

DESCRIPTION

TITLE OF INVENTION: HANDLER FOR TESTING ELECTRONIC COMPONENTS AND PICKER DEVICE THEREOF

Technical Field

5 [1] The present invention relates to a handler for supporting the testing of electronic components by electrically connecting the electronic components and a tester to each other.

Background Art

10 [2] A handler for testing electronic components is the equipment that handles electronic components in order to electrically connect the electronic components to a tester.

[3] As the degree of integration of electronic components such as semiconductor devices increases, there is a trend
15 toward the line width of circuits becoming increasingly narrow. Accordingly, higher precision is required when electronic components are connected to testers.

[4] For example, although an error range of 20 μm was previously sufficient to ensure the appropriate electrical
20 connection between electronic components and testers, an error range of 10 μm up to a few μm is required now.

[5] Meanwhile, among electronic components, there are dies that are separated into individual units from a wafer state.

[6] Dies may be completed as final products by undergoing a packaging task or by stacking them for High Bandwidth Memory (HBM) production and then undergoing a packaging task.

5 [7] The testing of dies is required to perform post-die tasks.

[8] Electronic components in a die state may be tested by electrically connecting the contact pads thereof to a tester.

10 [9] Dies have fine intervals between the contact pads thereof and are significantly thin, making them prone to breaking or cracking, so that no suitable test method capable of adequately supporting the testing of electronic components in a die or HBM state has been proposed until
15 now. Accordingly, the applicant proposed Korean Patent Application Publication No. 10-2021-0088373 (hereinafter referred to as the 'conventional art').

[10] The conventional art proposes a technology for aligning the positions of electronic components by
20 rearranging the electronic components before connecting them to a tester.

[11] The conventional art is configured to determine the current positions of electronic components by scanning them on a test table (referred to as a 'chuck' in the
25 conventional art) with a camera and reduce an error range by readjusting the locations of the electronic components.

[12] According to the conventional art, various types of electronic components can be placed on the test table, and the camera is fixed.

[13] Generally, electronic components have to operate even
5 at extreme temperatures.

[14] The testing of electronic components needs to be conducted via an extremely high- or low-temperature process. Consequently, the test table may undergo thermal shrinkage or expansion, so that it may be difficult for electronic
10 components and the test pins of a tester to align with each other.

[15] The amount of positional variation of electronic components attributable to thermal shrinkage or expansion increases in the direction away from the center of the test
15 table. This acts as a limitation that prevents the handling capacity of the tester from increasing.

[16] For example, test table A, which can accommodate 256 electronic components, and test table B, which can accommodate 516 electronic components, are compared with
20 each other.

[17] Assuming that the sizes of electronic components to be loaded are the same, the area of the top surface of test table B has to be larger than that of test table A. The amount of positional variation of electronic components at
25 the outermost edge of test table B attributable to thermal deformation is greater than the amount of positional variation of the electronic components at the outermost edge

of test table A attributable to thermal deformation.
Therefore, the handler for testing electronic components
according to the conventional art is inevitably limited to a
handling capacity equal to or lower than a predetermined
5 level.

[18] [Conventional Art Literature]

[19] [Patent Literature]

[20] (Patent Document 1) Korean Patent Application
Publication No. 10-2021-0088373

10 **Disclosure**

Technical Problem

[21] There is a demand for the development of technology
that may increase handling capacity while maintaining minute
precision.

15 **Technical Solution**

[22] According to a first aspect of the present invention,
there is provided a handler for testing electronic
components, the handler including: a transport shuttle
provided with a transport table capable of transporting
20 electronic components by moving with the electronic
components loaded thereonto; a first hand configured to load
the electronic components onto the transport table that is
placed in a first area by the operation of the transport
shuttle; a second hand configured to unload the electronic
25 components from the transport table that is moved from the

first area to a second area by the operation of the transport shuttle; a test table configured such that the electronic components unloaded from the transport table by the second hand are loaded thereonto; a rearrangement
5 mechanism configured to rearrange the electronic components that are loaded onto the test table in a rearrangement space by the second hand while aligning the electronic components; a movement mechanism configured to move the test table between the rearrangement space and a test space where the
10 electronic components are tested by a tester, and also configured to selectively lift and lower the test table to electrically connect or disconnect the electronic components, loaded onto the test table, to or from the tester; and a controller configured to control the operation
15 of the transport shuttle, the first hand, the second hand, the rearrangement mechanism, and the movement mechanism; wherein the test table has first and second unit areas in which the electronic components are loaded; wherein the first unit area corresponds to the first test area of the
20 tester, and the second unit area corresponds to the second test area of the tester; and wherein the interval between the first and second unit areas is wider than the interval between the electronic components loaded in the first or second unit area.

25 [23] The rearrangement space may include a pair of rearrangement spaces, and the pair of rearrangement spaces

may be divided and arranged on both sides of the test space with the test space disposed therebetween.

[24] The movement mechanism may include: an elevator configured to electrically connect or disconnect the electronic components, loaded onto the test table, to or from the tester by selectively lifting and lowering the test table; a first movement plate configured such that the elevator is installed thereon, and installed to be movable in a first direction; a first mover configured to move the first movement plate in the first direction; a second movement plate configured such that the first movement plate and the first mover are installed thereon, and installed to be movable in a second direction orthogonal to the first direction; and a second mover configured to move the second movement plate in the second direction.

[25] The test table may include a first table provided with the first unit area and a second table spaced apart from the first table and provided with the second unit area, and the positions of the first and second tables may be variable relative to each other.

[26] The movement mechanism may include: a first movement element configured to move the first table in the second direction; and a second movement element configured to move the second table in the first direction.

[27] The first table may have a position fixed in the first direction, and the second table may have a position fixed in the second direction.

[28] The elevator may include: a first elevation element configured to individually and selectively lift and lower the first table; and a second elevation element configured to individually and selectively lift and lower the second table.

[29] The first movement plate may include two first movement plates, and the first mover may also include two first movers to move the first and second tables independently of each other in the first direction.

[30] The second movement plate may include a plurality of second movement plates.

[31] The elevator may include: a height adjuster configured such that the test table is coupled thereto; and an elevation motor configured to operate the height adjuster to selectively lift and lower the test table.

[32] The handler may further include a transfer member configured to transfer the power of the elevation motor to the height adjuster.

[33] According to a second aspect of the present invention, there is provided a handler for testing electronic components, the handler including: a transport shuttle provided with a transport table capable of transporting electronic components by moving with the electronic components loaded thereonto; a first hand configured to load the electronic components onto the transport table that is placed in a first area by the operation of the transport shuttle; a second hand configured to unload the electronic

components from the transport table that is moved from the first area to a second area by the operation of the transport shuttle; a plurality of test tables configured such that the electronic components unloaded from the transport table by the second hand are loaded thereonto; a plurality of rearrangement mechanisms configured to rearrange the electronic components that are loaded onto the plurality of test tables in a rearrangement space by the second hand while aligning the electronic components; a plurality of movement mechanisms configured to move respectively the plurality of test tables between the rearrangement space and a test space where the electronic components are tested by a tester, and also configured to selectively lift and lower the test tables to electrically connect or disconnect the electronic components, loaded onto the test tables, to or from the tester; and a controller configured to control the operations of the transport shuttle, the first hand, the second hand, the plurality of rearrangement mechanisms, and the plurality of movement mechanisms; wherein the plurality of test tables have first and second unit areas in which the electronic components are loaded; and wherein the first unit area corresponds to the first test area of the tester, and the second unit area corresponds to the second test area of the tester.

[34] The rearrangement space may include a pair of rearrangement spaces formed on both sides with the test space disposed therebetween, and the plurality of test

tables may be provided in pairs such that they are placed in the pair of rearrangement spaces, respectively.

[35] The controller may be able to control the operations of the plurality of movement mechanisms so that the testing of the electronic components can be performed in the state in which a test table moved from one of the rearrangement spaces corresponds to the first test area and a test table moved from the other of the rearrangement spaces corresponds to the second test area.

[36] The number of electronic components loaded in the first unit area and the number of electronic components loaded in the second unit area may be identical to each other.

[37] The first or second hand may include: a plurality of pickers configured to grip the electronic components; and a movement element configured to move a movable picker, excluding one or more fixed pickers among the plurality of pickers, in the horizontal directions.

[38] The rearrangement mechanism may further include a rotation element configured to rotate the movable picker.

[39] According to the present invention, there is provided a picker device for a handler for testing electronic components, the picker device including: a fixed picker configured to be installed at a fixed position such that the position of the gripped electronic component is fixed; a rotary picker paired with the fixed picker, and installed rotatably so that the angular coordinates of a gripped

electronic component can be varied; a variable element configured to rotate the rotary picker; and a main body configured such that the fixed picker, the rotary picker, and a rotation element are installed thereon.

5 [40] The variable element may enable the coordinates of the electronic component, gripped by the rotary picker, on the horizontal plane to be variable relative to the fixed picker by moving the rotary picker in the horizontal-axis directions.

10 **Advantageous Effects**

[41] According to the present invention, the test table is provided with the plurality of unit areas in which precision can be guaranteed, so that the precision of each of the unit areas can be guaranteed despite the thermal deformation of
15 the test table, thereby providing the effect of significantly improving handling capacity.

[42] According to the present invention, the interval between the unit areas of the test table is adjusted, so that the precision of each of the unit areas can be
20 guaranteed, thereby providing the effect of significantly improving handling capacity.

Description of Drawings

[43] FIG. 1 is a conceptual plan view of a handler for testing electronic components according to a first
25 embodiment of the present invention;

[44] FIG. 2 is a schematic plan view of a transport table applied to the handler for testing electronic components of FIG. 1;

5 [45] FIG. 3 is a schematic perspective view of a first hand applied to the handler for testing electronic components of FIG. 1;

[46] FIG. 4 is a schematic perspective view of a test table applied to the handler for testing electronic components of FIG. 1;

10 [47] FIG. 5 is a plan view of the test table of FIG. 4;

[48] FIGS. 6 to 15 are reference views illustrating the handler for testing electronic components of FIG. 1;

[49] FIGS. 16 and 17 are reference views illustrating a second embodiment of the present invention;

15 [50] FIG. 18 is a reference view illustrating a third embodiment of the present invention;

[51] FIGS. 19 and 20 are reference views illustrating a fourth embodiment of the present invention;

20 [52] FIG. 21 is a reference view illustrating a fifth embodiment of the present invention;

[53] FIGS. 22 to 24 are reference views illustrating a sixth embodiment of the present invention; and

[54] FIGS. 25 and 26 are reference views illustrating an improved picker device according to the present invention.

25 **Mode for Invention**

[55] Preferred embodiments according to the present invention will be described with reference to the accompanying drawings on a per-embodiment basis. However, for the sake of brevity, descriptions of well-known or redundant components will be omitted or abridged as much as possible.

[56] **<First Embodiment>**

[57] FIG. 1 is a conceptual plan view of a handler (hereinafter abbreviated as the 'handler') TH for testing electronic components according to the present invention.

[58] The handler TH according to the present invention may be divided into a movement part MP, a loading part LU, a rearrangement part RP, and a connection part CP, and includes a transport shuttle 100, a first hand 210, a second hand 220, a test table 300, a vacuum device 400, a rearrangement mechanism 500, a movement mechanism 600, and a controller 800.

[59] In the movement part MF, electronic components may be moved such that the electronic components are handed over between the unloading part LU and the rearrangement part RP. To this end, the transport shuttle 100 for transporting electronic components is installed in the movement part MP.

[60] The transport shuttle 100 is provided to transport electronic components between the unloading part LU and the rearrangement part RP.

[61] The transport shuttle 100 has a movable transport table 110.

[62] The transport shuttle 100 may have at least one transport table 110.

[63] The transport table 110 is capable of reciprocating in one direction.

5 [64] The transport table 110 is capable of reciprocating in the X-axis direction.

[65] In the case where the transport table 100 includes a plurality of transport tables 100, the plurality of transport tables 110 may be provided in parallel with each other in the Y-axis direction. In this case, the plurality of transport tables 110 need to be implemented to reciprocate in the X-axis direction independently of each other.

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[66] The transport table 110 may move back and forth between a first area A1 located on an unloading part (LU) side and a second area A2 located on a rearrangement part (RP) side.

15

[67] Electronic components may be loaded onto the transport table 110.

20 [68] The transport table 110 does not have a pocket structure having depressions into which electronic components can be seated, but has rather a vacuum structure which fixes electronic components, seated on a flat surface, by using vacuum pressure.

25 [69] As shown in the schematic plan view of FIG. 2, vacuum holes VH and vacuum depressions VG for vacuum-sucking electronic components are formed in the transport table 110.

[70] One vacuum hole VH and one vacuum depression VG form a pair.

[71] The vacuum pressure coming via the vacuum hole VH acts on an electronic component while being evenly distributed
5 via the vacuum depression VG.

[72] Since electronic components may be fixed to the transport table 110 by vacuum pressure, the shaking of the electronic components does not occur during the process in which the electronic components move in the X-axis direction
10 in the state of being loaded onto the transport table 110. Accordingly, as long as the electronic components are placed precisely on the transport table 110, the tolerance for the positional misalignment of the electronic components, which has been a problem in the past, may be minimized.

[73] The vacuum holes VH and the vacuum depressions VG may
15 be arranged in a 2×8 matrix, but the loading capacity of the transport table 110 may be increased or decreased freely as needed.

[74] In the unloading part LU, electronic components are
20 fed to the handler TH or recovered from the handler TH.

[75] Electronic components to be tested are fed to the handler TH through the unloading part LU, and tested electronic components are recovered from the handler TH through the unloading part.

[76] Electronic components may be loaded onto a JEDEC tray,
25 a ring frame, or another type of customer tray, and may then be fed to the handler TH or recovered from the handler TH.

[77] Electronic components to be tested in the unloading part LU are loaded onto the transport table 110 in the first area A1, and tested electronic components loaded onto the transport table 110 in the first area A1 are unloaded from the transport table 110. To this end, the first hand 210 is provided in the unloading part LU.

[78] The first hand 210 is provided to load electronic components onto the transport table 110 or unload electronic components from the transport table 110.

10 [79] For the unloading operations performed by the first hand 210, the transport table 110 has to be moved toward the unloading part LU and then placed in the first area A1.

[80] The first hand 210 loads electronic components to be tested onto the transport table 110 in the first area A1, or unloads tested electronic components from the transport table 110 in the first area A1.

[81] The first hand 210 may have one or more pickers capable of gripping or releasing electronic components. The pickers may grip electronic components by means of vacuum pressure.

[82] Preferably, an implementation may be made such that four pickers are installed in the first hand 210 as a set, thereby improving handling capacity.

25 [83] For example, as shown in the schematic diagram of FIG. 3, the first hand 210 may have four pickers P arranged in a 2×2 matrix. It is obvious that depending on the

implementation, the number of pickers P provided in the first hand 210 may be increased or decreased.

[84] The first hand 210 may further include a camera C.

[85] The first hand 210 is controlled by the controller 800
5 to grip an electronic component whose position is accurately calculated from an image captured by the camera C before an electronic component is gripped from a customer tray.

[86] The first hand 210 is controlled by the controller 800 so that an electronic component is seated such that the
10 center of the electronic component is aligned with the vacuum hole VH whose position is accurately calculated from an image captured by the camera C before the electronic component is placed on the transport tray 110.

[87] Accordingly, the picker P may grip or release an
15 electronic component at a more precise position, and thus allows for the more precise positioning of the electronic component.

[88] In the rearrangement part RP, electronic components ED to be tested are unloaded from the transport table 110 and
20 loaded onto the test table 300, and the electronic components loaded onto the test table 300 are rearranged. To this end, a rearrangement space RS where the rearrangement of electronic components is performed is formed in the rearrangement part RP.

[89] According to the present embodiment, the rearrangement
25 part RP is positioned on one side of the connection part CP in the X-axis direction.

[90] The second hand 220 is provided in the rearrangement part RP.

[91] The second hand 220 unloads electronic components ED to be tested from the transport table 110 or loads tested
5 electronic components ED onto the transport table 110.

[92] For the unloading operations performed by the second hand 220, the transport table 110 has to be moved toward the rearrangement part RP and then placed in the second area A2.

[93] The second hand 220 unloads electronic components to
10 be tested from the transport table 110 in the second area A2 or loads tested electronic components onto the transport table 110 in the second area A2.

[94] The second hand 220 may be constructed in the same configuration as the first hand 210. It is obvious that the
15 number of pickers P provided in the first hand 210 and the number of pickers P provided in the second hand 220 may be different from each other.

[95] The second hand 220 unloads electronic components to be tested from the transport table 110 in the second area A2
20 and then loads them onto the test table 300 that has been moved to the rearrangement part RP.

[96] The second hand 220 loads the tested electronic components, loaded onto the test table 300, onto the transport table 110 in the second area A2.

[97] The test table 300 is provided to be loaded with the
25 electronic components ED that are unloaded from the transport table 110 by the second hand 220.

[98] As shown in the schematic excerpt of FIG. 4, the test table 300 is formed in a rectangular shape in which the length thereof in the X-axis direction is shorter than the length thereof in the Y-axis direction, and the top surface of the test table 300 is flat.

[99] Electronic components are loaded onto the test table 300 in such a manner that they are placed on the flat top surface of the test table 300.

[100] The test table 300 may be moved in the X-axis, Y-axis, and Z-axis directions.

[101] The test table 300 may be rotated in the Θ -axis direction by using the vertical line V, passing through the center of the test table 300 in the Z-axis direction, as the axis of rotation.

[102] Generally, during a process in which an electronic component ED is moved to the test table 300, shock or inertia accompanying the movement occurs. Shock, inertia, or the like may cause the position of the electronic component, loaded onto the test table 300, to be changed. To prevent this, vacuum holes h are formed in the area of the test table 300 where electronic components are loaded.

[103] When an electronic component is placed on the test table 300 by the second hand 220, the electronic component may be seated at the position, where it is placed, by vacuum pressure. When the second hand 220 releases the electronic component in that state, the electronic component is fixed at the position where it was placed without change.

[104] The vacuum device 400 provides vacuum pressure to the vacuum holes h in the test table 300 through a vacuum circuit (not shown).

5 [105] The vacuum pressure provided by the vacuum device 400 is transferred to electronic components ED through the vacuum holes h, and the electronic components loaded onto the test table 300 are fixed in position by the vacuum pressure.

10 [106] The vacuum holes h may be implemented to be selectively opened and closed depending on the control of the vacuum circuit. The electronic components ED may be selectively fixed to the test table 300 and removed from the test table 300.

15 [107] The features of the present invention are further discussed with reference to FIG. 5, which is a schematic plan view of the test table 300.

[108] In the handler TH according to the present invention, the test table 300 has a first unit area US1 and a second unit area US2 arranged side by side in the Y-direction.

20 [109] The first and second unit areas US1 and US2 are the areas where electronic components are loaded, and thus, the vacuum holes h are formed therein.

25 [110] The first and second unit areas US1 and US2 are set to the widths that can ensure precision in the electrical connection between electronic components and a tester despite the thermal deformation of the test table 300.

[111] The tester has test pins that make electrical contact with electronic components, and the test pins are installed on the test board that forms the tester. The test board will be described later.

5 [112] The precision currently required resides within the area where electronic components are arranged in the form of a 16×16 matrix. Accordingly, the first and second unit areas US1 and US2 are set to the same widths, respectively, each allowing 256 electronic components to be arranged.

10 [113] When more precision is required, the areas of the first and second unit areas US1 and US2 may be reduced, and the numbers of electronic components arranged therein may also be reduced. For example, in the case where higher precision is required, the first and second unit areas US1
15 and US2 may each be set to an area where electronic components can be loaded in the form of an 8×8 matrix.

[114] Different types of electronic components may be tested in a single handler TH. In this case, even when the areas of the first and second unit areas US1 and US2 are the same,
20 the numbers of electronic components that can be loaded in the respective areas may be different from each other.

[115] Even when the same type of electronic components are loaded in the first and second unit areas US1 and US2, the areas of the first and second unit areas US1 and US2 may be
25 set to different values depending on various situations.

[116] FIG. 6 shows an arrangement for an electronic component on the test table 300 to be electrically connected to the test pins of test boards TB1 and TB2.

[117] A first test area TS1 is set on the first test board TB1, and a second test area TS2 is set on the second test board TB2.

[118] Test pins are installed in the first and second test areas TS1 and TS2.

[119] The first test area TS1 corresponds to the first unit area US1, and the second test area TS2 corresponds to the second unit area US2.

[120] At least one of the test boards TB1 and TB2 may have its horizontal movement finely adjusted. Accordingly, even when the test table 300 shrinks or expands due to thermal deformation, the first test area TS1 may be aligned with the first unit area US1 and the second test area TS2 may be aligned with the second unit area US2 by adjusting the position of the test board TB1 or TB2. Therefore, the test pins of the test boards TB1 and TB2 and the electronic components of the test table 300 may be electrically connected to each other precisely.

[121] Referring again to FIG. 5, the position adjustment of the test boards TB1 and TB2 is required, so that a predetermined set interval G is required between the first and second unit areas US1 and US2 by taking into consideration the hardware structure or thermal shrinkage of the test boards TB1 and TB2.

[122] The set interval G has to be wider than the interval g between adjacent electronic components loaded in at least the first or second unit area US1 or US2.

[123] According to the present invention, electronic components to be tested, which have been loaded onto the test table 300, are precisely rearranged in the rearrangement part RP.

[124] The rearrangement mechanism 500 precisely rearranges the positions of the electronic components, loaded onto the test table 300, in the rearrangement space RS. The rearrangement mechanism 500 will be described in detail later.

[125] In the connection part CP, electrical connections are made between the electronic components, loaded onto the test table 300 that have been moved to the connection part CP, and the test pins of the test boards TB1 and TB2.

[126] The test board TB is coupled to the handler TH in the connection part CP.

[127] In this case, the test board TB (TB1, and TB2) is discussed in brief.

[128] The test board TB may be provided in the structure of a probe card or the structure of another type of interface board having test sockets.

[129] As shown in the bottom view of FIG. 7, test zones TZ corresponding to respective electronic components are arranged on the test board TB. The test zones TZ correspond

to the electronic components, loaded onto the test table 300, in a one-to-one correspondence.

[130] Each of the test zones TZ is provided with test pins t for electrically connecting to one electronic component.

5 [131] The test pins t in each test zone TZ form a single set to form the test zone TZ, and are electrically connected to an electronic component ED.

[132] The test zone TZ and the electronic component ED have to be aligned with each other. When the coordinates of the
10 electronic component ED on the test table 300 do not match the coordinates of the test zone TZ on the X-Y plane, a failure occurs in the electrical connection between the electronic component ED and the tester.

[133] In particular, as shown in the conceptual example of
15 FIG. 8, when the electronic component ED on the test table 300 is placed at an angular position rotated by a rotation angle θ_1 in the θ -axis direction relative to the test zone TZ, a failure occurs in the electrical connection between the electronic component ED and the tester. Accordingly,
20 all the test zones TZ of the test board TB and all electronic components ED on the test table 300 have to be aligned with each other.

[134] The rearrangement mechanism 500 is provided to achieve the alignment between the test zones TZ and the electronic
25 components ED.

[135] According to the present embodiment, the electronic components ED are moved from the transport table 110 to the

test table 300 by the second hand 220. During this process, an error may occur in the position of the electronic component ED due to an operational error or shock of the second hand 220.

5 [136] The positions of the electronic components ED, loaded onto the test table 300 by the second hand 220, on the X-Y plane or the angular positions thereof may differ from each other, and the electronic components ED loaded onto the test table 300 and the test zones TZ of the test board TB may not
10 match each other.

[137] It does not matter when the range of error tolerances between the electronic components ED and the test zones TZ is wide. However, the reality is that a precision within 30 μm is required for the packaged semiconductor device and a
15 precision within 5 μm is required for the die or HBM.

[138] In the present invention, when the second hand 220 moves electronic components from the transport table 110 to the test table 300, the electronic components are loaded into temporary zones and then rearranged from the temporary
20 zones into regular zones.

[139] The temporary zones are not set positions, but are any positions where electronic components ED are placed on the test table 300 by the second hand 220.

[140] The temporary zones are not set by the controller 800
25 or are not fixed, but are the positions determined by the second hand 220 as desired. For example, when the second hand 220 seats electronic components ED onto the test table

300, the zones where the electronic components ED are seated become the temporary zones BZ.

[141] Exaggerated FIG. 9 shows an example of the temporary zones BZ on the test table 300.

5 [142] The regular zones RZ refer to the positions where the electronic components and the test zones TZ are aligned with each other. Exaggerated FIG. 10 shows the relationship between the temporary zone BZ and the regular zone RZ on the test table 300.

10 [143] Although the regular zones RZ may be preset, they may be set to match the positions and arrangement of test zones TZ on the test board TB after the electronic components ED to be tested have been loaded onto the test table 300.

15 [144] In FIG. 10, the temporary zone BZ has errors in the X-axis, Y-axis, and Θ -axis directions with respect to the regular zone RZ.

[145] The rearrangement mechanism 500 is provided to rearrange the positions of electronic components ED, loaded onto the test table 300 by the second hand 220, from the
20 temporary zones BZ to the regular zones RZ.

[146] According to the present embodiment, the second hand 220 loads electronic components ED, unloaded from the transport table 110 and to be tested, into the temporary zones BZ. Then, the rearrangement mechanism 500 is utilized
25 to move the electronic components ED, placed in the temporary zones BZ, to the regular zones RZ.

[147] As shown in the schematic diagram of FIG. 11, the rearrangement mechanism 500 includes a rearrangement picker 510 and a rearrangement camera 520.

[148] The rearrangement mechanism 500 has a fixed position.

5 For example, the rearrangement mechanism 500 may be fixedly mounted onto a frame, which forms the skeleton of the handler TH.

[149] The rearrangement picker 510 may grip or release an electronic component ED. The rearrangement picker 510 may
10 grip an electronic component ED by means of vacuum pressure.

[150] The rearrangement picker 510 has a position fixed in the horizontal directions, which are the X-axis and Y-axis directions.

[151] The rearrangement camera 520 is disposed to be spaced
15 apart from the rearrangement picker 510.

[152] The rearrangement camera 520 is provided to photograph an electronic component ED.

[153] As shown in the example of FIG. 12, the rearrangement camera 520 photographs identification marks M (M1, and M2)
20 on an electronic component ED. The identification marks M may be arranged diagonally opposite each other.

[154] However, the objects photographed by the rearrangement camera 520 to rearrange an electronic component ED do not need to be limited to the identification marks M. The
25 objects photographed by the rearrangement camera 520 may be replaced with the corners of an electronic component ED, the

identification pads or identification pattern of an electronic component ED, or the like.

[155] The rearrangement picker 510 and the rearrangement camera 520 are grouped and combined into a single module.

5 Accordingly, the relative positions of the rearrangement picker 510 and the rearrangement camera 520 are fixed.

[156] The movement mechanism 600 may move the test table 300 in the horizontal directions, which are the X-axis and Y-axis directions.

10 [157] The movement mechanism 600 may rotate the test table 300 in the Θ -axis direction.

[158] The movement mechanism 600 may selectively lift and lower the test table 300 in the Z-axis direction.

15 [159] As shown in the schematic excerpt of FIG. 13, the movement mechanism 600 includes a rotator 610, an elevator 620, a first movement plate 630, a first mover 640, a second movement plate 650, and a second mover 660.

[160] The rotator 610 rotates the test table 300 in the Θ -axis direction.

20 [161] By rotating the test table 300 with the rotator 610, the angular position of the electronic components ED may be adjusted.

[162] The elevator 620 selectively lifts and lowers the test table 300.

25 [163] The test table 300 is coupled to the elevator 620 via the rotator 610.

[164] When the test table 300 is lifted by the elevator 620, the electronic components ED of the test table 300 come into contact with the test pins t, thereby electrically connecting the electronic components ED to the tester. When
5 the test table 300 is lowered by the elevator 620, the contact between the electronic components ED and the test pins t is released, and the test table 300 enters the state of being movable in the horizontal directions.

[165] FIG. 14 is a schematic example of the elevator 620.

10 [166] The elevator 620 may include a height adjuster 621, an elevation motor 622, and a transfer member 623.

[167] The height adjuster 621 includes a rotation member 621a and an elevation member 621b.

15 [168] The rotation member 621a and the elevation member 621b are coupled to each other by a screw structure.

[169] The rotation member 621a is selectively rotated in forward and reverse directions by the power of the elevation motor 622.

20 [170] The elevation member 621b is selectively lifted and lowered in conjunction with the forward and reverse rotation of the rotation member 621a. The movement of the elevation member 621b is prohibited by a limiting member that is not shown in the drawings.

25 [171] The test table 300 is coupled to the elevation member 621b via the rotator 610. Accordingly, the test table 300 is selectively lifted and lowered along with the elevation member 621b.

[172] The elevation motor 622 selectively lifts and lowers the test table 300 by operating the height adjuster 621.

[173] As the rotation member 621a is rotated by the power generated by the elevation motor 622, the elevation member
5 621b is selectively lifted and lowered.

[174] The transfer member 623 transfers the power of the elevation motor 622 to the height adjuster 621. More specifically, the power of the elevation motor 622 is transferred to the rotation member 621a of the height
10 adjuster 621.

[175] The transfer member 623 may be provided as a rotation belt.

[176] According to an example such as that of FIG. 14, it may be possible to arrange the lifting motor 622, requiring
15 a high height due to its large size, in an area out of the space between the test table 300 and the first movement plate 630, so that there is an advantage in that the gap between the test table 300 and the first movement plate 630 can be reduced.

20 [177] FIG. 15 shows examples of the arrangement of the elevator 620.

[178] FIG. 15(a) shows an example in which the elevator 620 has a single component configured to apply elevation force near the center of the test table 300.

25 [179] FIG. 15(b) shows an example in which the elevator 620 is configured to be divided into a first elevation element 620A configured to apply elevation force near the center of

the first unit area US1 of the test table 300 and a second elevation element 620B configured to apply elevation force near the center of the second unit area US2 of the test table 300.

5 [180] The first movement plate 630 is moved in the first direction, which is the Y-axis direction.

[181] The elevator 620 is installed on the first movement plate 630. Accordingly, the rotator 610, the elevator 620, and the test table 300 coupled with the elevator 620 are
10 moved in the Y-axis direction along with the first movement plate 630.

[182] The first mover 640 moves the first movement plate 630 in the Y-axis direction.

[183] The second movement plate 650 is moved in the second
15 direction, which is the X-axis direction.

[184] The second movement plate 650 may be installed to be movable in such a manner that it is rail-coupled to the base plate BS, which forms the skeleton of the handler TH.

[185] The first movement plate 630 is installed on the
20 second movement plate 650 to be moveable in the Y-axis direction. Accordingly, the first movement plate 630, the elevator 620, and the test table 300 are moved in the X-axis direction along with the second movement plate 650.

[186] An implementation is made such that depending on the
25 implementation, the first movement plate 630 may be moved in the X-axis direction and the second movement plate 650 may be moved in the Y-axis direction.

[187] The second mover 660 moves the second movement plate 650 in the X-axis direction.

[188] By moving the test table 300 in the X-axis direction with the second mover 660, the test table 300 may be
5 selectively positioned in the rearrangement space RS and the test space TS. In this case, the test space TS is a space formed in the test part RP. When the test table 300 is in the test space TS, an electrical connection is made between an electronic component ED and the tester by the lifting of
10 the test table 300.

[189] The above-described movement mechanism 600 has three functions.

[190] A first function is the function of moving the test table 300 between the rearrangement space RS and the test
15 space TS.

[191] A second function is the function of electrically connecting or disconnecting the electronic component ED to or from the tester.

[192] A third function is a function for the rearrangement
20 of the electronic component ED performed in the rearranging space RS. Since the rearrangement picker 510 is fixed, the test table 300 adjusts the position of the electronic component ED while moving in the X-axis, Y-axis, and Z-axis directions.

[193] The operation performed during the rearrangement of
25 the electronic component ED will be described here.

[194] As shown in FIG. 10, the temporary zone BZ of the electronic component ED may differ from the regular zone RZ in the X-axis, Y-axis, and Θ -axis directions.

5 [195] The rearrangement camera 520 photographs the electronic component ED on the test table 300, and identifies the temporary zone BZ through the locations of identification marks M.

10 [196] When the temporary zone BZ is identified, the first mover 640 and the second mover 660 operate to position the center of the temporary zone BZ below the rearrangement picker 510, and the elevator 620 operates to lift the test table 300.

15 [197] When the rearrangement picker 510 sucks and grips an electronic component ED on the lifted test table 300 with vacuum pressure, the elevator 620 operates to lower the test table 300. Thereafter, the first mover 640 and the second mover 660 operate to align the center of the regular zone RZ with the center of the electronic component ED gripped by the rearrangement picker 510, and the rotator 610 operates
20 to align the electronic component ED with the regular zone RZ. In this state, the elevator 620 operates to lift the test table 300, thereby allowing the electronic component ED, gripped by the rearrangement picker 510, to be seated in the regular zone RZ.

25 [198] When the electronic component ED is fixed to the test table 300 by vacuum pressure applied through the vacuum hole h in the state in which the electronic component ED has been

seated in the regular zone RZ, the rearrangement picker 510 releases the electronic component ED. Then, the test table 300 is lowered, and the rearrangement of a subsequent electronic component ED starts.

5 [199] The controller 800 controls the components required for the appropriate operation of the handler TH, such as the transport shuttle 100, the first hand 210, the second hand 220, the vacuum 400, the rearrangement mechanism 500, and the movement mechanism 600.

10 [200] The operation of the handler TH described above will be described below.

[201] The gap between the first test board TB1 and the second test board TB2 is pre-adjusted by taking into consideration thermal deformation.

15 [202] In the unloading part LU, the first hand 210 loads the electronic components ED to be tested onto the transport table 110 in the first area A1.

[203] Once all the electronic components ED have been loaded onto the transport table 110, the transport shuttle 100
20 operates to move the transport table 110 to the second area A2.

[204] The second hand 220 unloads the electronic components ED from the transport table 110 placed in the second area A2 and moves them to the test table 300 placed in the
25 rearrangement area RS. In this case, the positions of the electronic components ED loaded onto the test table 300 by the second hand 220 are temporary zones BZ.

[205] Once all the electronic components ED to be tested have been loaded onto the test table 300, the controller 800 operates the rearrangement mechanism 500 and the movement mechanism 600 to rearrange the electronic components ED from the temporary zones BZ to the regular zones RZ.

[206] When the rearrangement of the electronic components ED on the test table 300 is completed, the movement mechanism 600 operates to move the test table 300 to the test area TS. Accordingly, the first unit area US1 of the test table 300 is placed at a position aligned with the first test area TS1, and the second unit area US2 is placed at a position aligned with the second test area TS2.

[207] Thereafter, the connector 700 operates to lift the test table 300 toward the test board TB so that the electronic components ED are electrically connected to the tester.

[208] When the testing of the electronic components ED is completed, the test table 300 is moved to the rearrangement part RP by the movement mechanism 600. Then, the second hand 220 moves the tested electronic components ED to the transport tray 110 placed in the second area A2, and the transport tray 110 filled with the tested electronic components ED moves to the first area A1. Then, the first hand 210 unloads the tested electronic components ED from the transport table 110, and loads them onto an empty customer tray.

[209] **<Second Embodiment>**

[210] A second embodiment may be applied to a test board TB such as that referenced from FIG. 16.

[211] According to the example of FIG. 16, first and second test areas TS1 and TS2 are set on a single test board TB.

5 Accordingly, the positions of the first and second test areas TS1 and TS2 are fixed relative to each other.

[212] The test table 300 is divided into a first table 310 and a second table 320.

10 [213] A first unit area US1 is set on the first table 310, and a second unit area US2 is set on the second table 320.

[214] The rotator 610 of the movement mechanism 600 is placed to be divided into a first rotation element 610A and a second rotation element 610B, and the elevator 620 is placed to be divided into a first elevation element 620A and
15 a second elevation element 620B.

[215] The first rotation element 610A and the first elevation element 620A rotate or lift/lower the first table 310.

20 [216] The second rotation element 610B and the second elevation element 620B rotate or lift/lower the second table 320.

[217] In addition, as referenced from FIG. 17, the movement mechanism 600 further includes a third movement plate 671, a fourth movement plate 672, a first movement element 680, and
25 a second movement element 690.

[218] The third movement plate 671, the fourth movement plate 672, the first movement element 680, and the second

movement element 690 are installed on the first movement plate 630.

[219] The third movement plate 671 is installed to be moveable in the Y-axis direction.

5 [220] The first table 310, the first rotation element 610A, and the first elevation element 620A are mounted on the third movement plate 671. Accordingly, the first table 310, the first rotation element 610A, and the first elevation element 620A are moved along with the third movement plate
10 671 in the Y-axis direction.

[221] The fourth movement plate 672 is installed to be movable in the X-axis direction.

[222] The second table 320, the second rotation element 610B, and the second elevation element 620B are mounted on
15 the fourth movement plate 672. Accordingly, the second table 320, the second rotation element 610B, and the second elevation element 620B are moved along with the fourth movement plate 672 in the X-axis direction.

[223] The third movement plate 671 has its position fixed in
20 the X-axis direction. Accordingly, the first table 310, the first rotation element 610A, and the first elevation element 620A also have their positions fixed in the X-axis direction.

[224] The fourth movement plate 672 has its position fixed
25 in the Y-axis direction. Accordingly, the second table 320, the second rotation element 610B, and the second elevation

element 620B also have their positions fixed in the X-axis direction.

[225] Naturally, like the movement mechanism 600 in the first embodiment, the movement mechanism 600 in the second embodiment also has a first movement member 640, a second movement plate 650, and a second movement member 660.

[226] According to the second embodiment, instead of the first and second test areas TS1 and TS2 being fixed, the first and second tables 310 and 320 are moved.

10 [227] The interval between the first and second tables 310 and 320 may be adjusted by moving the first table 310 in the Y-axis direction by the operation of the first movement element 680.

15 [228] When thermal deformation occurs, the first movement element 680 operates to move the first table 310 in the Y-axis direction. Accordingly, the interval between the first and second unit areas US1 and US2 becomes equal to the interval between the first and second test areas TS1 and TS2. In this state, the first mover 640 and the second mover 660 operate to move the first table 310 to a position where the first unit area US1 can be aligned with the first test area TS1. Furthermore, the second movement element 690 operates to move the second table 320 in the X-axis direction to a position where the second unit area US2 can be aligned with the second test area TS2.

25 [229] The second embodiment may have various variations.

[230] For example, a modification may be made such that the first movement element 680 and the second movement element 690 are implemented such that the position of the first table 310 is fixed and the second table 320 is moved in both the X-axis and Y-axis directions.

[231] For example, an implementation may be made such that two first movement elements 680 and two second movement elements 690 may be provided, and thus, both the first table 310 and the second table 320 can be moved in the X-axis or Y-axis direction.

[232] However, to minimize the number of additional parts and simplify design for movement, an example made with reference to FIGS. 16 and 17 is most preferable.

[233] **<Third Embodiment>**

[234] A third embodiment is implemented such that a single first movement plate 630, such as that referenced from FIG. 18, is movably installed on a plurality of second movement plates 650.

[235] According to the example of FIG. 18, the first movement plate 630 is guided through movement in the Y-axis direction by guide means installed on the plurality of second movement plates 650. Accordingly, the first movement plate 630 performs balanced movement in the Y-axis direction in the state of minimizing bending between both ends thereof in the Y-axis direction.

[236] **<Fourth Embodiment>**

[237] In a fourth embodiment, a pair of rearrangement spaces RS are provided as referenced from FIG. 19.

[238] The pair of rearrangement spaces RS are arranged to be divided in the X-axis direction with a test space TS
5 disposed therebetween.

[239] It is obvious that a pair of test tables 300 are also provided in the fourth embodiment. Accordingly, the different test tables 300 are located in the rearrangement spaces RS, respectively.

10 [240] Referring to FIG. 20, when the testing of electronic components ED is performed in the state in which the test table 300 on one side is located in the test area TS, the electronic components ED may be rearranged on the test table 300 placed in the rearrangement space RS on the other side.

15 [241] According to the fourth embodiment, the idle time of the tester is significantly reduced, thereby improving handling capacity.

[242] **<Fifth Embodiment>**

[243] For a fifth embodiment, reference may be made to FIG.
20 21.

[244] In the fifth embodiment, two first movement plates 630 are arranged in the Y-axis direction in the rearrangement space RS.

[245] The first movement plates 630 may be moved
25 independently of each other in the Y-axis direction. To this end, two first movers 640 are also provided.

[246] A first table 310 and a second table 320 are installed to be divided on the two first movement plates 630, respectively.

5 [247] The first table 310 is positioned on the first movement plate 630 in the -Y direction, and the second table 320 is positioned on the second movement plate 630 in the +Y direction.

10 [248] Therefore, the first table 310 and the second table 320 may also be moved independently of each other in the Y-axis direction.

[249] In the fifth embodiment, an implementation may be made such that transport shuttle 100 are provided at both ends in the Y-axis direction, thereby further increasing handling capacity.

15 [250] **<Sixth Embodiment>**

[251] A sixth embodiment is a combination of the fourth and fifth embodiments, as shown in FIG. 22.

20 [252] In the sixth embodiment as well, four test tables 300 may be divided into two pairs of test tables 300 and the two pairs of test tables 300 are positioned in rearrangement spaces RS, respectively, on both sides of a test space TS.

[253] The four test tables 300 may be moved independently of each other in the X-axis and Y-axis directions.

25 [254] According to the sixth embodiment, various types of variations may be made in the positions of the test tables 300 for the rearrangement and testing of electronic components ED.

[255] As shown in FIG. 23, the testing of electronic components ED may be performed in the state in which a pair of test tables 300, in which the electronic components have been rearranged in the rearrangement space RS on one side,
5 are positioned together in the test space TS.

[256] Furthermore, as shown in FIG. 24, the testing of electronic components ED may be performed in the state in which a test table 300, in which electronic components are rearranged in a rearrangement space RS on one side, and a
10 test table 300, in which electronic components are rearranged in a rearrangement space RS on the other side, are placed together in the test space TS.

[257] According to the sixth embodiment, handling capacity may be further expanded through the arrangement of the test
15 tables 300 according to the situation.

[258] **<Notes on Picker Devices>**

[259] According to the present invention, a first hand 210 and a second hand 220 are provided as a total of two types of picker devices for moving electronic components ED.

20 [260] As shown in the example of FIG. 3, each of the picker devices may have a plurality of pickers that form a set.

[261] FIG. 23 shows an example of an improved picker device PA.

25 [262] The picker device PA includes four pickers Pf and Pr, three variable elements TE, and a main body.

[263] One of the four pickers Pf and Pr is provided as a fixed picker Pf.

[264] The fixed picker Pf is installed such that the position thereof is fixed onto the main body B. Accordingly, the position of an electronic component ED gripped by the fixed picker Pf is fixed relative to the main
5 body B.

[265] The remainder of the four pickers Pf and Pr are provided as rotary pickers Pr.

[266] As shown in the conceptual bottom view of FIG. 26, the variable elements TE rotate the rotary pickers Pr in the Θ -
10 axis direction.

[267] The electronic component ED gripped by the rotary picker Pr is rotated along with the rotation of the rotary picker Pr, and the angular coordinates thereof may be varied.

15 [268] Furthermore, the variable elements TE move the rotary pickers Pr in the horizontal-axis directions.

[269] The horizontal-axis directions are the X-axis and Y-axis directions.

[270] The horizontal coordinates of an electronic component
20 ED gripped by the rotary picker Pr via the variable element TE may be varied relative to the fixed pickers Pf.

[271] The improved picker device PA enables the accurate gripping of the electronic component ED. To achieve this, it is necessary to identify the position of an electronic
25 component ED using the camera C before gripping the electronic component ED with the picker device PA.

[272] The camera C may be installed on the picker device PA as shown in FIG. 25, or may be provided on the upper side of a loading element, such as a customer tray carrying electronic components ED to be gripped.

5 [273] The improved picker device PA may correct the interval between electronic components ED and the rotation angles thereof during the process of moving the electronic components ED. Accordingly, the improved picker device PA may accurately seat electronic components ED onto a loading
10 element such as the transport table 110.

[274] The above-described embodiments have been described using preferred examples of the present invention, and may have various forms of application. Therefore, the present invention should not be understood as being limited only to
15 the content described above. Instead, the scope of the present invention should be understood as the separately described claims and their equivalents.

CLAIMS

[Claim 1] A handler for testing electronic components,
the handler comprising:

5 a transport shuttle provided with a transport table
capable of transporting electronic components by moving with
the electronic components loaded thereonto;

a first hand configured to load the electronic
components onto the transport table that is placed in a
first area by an operation of the transport shuttle;

10 a second hand configured to unload the electronic
components from the transport table that is moved from the
first area to a second area by an operation of the transport
shuttle;

15 a test table configured such that the electronic
components unloaded from the transport table by the second
hand are loaded thereonto;

a rearrangement mechanism configured to rearrange the
electronic components that are loaded onto the test table in
a rearrangement space by the second hand while aligning the
20 electronic components;

a movement mechanism configured to move the test table
between the rearrangement space and a test space where the
electronic components are tested by a tester, and also
configured to selectively lift and lower the test table to
25 electrically connect or disconnect the electronic
components, loaded onto the test table, to or from the

tester; and

a controller configured to control operations of the transport shuttle, the first hand, the second hand, the rearrangement mechanism, and the movement mechanism;

5 wherein the test table has first and second unit areas in which the electronic components are loaded;

 wherein the first unit area corresponds to a first test area of the tester, and the second unit area corresponds to a second test area of the tester; and

10 wherein an interval between the first and second unit areas is wider than an interval between the electronic components loaded in the first or second unit area.

[Claim 2] The handler of claim 1, wherein:

 the rearrangement space comprises a pair of
15 rearrangement spaces; and

 the pair of rearrangement spaces are divided and arranged on both sides of the test space with the test space disposed therebetween.

 [Claim 3] The handler of claim 1, wherein the movement
20 mechanism comprises:

 an elevator configured to electrically connect or disconnect the electronic components, loaded onto the test table, to or from the tester by selectively lifting and lowering the test table;

25 a first movement plate configured such that the

elevator is installed thereon, and installed to be movable in a first direction;

a first mover configured to move the first movement plate in the first direction;

5 a second movement plate configured such that the first movement plate and the first mover are installed thereon, and installed to be movable in a second direction orthogonal to the first direction; and

a second mover configured to move the second movement
10 plate in the second direction.

[Claim 4] The handler of claim 1, wherein:
the test table comprises:

a first table provided with the first unit area; and

15 a second table spaced apart from the first table, and provided with the second unit area; and
positions of the first and second tables are variable relative to each other.

[Claim 5] The handler of claim 4, wherein the movement
20 mechanism comprises:

a first movement element configured to move the first table in the second direction; and

a second movement element configured to move the second table in the first direction.

[Claim 6] The handler of claim 5, wherein:
the first table has a position fixed in the first
direction; and
the second table has a position fixed in the second
5 direction.

[Claim 7] The handler of claim 4, wherein the elevator
comprises:

a first elevation element configured to individually
and selectively lift and lower the first table; and

10 a second elevation element configured to individually
and selectively lift and lower the second table.

[Claim 8] The handler of claim 7, wherein:
the first movement plate comprises two first movement
plates; and

15 the first mover also comprises two first movers to
move the first and second tables independently of each other
in the first direction.

[Claim 9] The handler of claim 3, wherein the second
movement plate comprises a plurality of second movement
20 plates.

[Claim 10] The handler of claim 1, wherein the
elevator comprises:

a height adjuster configured such that the test table

is coupled thereto; and

an elevation motor configured to operate the height adjuster to selectively lift and lower the test table.

[Claim 11] The handler of claim 10, further comprising
5 a transfer member configured to transfer power of the elevation motor to the height adjuster.

[Claim 12] A handler for testing electronic components, the handler comprising:

a transport shuttle provided with a transport table
10 capable of transporting electronic components by moving with the electronic components loaded thereonto;

a first hand configured to load the electronic components onto the transport table that is placed in a first area by an operation of the transport shuttle;

15 a second hand configured to unload the electronic components from the transport table that is moved from the first area to a second area by an operation of the transport shuttle;

a plurality of test tables configured such that the
20 electronic components unloaded from the transport table by the second hand are loaded thereonto;

a plurality of rearrangement mechanisms configured to rearrange the electronic components that are loaded onto the plurality of test tables in a rearrangement space by the
25 second hand while aligning the electronic components;

a plurality of movement mechanisms configured to move respectively the plurality of test tables between the rearrangement space and a test space where the electronic components are tested by a tester, and also configured to
5 selectively lift and lower the test tables to electrically connect or disconnect the electronic components, loaded onto the test tables, to or from the tester; and

a controller configured to control operations of the transport shuttle, the first hand, the second hand, the
10 plurality of rearrangement mechanisms, and the plurality of movement mechanisms;

wherein the plurality of test tables have first and second unit areas in which the electronic components are loaded; and

15 wherein the first unit area corresponds to a first test area of the tester, and the second unit area corresponds to a second test area of the tester.

[Claim 13] The handler of claim 14, wherein the rearrangement space comprises a pair of rearrangement spaces
20 formed on both sides with the test space disposed therebetween, and the plurality of test tables are provided in pairs such that they are placed in the pair of rearrangement spaces, respectively.

[Claim 14] The handler of claim 13, wherein the
25 controller is able to control operations of the plurality of

movement mechanisms so that testing of the electronic components can be performed in a state in which a test table moved from one of the rearrangement spaces corresponds to the first test area and a test table moved from a remaining
5 one of the rearrangement spaces corresponds to the second test area.

[Claim 15] The handler of claim 1 or 12, wherein a number of electronic components loaded in the first unit area and a number of electronic components loaded in the
10 second unit area are identical to each other.

[Claim 16] The handler of claim 1 or 12, wherein the first or second hand comprises:

a plurality of pickers configured to grip the electronic components; and

15 a movement element configured to move a movable picker, excluding one or more fixed pickers among the plurality of pickers, in horizontal directions.

[Claim 17] The handler of claim 16, wherein the rearrangement mechanism further comprises a rotation element
20 configured to rotate the movable picker.

[Claim 18] A picker device for a handler for testing electronic components, the picker device comprising:

a fixed picker configured to be installed at a fixed

position such that a position of the gripped electronic component is fixed;

5 a rotary picker paired with the fixed picker, and installed rotatably so that angular coordinates of a gripped electronic component can be varied;

a variable element configured to rotate the rotary picker; and

a main body configured such that the fixed picker, the rotary picker, and a rotation element are installed thereon.

10 [Claim 19] The picker device of claim 18, wherein the variable element enables coordinates of the electronic component, gripped by the rotary picker, on a horizontal plane to be variable relative to the fixed picker by moving the rotary picker in horizontal-axis directions.