the observation window 30 is provided on the front surface side of the resin molding apparatus 100.
10 However, the reception part 10 or the observation window 30 may be provided on a side surface side and/or a back surface side of the resin molding apparatus 100.

[0060] <5-6>

In the above embodiments, the doors 20 are single hinged doors or double hinged doors (French doors). However, the doors 20 may be any form of door, such
15 as a swing-up door, for example.

[0061] Hereinabove, embodiments of the present invention are illustratively described. That is, the detailed description and accompanying drawings are disclosed for the purpose of illustrative description. Therefore, some of the constituent elements illustrated in the detailed description and accompanying drawings may not
20 be essential for solving the problem. Accordingly, the fact that those non-essential components are illustrated in the detailed description and accompanying drawings should not immediately be taken as meaning that those non-essential constituent elements are essential.

[0062] Also, the above embodiments are in all respects merely illustrative
25 examples of the present invention. Various modifications and changes can be made to the above embodiments within the scope of the invention. For example, at least part of the configuration of one of the embodiments may be combined with at least

part of the configuration of another of the embodiments. In other words, in implementing the present invention, specific configurations may be adopted according to the embodiment.

[0063] [6. Appendix]

5 <Technique 1>
(Configuration)

A manufacturing apparatus for electronic components, the electronic components being manufactured through a plurality of processes, the manufacturing apparatus including:

10 a plurality of mechanisms each configured to perform a process included in the plurality of processes;

a casing covering each of the plurality of mechanisms;

a first observation window provided in the casing and switchable between a transmissive state and a non-transmissive state; and

15 a reception part configured to receive an operating instruction for the manufacturing apparatus,

the plurality of mechanisms being arranged in a predetermined direction,

the first observation window and the reception part being spaced apart from each other in the predetermined direction, and

20 the first observation window receiving the operating instruction, when the first observation window is in the non-transmissive state.

(Effects, etc.)

With this manufacturing apparatus, the first observation window receives operating instructions for the manufacturing apparatus, when the first observation
25 window is in the non-transmissive state. Accordingly, with this manufacturing apparatus, if, for example, the operator of the manufacturing apparatus is observing the manufacturing state of electronic components through the first observation window

in the transmissive state, the operator is able to give operating instructions for the manufacturing apparatus, by switching the first observation window from the transmissive state to the non-transmissive state. That is, with this manufacturing apparatus, the operator is able to give operating instructions for the manufacturing apparatus, without having to move to the position of the reception part.

[0064] <Technique 2>

(Configuration)

The manufacturing apparatus according to technique 1, in which the first observation window displays an operating screen of the manufacturing apparatus, when the first observation window is in the non-transmissive state.

(Effects, etc.)

According to this manufacturing apparatus, an operating screen of the manufacturing apparatus is displayed on the first observation window, and thus the operator is able to give operating instructions for the manufacturing apparatus via the operating screen.

[0065] <Technique 3>

(Configuration)

The manufacturing apparatus according to technique 2, in which the operating screen includes an image for advertising the manufacturing apparatus.

(Effects, etc.)

According to this manufacturing apparatus, an image for advertising the manufacturing apparatus is displayed on the first observation window, and thus the manufacturing apparatus can, for example, be advertised to potential users who are inspecting the manufacturing apparatus.

[0066] <Technique 4>

(Configuration)

The manufacturing apparatus according to any one of techniques 1 to 3, in

which the first observation window includes:

a display switchable between the transmissive state and the non-transmissive state; and

a touch panel disposed on an outer side of the display.

5 (Effects, etc.)

According to this manufacturing apparatus, switching of the first observation window between the transmissive state and the non-transmissive state and operating instructions for the manufacturing apparatus given via the first observation window can both be realized.

10 [0067] <Technique 5>

(Configuration)

The manufacturing apparatus according to technique 4, in which the first observation window further includes a thermal insulation plate disposed on an inner side of the display.

15 (Effects, etc.)

According to this manufacturing apparatus, a thermal insulation plate is disposed on the inner side of the display in the first observation window, and thus degradation of the display can be suppressed even if the inside of the casing reaches a high temperature.

20 [0068] <Technique 6>

(Configuration)

The manufacturing apparatus according to technique 4 or 5, further including:

a control substrate on which is mounted a first control apparatus
25 configured to control the display,

the casing including a rectangular door,

the first observation window being provided in the door, and

a wiring connecting the display to the control substrate being concentrated in a vicinity of a side, out of four sides of the door, taken as a rotation axis.

(Effects, etc.)

With this manufacturing apparatus, the wiring connecting the display and the control substrate is concentrated in the vicinity of the side, out of the four sides of the door, taken as the rotation axis. Accordingly, with this manufacturing apparatus, the change in distance between the display and the control substrate is relatively small even with the door open, and thus the length of the wiring can be shortened, compared to the case where the wiring is concentrated in the vicinity of a side other than the side taken as the rotation axis, for example.

[0069] <Technique 7>

(Configuration)

The manufacturing apparatus according to any one of techniques 1 to 6, further including:

a lighting apparatus configured to illuminate the first observation window from an inner side of the casing; and

a second control apparatus configured to control the lighting apparatus, the second control apparatus controlling the lighting apparatus to turn off in response to the first observation window being switched from the non-transmissive state to the transmissive state.

(Effects, etc.)

In this manufacturing apparatus, the lighting apparatus turns off in response to the first observation window being switched from the non-transmissive state to the transmissive state. Accordingly, with this manufacturing apparatus, the lighting apparatus does not emit light toward the operator when the first observation window is in the non-transmissive state, and thus deterioration of visibility inside the casing can be suppressed, compared to the case where the lighting apparatus emits

light toward the operator when the first observation window is in the non-transmissive state.

[0070] <Technique 8>
(Configuration)

5 The manufacturing apparatus according to technique 6, further including:
a lighting apparatus configured to illuminate the first observation window
from an inner side of the casing; and

a second control apparatus configured to control the lighting apparatus,
the door being switchable between a locked state and an unlocked state,
10 and

the second control apparatus controlling the lighting apparatus to turn off
in response to the door being switched from the locked state to the unlocked state,
when the first observation window is in the non-transmissive state.

(Effects, etc.)

15 In this manufacturing apparatus, the lighting apparatus turns off in
response to the door being switched from the locked state to the unlocked state, when
the first observation window is in the non-transmissive state. Accordingly, with this
manufacturing apparatus, the lighting apparatus does not emit light toward the operator
when the door is open, and thus deterioration of visibility inside the casing can be
20 suppressed, compared to the case where the lighting apparatus emits light toward the
operator when the door is open.

[0071] <Technique 9>
(Configuration)

The manufacturing apparatus according to any one of techniques 1 to 8, in
25 which the reception part is constituted by a second observation window,
the second observation window is provided in the casing and is
switchable between the transmissive state and the non-transmissive state, and

the second observation window receives the operating instruction, when the second observation window is in the non-transmissive state.

(Effects, etc.)

With this manufacturing apparatus, the reception part is constituted by a
5 second observation window. Accordingly, with this manufacturing apparatus, the operator is able to observe the manufacturing state of electronic components through the second observation window in the transmissive state, and is able to give operating instructions for the manufacturing apparatus via the second observation window in the non-transmissive state.

10 [0072] <Technique 10>

(Configuration)

The manufacturing apparatus according to any one of techniques 1 to 9, in which the electronic components are semiconductor devices.

(Effects, etc.)

15 According to this manufacturing apparatus, in the case where, for example, the operator of the manufacturing apparatus is observing the manufacturing state of semiconductor devices through the first observation window in the transmissive state, the operator is able to give operating instructions for the manufacturing apparatus by switching the first observation window from the transmissive state to the non-
20 transmissive state.

List of Reference Numerals

- | | | |
|--------|---|-------------------------------|
| [0073] | 1 | Substrate supply part |
| | 2 | Substrate storage part |
| 25 | 3 | Substrate placement part |
| | 4 | Substrate conveying mechanism |
| | 5 | Compression molding part |

	6	Moving table
	7	Resin material housing part
	8	Resin material supply mechanism
	9	Resin material conveying mechanism
5	10	Reception part
	15	Casing
	20	Door
	30	Observation window
	31	Touch panel
10	32	Display
	33	Thermal insulation plate
	35	Adhesive
	40	Handle
	50	Molding die
15	51	Lower die
	51C	Cavity
	52	Upper die
	53	Clamping mechanism
	60	Lighting apparatus
20	65	Locking mechanism
	100	Resin molding apparatus
	200	Controller
	A	Substrate supply/storage module
	B	Resin molding module
25	BS1	Boss
	BZ1	Bezel
	BZ10	First portion

	BZ11	Second portion
	C	Resin material supply module
	CL1	Clamper
	CP1	Control apparatus
5	CS1, CS2	Cushion
	H1	Opening
	L1	Wiring group
	P	Resin material
	SD1	Side
10	SS1	Control substrate
	W	Substrate
	WD1	Window

CLAIMS

[Claim 1] A manufacturing apparatus for electronic components, the electronic components being manufactured through a plurality of processes, the manufacturing apparatus comprising:

a plurality of mechanisms each configured to perform a process included in the plurality of processes;

a casing covering each of the plurality of mechanisms;

a first observation window provided in the casing and switchable between a transmissive state and a non-transmissive state; and

a reception part configured to receive an operating instruction for the manufacturing apparatus,

wherein the plurality of mechanisms are arranged in a predetermined direction,

the first observation window and the reception part are spaced apart from each other in the predetermined direction, and

the first observation window receives the operating instruction, when the first observation window is in the non-transmissive state.

[Claim 2] The manufacturing apparatus according to claim 1,

wherein the first observation window displays an operating screen of the manufacturing apparatus, when the first observation window is in the non-transmissive state.

[Claim 3] The manufacturing apparatus according to claim 2,

wherein the operating screen includes an image for advertising the manufacturing apparatus.

[Claim 4] The manufacturing apparatus according to any one of claims 1 to 3,

wherein the first observation window includes:

a display switchable between the transmissive state and the non-
5 transmissive state; and

a touch panel disposed on an outer side of the display.

[Claim 5] The manufacturing apparatus according to claim 4,

wherein the first observation window further includes a thermal insulation
10 plate disposed on an inner side of the display.

[Claim 6] The manufacturing apparatus according to claim 4 or 5, further
comprising:

a control substrate on which is mounted a first control apparatus
15 configured to control the display,

wherein the casing includes a rectangular door,

the first observation window is provided in the door, and

a wiring connecting the display to the control substrate is concentrated in
a vicinity of a side, out of four sides of the door, taken as a rotation axis.

20

[Claim 7] The manufacturing apparatus according to any one of claims 1 to 6,
further comprising:

a lighting apparatus configured to illuminate the first observation window
from an inner side of the casing; and

25 a second control apparatus configured to control the lighting apparatus,

wherein the second control apparatus controls the lighting apparatus to
turn off in response to the first observation window being switched from the non-

transmissive state to the transmissive state.

[Claim 8] The manufacturing apparatus according to claim 6, further comprising:
a lighting apparatus configured to illuminate the first observation window

5 from an inner side of the casing; and

a second control apparatus configured to control the lighting apparatus,
wherein the door is switchable between a locked state and an unlocked
state, and

the second control apparatus controls the lighting apparatus to turn off in
10 response to the door being switched from the locked state to the unlocked state, when
the first observation window is in the non-transmissive state.

[Claim 9] The manufacturing apparatus according to any one of claims 1 to 8,
wherein the reception part is constituted by a second observation window,

15 the second observation window is provided in the casing and is

switchable between the transmissive state and the non-transmissive state, and

the second observation window receives the operating instruction, when
the second observation window is in the non-transmissive state.

20 [Claim 10] The manufacturing apparatus according to any one of claims 1 to 9,
wherein the electronic components are semiconductor devices.