

DESCRIPTION

ELECTRONIC MODULE HANDLER

TECHNICAL FIELD

[0001] The present invention relates to an electronic module handler, and more particularly, to an electronic module handler for transferring and placing an electronic module such as a solid-state drive (SSD) from a first carrying member to a second carrying member.

BACKGROUND ART

[0002] A solid state drive (SSD) refers to a mass storage device using a high-speed semiconductor memory such as NAND flash as a storage medium. The high-speed semiconductor memory referred to herein refers to a semiconductor device for data storage that is used in mobile phones, MP3 players, memory cards, digital cameras, or the like.

[0003] Meanwhile, the SSD operates similarly to a hard disk drive (HDD), but unlike the HDD, uses semiconductors to store information, and have advantages of high speed, low mechanical delay or failure rate, less heat and noise, and miniaturization and light weight.

[0004] With SSDs being developed with large-capacity and provided at lower prices in addition to these advantages, the scope of applications is expanding, for example, to laptop computers and desktop computers, and the market size is expanding significantly.

[0005] Meanwhile, as the demand and market for SSDs expand and the standard of SSDs is established, the production process is standardized, and in the production process

for SSDs, SSDs go through a transferring and carrying process several times, for example, SSDs are transferred from a first carrying member, such as an H tray, to a second carrying member, such as a test board, for a process such as the burn-in test, classification according to test results, or the like.

[0006] However, in the production process for SSDs in the related art, particularly in the transferring and carrying process, some of the handling work for SSDs are done manually, which may lead to a problem that productivity is lowered.

DISCLOSURE OF THE INVENTION

TECHNICAL PROBLEM

[0007] In order to solve the above-mentioned problem, an object of the present invention is to provide an electronic module handler capable of quickly and efficiently transferring and carrying an electronic module such as an SSD.

TECHNICAL SOLUTION

[0008] The present invention has been made to achieve the object of the present invention as described above, and in accordance with an embodiment of the present invention, there is provided an electronic module handler including: a main table (200) that moves, in a Y-axis direction, a vertical main carrying member (30) onto which a plurality of electronic modules (10) are carried in a vertical state; one or more loading parts (100) installed to be spaced apart from the main table (200) in an X-axis direction and moving, in the Y-axis direction, a horizontal carrying member (20) on which a plurality of electronic modules (10) are carried in a horizontal state; one or more buffer parts (300) installed to face the loading parts (100) with respect to the main table (200) and to be spaced apart

from the main table (100) in the X-axis direction and moving, in the Y-axis direction, a horizontal buffer carrying member (40) on which a plurality of electronic modules (10) are temporarily carried in the horizontal state; a first transfer tool (410) movably installed along a first movement line (L1) set in the X-axis direction across the loading parts (100), the main table (200), and the buffer parts (300), and directly or indirectly exchanging the electronic modules (10) between the horizontal carrying member (20) of the loading part (100) and the vertical main carrying member (30) of the main table (200); a second transfer tool (420) movably installed along the first movement line (L1) and directly or indirectly exchanging the electronic modules (10) between the vertical main carrying member (30) of the main table (200) and the horizontal buffer carrying member (40) of the buffer part (300); and a third transfer tool (430) movably installed along a second movement line (L2) set parallel to the first movement line (L1) and transferring the electronic modules (10) along a preset movement section.

[0009] In accordance with another embodiment of the present invention, there is provided an electronic module handler including: a main table (200) that moves, in a horizontal direction, a vertical main carrying member (30) onto which a plurality of electronic modules (10) are carried in a vertical state; a loading part (100) that includes a horizontal loading carrying member (22) onto which the electronic modules (10) that are to be loaded on the vertical main carrying member (30) are carried in a horizontal state; a first transfer tool (410) movably installed and picking up the electronic modules (10) carried onto the horizontal loading carrying member (22); a first flip part (710) movably installed, receiving the electronic modules (10) which are picked up by the first transfer tool (410), and flipping the electronic modules (10) in the vertical state; and a second transfer tool (420) movably installed, receiving the electronic modules (10) which are flipped in the

vertical state by the first flip part (710), and carrying the electronic modules (10) onto the vertical main carrying member (30).

[0010] A pair of the first flip parts (710) may be provided to alternately receive the electronic modules (10) from the first transfer tool (410).

[0011] A pair of the first transfer tools (410) and a pair of the second transfer tools (420) may be provided so that the respective pairs of transfer tools face each other with respect to the main table (200).

[0012] Also, the present invention discloses an electronic module handler including: an unloading part (400) that includes a horizontal unloading carrying member (24) onto which the electronic modules (10) pulled out from the vertical main carrying member (30) are carried in the horizontal state;

[0013] a third transfer tool (410) movably installed and picking up the electronic modules (10) carried onto the vertical main carrying member (30); a second flip part (720) movably installed, receiving the electronic modules (10) which are picked up by the third transfer tool (430), and flipping the electronic modules (10) in the horizontal state; and a fourth transfer tool (440) movably installed, receiving the electronic modules (10) which are flipped in the horizontal state by the second flip part (720), and carrying the electronic modules (10) onto the horizontal unloading carrying member (24).

[0014] A pair of the first flip parts (710) may be provided to alternately receive the electronic modules (10).

[0015] A pair of the second flip parts (720) may be provided to alternately receive the electronic modules (10).

[0016] The first transfer tool (410) and the third transfer tool (430) may be arranged to face each other with respect to the main table (200).

[0017] The second transfer tool (420) and the fourth transfer tool (440) may be arranged to face each other with respect to the main table (200).

[0018] In accordance with yet another embodiment of the present invention, there is provided an electronic module handler including: a main table (200) that moves, in a horizontal direction, a vertical main carrying member (30) onto which a plurality of electronic modules (10) are carried in a vertical state; an unloading part (400) that includes a horizontal unloading carrying member (24) onto which the electronic modules (10) unloaded from the vertical main carrying member (30) are carried in a horizontal state; a third transfer tool (430) movably installed and picking up the electronic modules (10) carried onto the horizontal unloading carrying member (24); a second flip part (720) movably installed, receiving the electronic modules (10) which are picked up by the third transfer tool (430), and flipping the electronic modules (10) in the horizontal state; and a fourth transfer tool (440) movably installed, receiving the electronic modules (10) which are flipped in the horizontal state by the second flip part (720), and carrying the electronic modules (10) onto the horizontal unloading carrying member (24).

[0019] A pair of the second flip parts (720) may be provided to alternately receive the electronic modules (10).

[0020] A pair of the third transfer tools (430) and a pair of the fourth transfer tools (440) may be provided so that the respective pairs of transfer tools face each other with respect to the main table (200).

[0021] The first flip part (710) and the second flip part (720) may include one or more pairs of flip members (702) with a spacing therebetween that is varied according to a width standard of the electronic modules (10).

[0022] The first flip part (710) and the second flip part (720) may further include a flip

alignment member (704) for aligning the electronic modules (10) by being displaced in a longitudinal direction of the electronic modules (10) according to a length standard of the electronic modules (10).

[0023] The second transfer tool (420) and the third transfer tool (430) may include one or more pairs of grip members (402) with a spacing therebetween that is varied according to a width standard of the electronic modules (10).

[0024] The electronic module handler may further include a buffer part (300) that separately classifies and carries an electronic module (10) when it is determined that the electronic module (10) is defective in a transfer process for the electronic modules (10) by the fourth transfer tool (440).

[0025] The buffer part (300) may include one or more pairs of jig members (302) with a spacing therebetween that is varied according to a width standard of the electronic modules (10).

[0026] The buffer part (300) may further include a buffer alignment member (304) for aligning the electronic modules (10) by being displaced in a longitudinal direction of the electronic modules (10) according to a length standard of the electronic modules (10).

ADVANTAGEOUS EFFECTS

[0027] The electronic module handler according to the present invention has an advantage in that the transferring and carrying process from the first carrying member to the second carrying member may be performed more quickly.

[0028] The electronic module handler according to the present invention has an advantage of being able to more quickly perform the transferring and carrying process from the first carrying member to the second carrying member by setting the movement

section of the transfer tool transferring the electronic module to two movement sections arranged in parallel.

[0029] In addition, the electronic module handler according to the present invention has an advantage of being able to configure the compact-sized device in that the handler for performing the transferring and carrying process from the first carrying member to the second carrying member is efficiently disposed by setting the movement section of the transfer tool transferring the electronic module to the two movement sections arranged in parallel.

[0030] In addition, the electronic module handler according to the present invention has an advantage in that the transferring and carrying process from the first carrying member to the second carrying member may be performed more diversely by setting the movement section of the transfer tool transferring the electronic module to two movement sections arranged in parallel.

[0031] In addition, the electronic module handler according to the present invention has an advantage of being able to faster and more efficiently perform the electronic module handling for picking up electronic modules carried on one carrying member in the horizontal state, flipping the electronic modules in the vertical state, and carrying the electronic modules onto another carrying member in the vertical state, or picking up electronic modules carried on one carrying member in the vertical state, flipping the electronic modules in the horizontal state, and carrying the electronic modules onto another carrying member in the horizontal state.

[0032] In particular, the electronic module handler according to the present invention has an advantage of being able to adaptively respond to each standard of each electronic module without extensive design changes for each component of the handler, even when

the standard of the electronic module to be handled is changed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033] FIG. 1 is a plan view showing an arrangement of an electronic module handler according to the present invention.

[0034] FIG. 2 is a conceptual diagram illustrating a transfer process of an electronic module in the electronic module handler of FIG. 1.

[0035] FIG. 3 is a conceptual diagram illustrating a transfer process of an electronic module between a loading part and a main table in the electronic module handler of FIG. 1.

[0036] FIG. 4 is a conceptual diagram illustrating a transfer process of an electronic module between the main table and the buffer part in the electronic module handler of FIG. 1.

[0037] FIGS. 5a to 5c are plan views illustrating an arrangement of an electronic module handler according to another embodiment of the present invention.

[0038] FIG. 6 is a conceptual diagram illustrating pickup, transfer, and flip processes of an electronic module performed in the electronic module handler of FIGS. 5a to 5c.

[0039] FIGS. 7a to 7c are diagrams illustrating a grip state of an electronic module during the transfer process for the electronic module of FIG. 6.

[0040] FIG. 8 is a diagram illustrating a first flip part or a second flip part in the electronic module handler of FIGS. 5a to 5c.

[0041] FIG. 9 is a diagram illustrating a buffer part in the electronic module handler of FIGS. 5a to 5c.

MODE FOR CARRYING OUT THE INVENTION

[0042] Hereinafter, an electronic module handler according to the present invention

will be described with reference to the accompanying drawings.

[0043] As shown in FIG. 1 and 2, an electronic module handler according to the present invention includes: a main table 200 that moves, in a Y-axis direction, a vertical main carrying member 30 onto which a plurality of electronic modules 10 are carried in a vertical state; one or more loading parts 100 installed to be spaced apart from the main table 200 in an X-axis direction and moving, in the Y-axis direction, a horizontal carrying member 20 on which a plurality of electronic modules 10 are carried in a horizontal state; one or more buffer parts 300 installed to face the loading parts 100 with respect to the main table 200 and to be spaced apart from the main table 200 in the X-axis direction and moving, in the Y-axis direction, a horizontal buffer carrying member 40 on which a plurality of electronic modules 10 are temporarily carried in the horizontal state; a first transfer tool 410 movably installed along a first movement line L1 set in the X-axis direction across the loading parts 100, the main table 200, and the buffer parts 300, and directly or indirectly exchanging the electronic modules 10 between the horizontal carrying member 20 of the loading part 100 and the vertical main carrying member 30 of the main table 200; a second transfer tool 420 movably installed along the first movement line L1 and directly or indirectly exchanging the electronic modules 10 between the vertical main carrying member 30 of the main table 200 and the horizontal buffer carrying member 40 of the buffer part 300; and a third transfer tool 430 movably installed along a second movement line L2 set parallel to the first movement line L1 and transferring the electronic modules 10 along a preset movement section.

[0044] The electronic module 10 is defined as one module composed of a plurality of semiconductor devices and a PCB in which the semiconductor devices are installed, such as the SSD, and any module capable of horizontal carrying and vertical carrying may be

used.

[0045] In particular, it is preferable that the electronic module 10 handled by the handler according to the present invention is used which has a rectangular plate shape like the SSD and in which terminals for power supply and signal exchange from the outside are formed and used on at least one side.

[0046] For example, the electronic module 10 as the SSD may physically have a serial AT attachment (SATA) (SATA cable connection) or M.2 (M.2 slot connection) port standard and the communication standard thereof may also have SATA or NVMe communication standards within the M.2 port standard; however, the type of the electronic module 10 to be handled is not limited to a specific standard.

[0047] That is, the electronic module 10 may be defined as a module capable of both horizontal carrying and vertical carrying.

[0048] Here, the electronic module 10 may be vertically carried with the terminal being inserting into a connection terminal installed on a test board when being vertically carried.

[0049] The main table 200 has a configuration for moving, in the Y-axis direction, the vertical main carrying member 30 onto which the plurality of electronic modules 10 are carried in the vertical state, and may have various configurations.

[0050] For example, the main table 200 has a configuration for moving, in the horizontal direction (preferably, the Y-axis direction), the vertical main carrying member 30 for picking up or carrying the electronic modules 10 by the first transfer tool 410 and the second transfer tool 420, which will be described below, in a state of fixing the vertical main carrying member 30 carried on a stacker 610 installed on at least one of the front, rear, and inside of the device, and may have various configurations depending on the fixing and

moving structure of the vertical main carrying member 30.

[0051] Meanwhile, the main table 200 may be provided with additional moving means for moving the vertical main carrying member 30 in directions other than the Y-axis direction, such as the X-axis direction, a vertical direction, a Z-axis direction, and a horizontal rotation, as necessary.

[0052] Further, the main table 200 may be provided with a configuration for introducing and returning the vertical main carrying member 30 from and to the stacker 610.

[0053] Meanwhile, the vertical main carrying member 30 is a member on which the electronic modules 10 are vertically carried, and examples thereof may include a test board for burn-in testing to check whether the electronic modules 10 operates normally under high temperature, a tray that is simply vertically carried, or the like.

[0054] The test board may be a board in which a plurality of connection terminals to which the terminals of the electronic modules 10 are inserted and coupled by vertical installation of the electronic modules 10 are disposed on the upper surface.

[0055] The stacker 610 has a configuration in which one or more vertical main carrying members 30 are carried thereon, and may have various configurations.

[0056] When a plurality of vertical main carrying members 30 are carried on the stacker 610, it is preferable that the vertical main carrying members 30 are installed at sufficient spacings up and down in consideration of the electronic modules 10 being vertically carried.

[0057] In addition, the stacker 610 is preferably installed to be movable up and down by an elevator (not shown) or the like for pulling out and introducing the vertical main carrying members 30 stacked up and down.

[0058] The loading part 100 is installed to be spaced apart from the main table 200 in the X-axis direction, and has a configuration for moving, in the Y-axis direction, a horizontal carrying member 20 on which a plurality of electronic modules 10 are carried in a horizontal state, and may have various configurations.

[0059] For example, the loading part 100 has a configuration for moving, in the Y-axis direction, the horizontal carrying member 20 for picking up or carrying the electronic modules 10 by a fourth transfer tool 440, which will be described below, in a state of fixing the horizontal carrying member 20 carried on a cassette 620 installed on at least one of the front, rear, and inside of the device, and may have various configurations depending on the fixing and moving structure of the horizontal carrying member 20.

[0060] Here, the horizontal carrying member 20 may have various configurations, such as a tray on which the electronic modules 10 are carried in a horizontal state.

[0061] The cassette 620 has the configuration in which a plurality of horizontal carrying members 20 are carried, which may be installed to be movable in the vertical direction.

[0062] Then, for the horizontal carrying members 20, a plurality of movement routes may be provided in a plurality of horizontal direction or up and down.

[0063] The buffer part 300 is installed to face the loading part 100 with respect to the main table 200 and to be spaced apart from the main table 200 in the X-axis direction, and has a configuration for moving, in the Y-axis direction, the horizontal buffer carrying member 40 on which a plurality of electronic modules 10 are temporarily carried in a horizontal state, and may have various configurations.

[0064] The buffer part 300 has a configuration for moving, in the Y-axis direction, a horizontal buffer carrying member 40 for picking up or carrying the electronic modules 10

by a fifth transfer tool 450, which will be described below, in a state of fixing the horizontal buffer carrying member 40 carried on a magazine 630 installed on at least one of the front, rear, and inside of the device, and may have various configurations depending on the fixing and moving structure of the horizontal buffer carrying member 40.

[0065] The horizontal buffer carrying member 40 may be the same as or similar to the horizontal carrying member 20 in configuration.

[0066] Further, the horizontal buffer carrying member 40 has a lower cover member so that the electronic modules 10 may be shipped in a stack form stacked up and down, and the electronic modules 10 received from the main vertical buffer member 30 may be stacked in a predetermined number and then carried onto the magazine 630 after a top cover member 641 is covered from a top cover member supply part 630 stacked adjacently.

[0067] Then, the buffer part 300 may move, in the Y-axis direction, the horizontal buffer carrying member 40 in a fixed state by various methods such as adsorption and fixing by vacuum pressure when the horizontal buffer carrying member 40 is fixed.

[0068] Meanwhile, the electronic module handler according to the present invention having the above configuration may perform efficient transferring and carrying of the electronic modules 10 by variously setting the logistics flow of the electronic modules 21 between the horizontal carrying member 20 of the loading part 100 and the horizontal buffer carrying member 40 centering around vertical main carrying member 30 on the main table 200.

[0069] - Loading & Unloading Mode

[0070] Specifically, the electronic modules 10 may be pulled out from the vertical main carrying member 30 on the main table 200 to the horizontal buffer carrying member 40 of the buffer part 300 by using the second transfer tool 420 and the fifth transfer tool

450, and new electronic modules 10 may be carried onto the sites of the pulled out electronic modules 10 in the vertical main carrying member 30 on the main table 200 from the horizontal carrying member 20 of the loading part 100 by using the first transfer tool 410 and the fourth transfer tool 440.

[0071] In this case, the electronic modules 10 supplied by the horizontal carrying member 20 of the loading part 100 may be new electronic modules 10 to be tested such as a burn-in test, and the electronic modules 10 pulled out from the horizontal buffer carrying member 40 may be the electronic module 10 that has been tested, such as the burn-in test.

[0072] Meanwhile, in the horizontal carrying member 20 of the loading part 100 and the horizontal buffer carrying member 40 of the buffer part 300, the electronic modules 10 are horizontally carried, and in the vertical main carrying member 30 on the main table 200, the electronic modules 10 are vertically carried, which needs to accompany a horizontal/vertical flip process for the electronic modules 10.

[0073] Therefore, on the movement route of the electronic modules 10 by the second transfer tool 420 and the fifth transfer tool 450 and the movement route of the electronic modules 10 by the first transfer tool 410 and the fourth transfer tool 440, a first flip part 710 and a second flip part 720 for performing a horizontal/vertical flip process for the electronic modules 10 may be installed.

[0074] The first flip part 710 is a module that is installed on the movement route of the electronic modules 10 by the first transfer tool 410 and the fourth transfer tool 440 to switch the electronic modules 10 from the horizontal state to the vertical state, and may have various configuration, such as a configuration for gripping the electronic modules 10.

[0075] Here, the first transfer tool 410 picks up one or two electronic modules 10 in the horizontal state by vacuum pressure and transfers the picked-up electronic modules 10

to the first flip part 710.

[0076] Then, the first flip part 710 switches the electronic modules 10 to the vertical state by rotation while gripping the electronic modules 10 transferred by the first transfer tool 410.

[0077] The electronic module 10 switched to the vertical state by the first flip part 710 is carried onto the main vertical carrying member 30 of the main table 200 by the fourth transfer tool 440.

[0078] In this case, the fourth transfer tool 440 preferably performs the transferring by gripping the electronic modules 10, and a first under-vision part 730 for checking the grip state of the fourth transfer tool 440 for smooth carrying may be installed on the movement route of the fourth transfer tool 440.

[0079] The first under-vision part 730 may calculate the rotational deviation (Θ rotation) about the Z-axis direction by photographing the electronic modules 10 gripped by the fourth transfer tool 440, and the fourth transfer tool 440 may smoothly carry the electronic modules 10 by the relative Θ rotation of the main table 200 with respect to the main vertical carrying member 30.

[0080] The second flip part 720 is a module that is installed on the movement route of the electronic modules 10 by the second transfer tool 420 and the fifth transfer tool 450 to switch the electronic modules 10 from the vertical state to the horizontal state, and may have various configurations, such as a configuration for gripping the electronic modules 10.

[0081] Here, the second transfer tool 420 picks up one or two of the electronic modules 10 in the vertical state from the main vertical carrying member 30 of the main table 200 to transfer the picked-up electronic modules 10 to the second flip part 720.

[0082] Here, it is preferable that the second transfer tool 420 picks up the vertical

electronic modules 10 by a grip.

[0083] Then, the second flip part 720 switches the electronic modules 10 to the horizontal state by rotation while gripping the electronic modules 10 transferred by the second transfer tool 420.

[0084] The electronic modules 10 switched to the horizontal state by the second flip part 720 are carried onto a horizontal buffer carrying member 40 of the buffer part 300 by the fifth transfer tool 450.

[0085] In this case, the fifth transfer tool 450 preferably performs the transferring by picking up the electronic module 10 in the horizontal state by vacuum pressure, and a second under-vision part 740 for checking the pickup state of the fifth transfer tool 440 for smooth carrying may be installed on the movement route of the fifth transfer tool 450.

[0086] The second under-vision part 740 may calculate the rotational deviation (Θ rotation) about the Z-axis direction by photographing the electronic module 10 gripped by the fifth transfer tool 450, and the fifth transfer tool 450 may smoothly carry the electronic module 10 by the relative Θ rotation of the buffer part 300 with respect to the horizontal buffer carrying member 40.

[0087] Meanwhile, the first flip part 710 and the second flip part 720 have been described only as a configuration for horizontal/vertical switching of the electronic modules 10; however, it may be necessary to switch the positions of the terminals of the electronic modules 10 described above, and thus the first flip part 710 and the second flip part may be configured to allow various angle change such as 180° and 270° , in addition to the 90° rotation.

[0088] Meanwhile, in the process of pulling out the electronic modules 10 by the second transfer tool 420 and the fifth transfer tool 450 and the process of carrying the

electronic modules 10 by the first transfer tool 410 and the fourth transfer tool 440, there are electronic modules 10 to be separately classified, such as defective electronic modules 10.

[0089] Accordingly, in the process of pulling out the electronic modules 10 by the second transfer tool 420 and the fifth transfer tool 450 and the process of carrying the electronic modules 10 by the first transfer tool 410 and the fourth transfer tool 440, some electronic modules 10 may be separately classified by additionally providing a separate carrying part 690.

[0090] In this case, in order not to interfere with the process of pulling out the electronic modules 10 by the second transfer tool 420 and the fifth transfer tool 450 and the process of carrying the electronic modules 10 by the first transfer tool 410 and the fourth transfer tool 440, the process of pulling out the electronic modules 10 by the second transfer tool 420 and the fifth transfer tool 450 and the process of carrying the electronic modules 10 by the first transfer tool 410 and the fourth transfer tool 440 may be performed along the first movement line L1 and the separate classification task may be performed by the third transfer tool 430 moving along the second movement line L2 set in parallel with the first movement line L1.

[0091] Here, the separate classification task for the electronic modules 10 in the process of pulling out the electronic modules 10 by the second transfer tool 420 and the fifth transfer tool 450 and the process of carrying the electronic modules 10 by the first transfer tool 410 and the fourth transfer tool 440 may be performed by configuring the first flip part 710 and the second flip part 720, which have been described above, to be movable between the first movement line L2 and the second movement line L2, that is, to be movable in the Y-axis direction.

[0092] Specifically, when the classification task for the electronic modules 10 is required in the process of pulling out the electronic modules 10 by the second transfer tool 420 and the fifth transfer tool 450, the second flip module 720 moves from the first movement line L1 to the second movement line L2, and moves again from the second movement line L2 to the first movement line L1 when the electronic modules 10 are picked up by the third transfer tool 430.

[0093] In addition, when the classification task for the electronic modules 10 is required in the process of carrying the electronic modules 10 by the first transfer tool 410 and the fourth transfer tool 440, the first flip module 710 moves from the first movement line L1 to the second movement line L2, and moves again from the second movement line L2 to the first movement line L1 when the electronic modules 10 are picked up by the third transfer tool 430.

[0094] Meanwhile, the separate carrying part 690 has a configuration in which the separately classified electronic modules 10 are carried in the process of pulling out the electronic modules 10 by the second transfer tool 420 and the fifth transfer tool 450 and the process of carrying the electronic modules 10 by the first transfer tool 410 and the fourth transfer tool 440, and may have various configurations depending on the carrying method for the electronic modules 10 by the separate carrying member 691, that is, a vertical carrying or a horizontal carrying.

[0095] The separate carrying member 691 may be configured in the same way as the horizontal carrying member 20 of the loading part 100 when the electronic modules 10 are horizontally carried.

[0096] Meanwhile, the separate carrying part 690 may be installed to be movable in the Y-axis direction so that the electronic modules 10 are smoothly carried by the third

transfer tool 430.

[0097] Further, the separate carrying part 690 may be configured to enable tray exchange with the loading part 100 when the separate carrying member 691 is used in the same way as the horizontal carrying member 20 of the loading part 100.

[0098] In addition, on the separate carrying member 691, the electronic modules 10 may be vertically carried, and in this case, the third transfer tool 430 is to pick up the electronic modules 10 in the vertical state, and thus may be configured to pick up the electronic module 10 by the grip method.

[0099] Meanwhile, the third transfer tool 430 picks up the electronic modules 10 in two ways, that is, pickup in the vertical state and pickup in the horizontal state, and, for variety of functions, and accordingly, may include a vacuum pickup tool for the pickup in the horizontal state and a grip pickup tool for the pickup in the vertical state.

[00100] In addition, the third transfer tool 430 may be constituted by a pair of pickup tools to perform pickup and placement.

[00101] That is, the third transfer tool 430 may be constituted by the vacuum pickup tool and the grip pickup tool as a pair.

[00102] In summary, in order to transfer the electronic modules 10 as described above, the handler according to the present invention is installed to be movable along the first moving line L1 set in the X-axis direction across the loading part 100, the main table 200, and the buffer part 300, and includes the first transfer tool 410 directly or indirectly exchanging the electronic modules 10 between the horizontal carrying member 20 of the loading part 100 and the vertical main carrying member 30 of the main table 200; a second transfer tool 420 installed to be movable along the first moving line L1 and directly or indirectly exchanging the electronic modules 10 between the vertical main carrying

member 30 of the main table 200 and the horizontal buffer carrying member 40 of the buffer part 300; and the third transfer tool 430 installed to be movable along the second movement line L2 set in parallel to the first movement line L1 and transferring the electronic modules 10 along a preset movement section.

[00103] Here, the fourth transfer tool 440 and the fifth transfer tool 450 are moved along the first movement line L1.

[00104] Meanwhile, the first transfer tool 410, the second transfer tool 420, the third transfer tool 430, the fourth transfer tool 440, and the fifth transfer tool 450 may include an image acquisition part (not shown) such as a fiducial camera, for checking pickup locations and carrying locations of the electronic modules 10.

[00105] In addition, the first transfer tool 410, the second transfer tool 420, the third transfer tool 430, the fourth transfer tool 440 and the fifth transfer tool 450 may be the vacuum pickup tool, the grip pickup tool, or the like, according to the pickup method.

[00106] In addition, the first transfer tool 410, the second transfer tool 420, the third transfer tool 430, the fourth transfer tool 440, and the fifth transfer tool 450 are preferably constituted by a pair of pickup tools to enable a smooth pick-up and placement of the electronic modules 10.

[00107] In addition, the first transfer tool 410, the second transfer tool 420, the third transfer tool 430, the fourth transfer tool 440, and the fifth transfer tool 450 may be configured to be moved only in the X-axis direction, and in this case, movement in the X-axis direction may be guided by one guide lane 1.

[00108] Meanwhile, in addition to the loading and unloading mode, the handler having the above configuration, of course, may perform a loading only mode for only carrying the electronic modules 10 onto the main vertical carrying member 30, and the unloading mode

for pulling out the electronic modules 10 from the main vertical carrying member 30.

[00109] In addition, meanwhile, the handler having the above configuration may variously perform the transfer and loading process for the electronic modules 10 by having the logistics flow of the electronic modules 10 in various ways.

[00110] - Modification Mode (main vertical carrying member 30 → horizontal buffer carrying member 40 → horizontal carrying member 20)

[00111] Meanwhile, after the electronic modules 10 are pulled out from the main vertical carrying member 30 and carried onto the horizontal buffer carrying member 40, the electronic modules 10 carried on the horizontal buffer carrying member 40 may be carried onto the horizontal carrying member 20 again.

[00112] In this case, in the buffer part 300, two movement routes of the horizontal buffer carrying member 40 may be set in the Y-axis direction.

[00113] In addition, when the electronic modules 10 are pulled out from the main vertical carrying member 30 and carried onto the horizontal buffer carrying member 40 in the first movement line L1, the horizontal buffer carrying member 40 is moved to the second movement line L2.

[00114] Here, the horizontal buffer carrying member 40 is pulled out from the magazine 630 and moved to the first movement line L1 along the movement route of the first horizontal buffer carrying member 40.

[00115] When the horizontal buffer carrying member 40 is moved to the second movement line L2, the third transfer tool 430 picks up and then moves the electronic modules 10 to the loading part 100 on which the horizontal carrying member 20 is seated so as to place the electronic modules 10.

[00116] Here, in order to smoothly pick up the electronic modules 10 picked up by the

third transfer tool 430, it is necessary to calculate the rotational deviation (Θ rotation) about the Z-axis direction of the electronic modules 10 picked up by the third transfer tool 430.

[00117] Accordingly, in order to calculate the rotational deviation (Θ rotation) about the Z-axis direction, the second under-vision part 740 may move in the Y-axis direction, and calculate the rotational deviation (Θ rotation) about the Z-axis direction by photographing the electronic modules 10 picked up by the third transfer tool 430, and the third transfer tool 430 may smoothly carry the electronic modules 10 by the relative Θ rotation with respect to the horizontal carrying member 20 of the loading part 100.

[00118] Meanwhile, the horizontal buffer carrying member 40 emptied by pickup of the electronic modules 10 on the second movement line L2 is moved to the movement route of another adjacent second horizontal buffer carrying member 40, and moved toward the magazine 630.

[00119] In this case, the magazine 630 may be installed to be movable in the horizontal and vertical directions for introduction and discharge of the horizontal buffer carrying members 40 between the movement routes of the two horizontal buffer carrying members 40.

[00120] Meanwhile, the first transfer tool 410, the second transfer tool 420, the third transfer tool 430, the fourth transfer tool 440, and the fifth transfer tool 450 described above may be installed to be movable in the X-axis direction in the middle, and the stacker 610, the cassette 620 and the magazine 630 may be disposed in front of the device.

[00121] In this case, the stacker 610, the cassette 620, and the magazine 630 may be transferred by a cart and exchanged in front of the device.

[00122] In another aspect, as shown in FIG. 5a, the electronic module handler

according to the present invention may include: the main table 200 that moves, in the horizontal direction, the vertical main carrying member 30 onto which a plurality of electronic modules 10 are carried in a vertical state; the loading part 100 that includes the horizontal loading carrying member 22 onto which the electronic modules 10 that are to be loaded on the vertical main carrying member 30 are carried in a horizontal state; the first transfer tool 410 movably installed and picking up the electronic modules 10 carried onto the horizontal loading carrying member 22; the first flip part 710 movably installed, receiving the electronic modules 10 which are picked up by the first transfer tool 410, and flipping the electronic modules 10 in the vertical state; and the second transfer tool 420 movably installed, receiving the electronic modules 10 which are flipped in the vertical state by the first flip part 710, and carrying the electronic modules 10 onto the vertical main carrying member 30.

[00123] Hereinafter, the electronic module handler of FIG. 5a will be described in detail focusing on differences from the electronic module handler described above with reference to FIGS. 1 to 4.

[00124] The main table 200 has a configuration for moving, in the Y-axis direction, the vertical main carrying member 30 onto which the plurality of electronic modules 10 are carried in the vertical state, and may have various configurations.

[00125] For example, the main table 200 has a configuration for moving, in the Y-axis direction, the vertical main carrying member 30 for picking up or carrying the electronic modules 10 by the first transfer tool 410 and the second transfer tool 420, which will be described below, in a state of fixing the vertical main carrying member 30 carried on a stacker 610 installed on at least one of the front, rear, and inside of the device, and may have various configurations depending on the fixing and moving structure of the vertical

main carrying member 30.

[00126] Meanwhile, the main table 200 may be provided with additional moving means for moving the vertical main carrying member 30 in directions other than the Y-axis direction, such as the X-axis direction, a vertical direction, a Z-axis direction, and a horizontal rotation, as necessary.

[00127] Further, the main table 200 may be provided with a configuration for introducing and returning the vertical main carrying member 30 from and to the stacker 610.

[00128] Meanwhile, the vertical main carrying member 30 is a member on which the electronic modules 10 are vertically carried, and examples thereof may include a test board for burn-in testing to check whether the electronic modules 10 operates normally under high temperature, a tray that is simply vertically carried, or the like.

[00129] The test board may be a board in which a plurality of connection terminals to which the terminals of the electronic modules 10 are inserted and coupled by vertical installation of the electronic modules 10 are disposed on the upper surface.

[00130] The stacker 610 has a configuration in which one or more vertical main carrying members 30 are carried thereon, and may have various configurations.

[00131] When a plurality of vertical main carrying members 30 are carried on the stacker 610, it is preferable that the vertical main carrying members 30 are installed at sufficient spacings up and down in consideration of the electronic modules 10 being vertically carried.

[00132] In addition, the stacker 610 is preferably installed to be movable up and down by an elevator 810 or the like for pulling out and introducing the vertical main carrying members 30 stacked up and down.

[00133] The vertical main carrying member 30 may be seated on the main table 200 through the buffer space 820 using the elevator 810.

[00134] The vertical main carrying member 30 seated on the main table 200, of course, may be carried back onto the stacker 610 through the reverse order of the above-described process.

[00135] The loading part 100 has a configuration for including a horizontal loading carrying member 22 onto which the electronic modules 10 to be loaded on the vertical main carrying member 30 are carried in the horizontal state, and may have various configurations.

[00136] The horizontal loading carrying member 22 is a tray on which the electronic modules 10 to be carried onto the vertical main carrying member 30 are carried in the horizontal direction, and may have various configurations and be configured to be the same as or similar to the above-described horizontal carrying member 20.

[00137] The loading part 100 may include one or more horizontal loading carrying members 22, and may be preferably a plate in which a plurality of horizontal loading carrying members 22 are arranged in one or more rows.

[00138] The loading part 100 may be installed at the front, rear or one side of the main table 200.

[00139] For example, the loading part 100 may include four horizontal loading carrying members 22 arranged in a row.

[00140] On one side of the loading part 100, a stacker 900 on which the horizontal loading carrying members 22 and/or the horizontal unloading carrying members 24 are carried may be installed to supply an empty horizontal loading carrying member 22 to the loading part 100, or to exchange the horizontal unloading carrying member 24 on which all

the electronic modules 10 are carried from the unloading part 400 with an empty horizontal unloading carrying member 24.

[00141] In the stacker 900, an elevator part for horizontal and vertical movements of the horizontal loading carrying members 22 and/or the horizontal unloading carrying members 24 may be installed.

[00142] The first transfer tool 410 is installed to be movable in an XYZ space and may be provided in various configurations for picking up the electronic modules 10 carried onto the horizontal loading carrying member 22.

[00143] The first transfer tool 410 may include one or more pickup parts to absorb and pick up the electronic modules 10 carried in the horizontal direction.

[00144] For example, the first transfer tool 410 may include a plurality of pickup parts to pick up a plurality of electronic modules 10 at a time.

[00145] Specifically, the first transfer tool 410 may include two pickup parts or four pickup parts spaced apart from each other in a row.

[00146] The spacing between the pickup parts may be varied according to the standard of the electronic modules 10 to be adsorbed.

[00147] FIG. 6 shows a configuration in which the first transfer tool 410 includes two pickup parts to pick up two electronic modules 10 at a time, but the scope of the present invention is not limited thereto.

[00148] The first flip part 710 is a flipper that is installed to be movable in the XYZ space and that receives the electronic modules 10 picked up by the first transfer tool 410 and flips the received electronic modules 10 in the vertical state, and may have various configurations.

[00149] The first flip part 710 may include a pair of flip members 702 for gripping ends

of the opposite side portions of the electronic modules 10.

[00150] The first flip part 710 may include more than one pairs of flip members 702 to flip the plurality of electronic modules 10 at a time.

[00151] In this case, the spacing between a pair of flip members 702 may be varied according to the width standard of the electronic modules 10.

[00152] The spacing between a pair of flip members 702, of course, may be varied manually or through a separate driving part (not shown).

[00153] Further, a pair of the first flip parts 710 may be provided to alternately receive the electronic modules 10 from the first transfer tool 410.

[00154] When one pair of the first flip parts 710 are provided, the first flip parts 710 are arranged in the horizontal direction or in the vertical direction to be reciprocally moved in a direction perpendicular to the arrangement direction of the horizontal loading carrying member 22 or the horizontal unloading carrying member 24, or to be movable from the bottom to the top or from the top to the bottom through the elevator part.

[00155] In addition, the first flip part 710 may further include a flip alignment member 704 for aligning the electronic modules 10 by being displaced in a longitudinal direction of the electronic modules 10 according to the length standard of the electronic modules 10.

[00156] The flip alignment member 704 may be provided in a configuration for facing the pair of flip members 702 with respect to the longitudinal direction of the electronic modules 10 and pressing the longitudinal ends of the electronic modules 10 to align the longitudinal positions of the electronic modules 10, and may have various configurations.

[00157] The flip alignment member 704 may be displaced according to the length standard of the target electronic modules 10, and thus may correspond to the electronic modules 10 of various standards.

[00158] The second transfer tool 420 is installed to be movable in the XYZ space and has a configuration for receiving the electronic modules 10 flipped vertically by the first flip part 710 and carrying the received electronic modules 10 onto the vertical main carrying member 30, and may have various configurations.

[00159] For example, the second transfer tool 420 may include a pair of grip members 402 with a spacing therebetween that is varied according to the width standard of the electronic modules 10.

[00160] The second transfer tool 420 may include more than one pairs of grip members 402 to transfer a plurality of electronic modules 10 at a time.

[00161] The spacing between a pair of grip members 402, of course, may be varied manually or through a separate driving part (not shown).

[00162] The electronic module 10 is positioned between the pair of grip members 402, and the electronic module 10 may be gripped in the second transfer tool 420 by pressing the opposing side portions of the electronic module 10 by the pair of grip members 402.

[00163] The pair of grip members 402 may be formed of a suitable shape and material to stably grip the opposite side portions of the electronic module 10 without damage.

[00164] As shown in FIG. 6, under the movement route of the second transfer tool 420, the first under-vision part 730 may be installed that images the bottom surface of the electronic module 10 picked up by the second transfer tool 420 and performs vision inspection before the second transfer tool 420 moves to the vertical main carrying member 30 and carries the electronic modules 10 onto the vertical main carrying member 30.

[00165] The first under-vision part 730 may photograph the electronic module 10 gripped by the second transfer tool 420 and calculate the rotational deviation (Θ rotation) about the Z-axis direction or the position deviation from the neighboring electronic module

10, and by using the calculation results, the electronic modules 10 may be enabled to be smoothly carried on the vertical main carrying member 30 through the second transfer tool 420.

[00166] Specifically, as shown in FIG. 7a, when the two electronic modules 10 gripped by the second transfer tool 420 are arranged in a straight line along the same line L to be parallel to each other, the two electronic modules 10 gripped by the second transfer tool 420 may be carried onto the vertical main carrying member 30 at the same time.

[00167] Alternatively, as shown in FIG. 7b, when two electronic modules 10 gripped by the second transfer tool 420 are arranged along lines La and La that are parallel to each other but deviate from each other, the two electronic modules 10 gripped by the second transfer tool 420 may not be carried at a time, and may be smoothly loaded sequentially on the vertical main carrying member 30.

[00168] Alternatively, as shown in FIG. 7c, two electronic modules 10 gripped by the second transfer tool 420 are arranged along inclined lines T1 and T2 that are not parallel to a reference parallel line L, the two electronic modules 10 gripped by the second transfer tool 420 may not be carried on the vertical main carrying member 30, and a warning alarm may be triggered in the system.

[00169] FIG. 5a shows the loading handler for loading the electronic modules 10 onto the vertical main carrying member 30 from the horizontal loading carrying member 22, and in order to more efficiently perform the loading process for the electronic module 10, a pair of the first transfer tools 410 and a pair of the second transfer tools 420 may be provided so that the respective pairs of transfer tools face each other with respect to the main table 200.

[00170] The second transfer tool 420 positioned on the left and the second transfer tool 420 positioned on the right with respect to the main table 200 are alternately arranged to

carry the electronic modules 10 on the vertical main carrying member 30.

[00171] For another example, as shown in FIG. 5b, the electronic module handler according to the present invention may further include: an unloading part 400 that includes a horizontal unloading carrying member 24 onto which the electronic modules 10 pulled out from the vertical main carrying member 30 are carried in the horizontal state; the third transfer tool 430 movably installed and picking up the electronic modules 10 carried onto the vertical main carrying member 30; the second flip part 720 movably installed, receiving the electronic modules 10 which are picked up by the third transfer tool 430, and flipping the electronic modules 10 in the horizontal state; and the fourth transfer tool 440 movably installed, receiving the electronic modules 10 which are flipped in the horizontal state by the second flip part 720, and carrying the electronic modules 10 onto the horizontal unloading carrying member 24.

[00172] Hereinafter, the handler of FIG. 5b will be described in detail focusing on the difference from FIG. 5a.

[00173] The handler of FIG. 5b may perform both loading of the electronic modules 10 onto the vertical main carrying member 30 and unloading of the electronic modules 10 from the vertical main carrying member 30, unlike the electronic module handler of FIG. 5a that carries the electronic modules 10 on the vertical main carrying member 30.

[00174] The unloading part 400 has a configuration for including the horizontal unloading carrying member 24 onto which the electronic modules 10 pulled out from the vertical main carrying member 30 are carried in the horizontal state, and may have various configurations.

[00175] The horizontal unloading carrying member 24 is a tray on which the electronic modules 10 that have been carried onto the vertical main carrying member 30 are unloaded

and carried in the horizontal direction, and may have various configurations and be configured to be the same as or similar to the above-described horizontal loading carrying member 22.

[00176] The unloading part 400 may include one or more horizontal unloading carrying members 24, and may be preferably a plate in which a plurality of horizontal unloading carrying members 24 are arranged in one or more rows.

[00177] The unloading part 400 may be installed at the front, rear or one side of the main table 200.

[00178] For example, the unloading part 100 may include two horizontal unloading carrying members 24 arranged in a row.

[00179] In this case, the electronic module handler performs both electronic module loading and unloading unlike FIG. 5a, and thus it is necessary to include both the loading part 100 and the unloading part 400, and accordingly, the space occupied by the loading part 100 and the unloading part 400 may be limited as compared to FIG. 5a or 5c.

[00180] As a result, as shown in FIG. 5b, the number of installed horizontal loading carrying members 22 or horizontal unloading carrying members 24 may be relatively small; for example, the loading part 100 may include two horizontal loading carrying members 22 and the unloading part 400 may include two horizontal unloading carrying members 24.

[00181] In addition, as shown in FIG. 5b, the loading part 100 and the unloading part 400 may be arranged side by side on the same side with respect to the main table 200 to increase space efficiency.

[00182] The third transfer tool 430 is installed to be movable in the XYZ space, and may be provided in various configurations for picking up the electronic modules 10 loaded

on the vertical main carrying member 30, and may be configured to be the same as or similar to the second transfer tool 420.

[00183] Meanwhile, the third transfer tool 430 may further include a socket press member 404 installed on the lower portion of the pair of grip members 402.

[00184] As shown in FIG. 6, the electronic module 10 unloaded by the third transfer tool 430 is to be maintained in a state of being inserted into the socket 32 provided on the upper side of the vertical main loading part 30; however, in order to pull out the electronic module 10 inserted and fixed in the socket 32 without damage, it is necessary to release the pressing force of the electronic module 10 through the socket 32 by pressing the socket 32.

[00185] The third transfer tool 430 is provided with a socket press member 404 on the lower side of the pair of grip members 402, such that the socket press member 404 naturally presses the socket 32 when the third transfer tool 430 is lowered and the electronic module 10 is pulled out from the socket 32.

[00186] The second flip part 720 is installed to be movable in the XYZ space and has a configuration for receiving the electronic modules 10 picked up by the third transfer tool 430 and flipping the received electronic modules 10 in the horizontal state, and may be configured to be the same as or similar to the first flip part 710 except that the electronic modules 10 are flipped in the vertical state by rotation by 90° to the horizontal state.

[00187] The fourth transfer tool 440 is installed to be movable in XYZ space and is provided in various configurations for receiving the electronic modules 10 flipped horizontally by the second flip part 720 and carrying the received electronic modules 10 on the horizontal unloading carrying member 24, and may be configured to be the same as or similar to the second transfer tool 420 described above.

[00188] When one pair of the second flip parts 720 are provided, the second flip parts

720 are arranged in the horizontal direction or in the vertical direction to be reciprocally moved in a direction perpendicular to the arrangement direction of the horizontal loading carrying member 22 or the horizontal unloading carrying member 24, or to be movable from the bottom to the top or from the top to the bottom through the elevator part.

[00189] Similar to that a pair of the first flip parts 710 are provided to alternately receive the electronic modules 10, a pair of the second flip parts 720 may also be provided to alternately receive the electronic modules 10 from the third transfer tool 430.

[00190] Further, the first transfer tool 410 and the third transfer tool 430 may be arranged to face each other with respect to the main table 200.

[00191] In this way, the loading and unloading of the electronic modules 10 to the vertical main carrying member 30 may be alternately performed sequentially.

[00192] Similarly, the second transfer tool 420 and the fourth transfer tool 440 may also be arranged to face each other with respect to the main table 200.

[00193] For another example, as shown in FIG. 5b, the electronic module handler according to the present invention may include: the main table 200 that moves, in the horizontal direction, the vertical main carrying member 30 onto which a plurality of electronic modules 10 are carried in the vertical state; the unloading part 400 that includes the horizontal unloading carrying member 24 onto which the electronic modules 10 unloaded from the vertical main carrying member 30 are carried in the horizontal state; the third transfer tool 430 movably installed and picking up the electronic modules 10 carried onto the horizontal unloading carrying member 24; the second flip part 720 movably installed, receiving the electronic modules 10 picked up by the third transfer tool 430, and flipping the electronic modules 10 in the horizontal state; and the fourth transfer tool 440 movably installed, receiving the electronic modules 10 flipped in the horizontal state by the

second flip part 720, and carrying the electronic modules 10 onto the horizontal unloading carrying member 24.

[00194] Hereinafter, the handler of FIG. 5c will be described in detail focusing on the difference from FIGS. 5a and 5b.

[00195] The handler of FIG. 5c may perform unloading of the electronic modules 10 from the vertical main carrying member 30, unlike the electronic module handler of FIG. 5a that carries the electronic modules 10 on the vertical main carrying member 30 or the electronic module handler of FIG. 5b that performs carrying and pulling-out of the electronic modules 10 on and from the vertical main carrying member 30.

[00196] Under the movement route of the third transfer tool 430, the second under-vision part 740 may be installed that images the bottom surface of the electronic module 10 picked up by the third transfer tool 430 and performs vision inspection before the third transfer tool 430 transfers the electronic modules 10 to the second flip part 720.

[00197] The second under-vision part 740 may photograph the electronic module 10 gripped by the third transfer tool 430 and calculate the rotational deviation (Θ rotation) about the Z-axis direction or the position deviation from the neighboring electronic module 10, and by using the calculation results, the electronic modules 10 may be enabled to be smoothly transferred to the second flip part 720 through the third transfer tool 430.

[00198] FIG. 5c shows the unloading handler for loading the electronic modules 10 onto the horizontal unloading carrying member 24 from the vertical main carrying member 30, and in order to more efficiently perform the unloading process for the electronic module 10, a pair of the third transfer tools 430 and a pair of the fourth transfer tools 440 may be provided so that the respective pairs of transfer tools face each other with respect to the main table 200.

[00199] The third transfer tool 430 positioned on the left and the third transfer tool 430 positioned on the right with respect to the main table 200 are alternately arranged to unload the electronic modules 10 from the vertical main carrying member 30.

[00200] Meanwhile, the electronic module handler may further include the buffer part 300 that separately classifies and carries an electronic module 10 when it is determined that the electronic module 10 is defective in the transfer process for the electronic modules 10 by the fourth transfer tool 440.

[00201] The buffer part 300 is a tray for temporarily carrying the electronic modules 10 picked up by the fourth transfer tool 440 in the horizontal state, and may have various configurations.

[00202] The buffer part 300 may include an electronic module seating part for carrying a plurality of electronic modules 10 in a plurality of rows.

[00203] In this case, the buffer part 300 may include a pair of jig members 302 for gripping the opposite side end portions of the electronic module 10.

[00204] The buffer part 300 may include more than one pairs of flip members 702 to carry the plurality of electronic modules 10 at a time.

[00205] In this case, the spacing between a pair of jig members 302 may be varied according to the width standard of the electronic modules 10.

[00206] The spacing between the pair of jig members 302, of course, may be varied manually or through a separate driving part (not shown).

[00207] Further, a plurality of the buffer parts 300 may be provided.

[00208] Meanwhile, the buffer part 300 may further include the buffer alignment member 304 for aligning the electronic modules 10 by being displaced in a longitudinal direction of the electronic modules 10 according to the length standard of the electronic

modules 10 carried in the horizontal state.

[00209] The buffer alignment member 304 may have a configuration for facing the pair of jig members 302 with respect to the longitudinal direction of the electronic modules 10 and pressing the longitudinal ends of the electronic modules 10 to align the longitudinal positions of the electronic modules 10, and may have various configurations.

[00210] The buffer alignment member 304 may be displaced according to the length standard of the target electronic modules 10, and thus may correspond to the electronic modules 10 of various standards.

[00211] Further, the buffer part 300 may be installed to be movable in the XYZ space. In particular, as shown in FIG. 5a, the buffer part 300 may be installed to be movable in the horizontal direction along the arrangement direction of the horizontal loading carrying member 22 or the horizontal unloading carrying member 24.

[00212] Furthermore, when a plurality of the buffer parts 300 are provided, the plurality of buffer parts 300 may be vertically arranged and installed to be movable in the horizontal direction.

[00213] When the buffer part 300 is filled with the carried electronic modules 300, the full buffer part 300 may be replaced with an empty buffer part 300. The replacement process, of course, may be automatically performed through the lower movement route of the electronic module handler.

[00214] In this way, when a plurality of fourth transfer tools 440 are provided, the buffer part 300 is moved, which may offer an advantage of maximizing the unloading efficiency.

[00215]

[00216] In the above, the preferred embodiments of the present invention have been

exemplarily described, but the scope of the present invention is not limited to the specific embodiment, and can be appropriately changed within the scope described in the claims.

CLAIMS

1. An electronic module handler comprising:

a main table (200) that moves, in a horizontal direction, a vertical main carrying member (30) onto which a plurality of electronic modules (10) are carried in a vertical state;

a loading part (100) that includes a horizontal loading carrying member (22) onto which the electronic modules (10) that are to be loaded on the vertical main carrying member (30) are carried in a horizontal state;

a first transfer tool (410) movably installed and picking up the electronic modules (10) carried onto the horizontal loading carrying member (22);

a first flip part (710) movably installed, receiving the electronic modules (10) which are picked up by the first transfer tool (410), and flipping the electronic modules (10) in the vertical state; and

a second transfer tool (420) movably installed, receiving the electronic modules (10) which are flipped in the vertical state by the first flip part (710), and carrying the electronic modules (10) onto the vertical main carrying member (30).

2. The electronic module handler of claim 1, wherein a pair of the first flip parts (710) are provided to alternately receive the electronic modules (10) from the first transfer tool (410).

3. The electronic module handler of claim 1, wherein a pair of the first transfer tools (410) and a pair of the second transfer tools (420) are provided so that the

respective pairs of transfer tools face each other with respect to the main table (200).

4. The electronic module handler of claim 1, further comprising:

an unloading part (400) that includes a horizontal unloading carrying member (24) onto which the electronic modules (10) pulled out from the vertical main carrying member (30) are carried in the horizontal state;

a third transfer tool (410) movably installed and picking up the electronic modules (10) carried onto the vertical main carrying member (30);

a second flip part (720) movably installed, receiving the electronic modules (10) which are picked up by the third transfer tool (430), and flipping the electronic modules (10) in the horizontal state; and

a fourth transfer tool (440) movably installed, receiving the electronic modules (10) which are flipped in the horizontal state by the second flip part (720), and carrying the electronic modules (10) onto the horizontal unloading carrying member (24).

5. The electronic module handler of claim 4, wherein a pair of the first flip parts (710) are provided to alternately receive the electronic modules (10).

6. The electronic module handler of claim 4, wherein a pair of the second flip parts (720) are provided to alternately receive the electronic modules (10).

7. The electronic module handler of claim 4, wherein the first transfer tool (410) and the third transfer tool (430) are arranged to face each other with respect to the main table (200).

8. The electronic module handler of claim 4, wherein the second transfer tool (420) and the fourth transfer tool (440) are arranged to face each other with respect to the main table (200).

9. An electronic module handler comprising:

a main table (200) that moves, in a horizontal direction, a vertical main carrying member (30) onto which a plurality of electronic modules (10) are carried in a vertical state;

an unloading part (400) that includes a horizontal unloading carrying member (24) onto which the electronic modules (10) unloaded from the vertical main carrying member (30) are carried in a horizontal state;

a third transfer tool (430) movably installed and picking up the electronic modules (10) carried onto the horizontal unloading carrying member (24);

a second flip part (720) movably installed, receiving the electronic modules (10) which are picked up by the third transfer tool (430), and flipping the electronic modules (10) in the horizontal state; and

a fourth transfer tool (440) movably installed, receiving the electronic modules (10) which are flipped in the horizontal state by the second flip part (720), and carrying the electronic modules (10) onto the horizontal unloading carrying member (24).

10. The electronic module handler of claim 9, wherein a pair of the second flip parts (720) are provided to alternately receive the electronic modules (10).

11. The electronic module handler of claim 9, wherein a pair of the third transfer tools (430) and a pair of the fourth transfer tools (440) are provided so that the respective pairs of transfer tools face each other with respect to the main table (200).

12. The electronic module handler of any one of claims 4 to 8, wherein the first flip part (710) and the second flip part (720) include one or more pairs of flip members (702) with a spacing therebetween that is varied according to a width standard of the electronic modules (10).

13. The electronic module handler of claim 12, wherein the first flip part (710) and the second flip part (720) further include a flip alignment member (704) for aligning the electronic modules (10) by being displaced in a longitudinal direction of the electronic modules (10) according to a length standard of the electronic modules (10).

14. The electronic module handler of any one of claims 4 to 8, wherein the second transfer tool (420) and the third transfer tool (430) include one or more pairs of grip members (402) with a spacing therebetween that is varied according to a width standard of the electronic modules (10).

15. The electronic module handler of any one of claims 4 to 9, further comprising a buffer part (300) that separately classifies and carries an electronic module (10) when it is determined that the electronic module (10) is defective in a transfer process for the electronic modules (10) by the fourth transfer tool (440).

16. The electronic module handler of claim 15, wherein the buffer part (300) includes one or more pairs of jig members (302) with a spacing therebetween that is varied according to a width standard of the electronic modules (10).

17. The electronic module handler of claim 16, wherein the buffer part (300) further includes a buffer alignment member (304) for aligning the electronic modules (10) by being displaced in a longitudinal direction of the electronic modules (10) according to a length standard of the electronic modules (10).