



TRAY LOADING STATION FOR HANDLER APPARATUS

TECHNICAL FIELD

The present invention relates to tray loading station for handler apparatus for reliably and easily supplying tray which carries the ICs to be tested (referred to DUT thereafter) to a IC test system when the test is carried out.

BACKGROUND ART

In a tray loading station for handler apparatus, DUT carrying trays are placed in tray loading station. The DUTs are automatically supplied to a IC test system, and then classified automatically according to the test result. Therefore, it is necessary to reliably receive and send the DUT carrying trays and position them correctly.

In addition, since there are large amount of DUTs and trays needed to be handled, the receiving and sending operation should be carried out easily and safely.

The first conventional apparatus is shown in Figs. 3, 4 and 5.

This conventional tray loading station for handler apparatus is aimed to correctly carry out the positioning operation.

Fig. 3 shows the perspective view of the tray loading station, and Fig. 4 shows its side view.

A plurality of DUTs are provided inside tray 90. The handler apparatus pick up each DUT, and sent it to a position where a electrical tests are carried out. A plurality of trays 90 are placed overlappingly on a tray loading station and moved to a desired position in height direction by a elevator mechanism.

In addition, trays may have different sizes suitable for different type of DUTs. In order to handle the trays of different sizes, positioning mechanism that can position trays in both X direction and in Y direction is also provided.

The main base 80 of the handle apparatus defines a position reference for the whole handle apparatus. Tray 90 that is provided along one side of X-direction and one side of Y-direction of main base 80 of handler apparatus is positioned by the push of movable tray adjust lever 25

in X and Y—direction respectively.

Generally, the bigger the elevator mechanism 35 of the tray 90, the easily the horizontal position of the tray can be ensured. Fig. 5 is the plane view of elevator 35 of tray 90. The plane of elevator mechanism 35 for pushing up the tray 90 can be extended except the moving portion of tray adjust lever 25. That is, it has concave and convex planes a, b, c, d, e, f, g, j, i, j, k, and l, and the planes d, e, f, g and i, j, k, l are for the movement of tray adjust lever 25. Besides, the tray adjust level 25 is so arranged that they can move to a position defining a minimum tray size. The planes a, b, c and h of elevator mechanism 35 defines an area that the tray of maximum size can cover. Therefore, since the elevator mechanism 35 is assured to have enough space, it always can lift the tray 90 horizontally regardless of size of the tray 90.

The tray 90 is pushed up or lowered down to a desired position by elevator 35 in the following way.

A linear tooth 76 is provided so that the elevator 35 can move up and down by means of the rotation of elevator gear 75. In addition, linear guide 45 is provided in order to hold the elevator 35 in horizontal position.

In order to push tray 90 which has been lifted to a desired height, tray pusher 26 is provided on tray adjust lever 25.

As shown in Fig. 4, tray pusher 26 pushes and fixes the highest tray, prevents the handler apparatus from intaking any dust when it intakes DUT, and correctly places the DUT into the DUT store area inside the tray.

Generally, in order to handle large amount of DUTs, handler apparatus usually use a plurality of trays. Loading/unloading operations of these trays to/from the tray installation are usually done by human.

As stated above, according to the first conventional example, after the main base 80 of the handler apparatus is positioned, tray 90 can also be fixed up. However, the loading/unloading operation of tray 90 to/from tray loading station are done by human. Since the movable portion of the handler apparatus is above the tray loading station, no broad space can be assured and therefore the operation of exchanging trays 90 becomes difficult.

The second conventional example is shown in Fig. 6 and 7. This conventional tray loading station for handler apparatus is aimed to facilitate the loading and unloading operations of trays.



Fig. 6 shows a perspective view of the tray loading station, and Fig. 7 shows a side view of the tray loading station. In this tray loading station, a tray guide bar 15 is provided over tray slide base 5 for positioning tray 90. Tray 90 provided along tray guide bar 15 is pushed in X or Y direction and positioned.

Elevator 35 is provided for horizontally pushing up or lowering down the tray to a desired positions.

In this conventional example, slider pack 6 is provided for pulling and pushing tray slider base 5 in/out of the handler apparatus.

For this reason, the tray loading station and tray 90 can be pulled out together, and the tray can be loaded or unloaded under the pull-out state. When tray 90 is loaded or unloaded, a broad space can be ensured over tray loading station to facilitate the operation of exchanging tray 90. In addition, because there is no movable portion of handler apparatus near the tray loading station, operations can be carried out safely.

Referring to Fig. 7, the process of horizontally pushing the tray up to a desired position is described below.

Tray guide bar 15 and tray adjust bar 25 is provided on tray slider base 5. Tray pusher 26 is provided on tray adjust bar 25 so as to push tray 90.

Linear tooth 76 is so provided that elevator 35 can move up and down by means of the rotation of elevator gear 75.

Linear guide 45 is provided for holding elevator 35 in horizontal position.

The operation of positioning tray 90 is always carried out with respect to tray guide bar 15. However, since slider pack 6 is movable because of slider mechanism, there always exists a narrow gap which make the positioning operation with respect to the body of handler apparatus difficult. The position of tray 90 has a error of x with respect to the main base 80 of the handler apparatus.

Thus, the positioning of tray can not be correctly carried out since the tray slider base of the tray loading station has no positioning reference with respect to the handler apparatus.

In order to give out correct position of tray slider base, expansive linear motion guide must be used to replace slider pack on the tray slider base.





DISCLOSURE OF THE INVENTION

The object of the present invention is to provide a tray loading station for handler apparatus which is capable of supplying DUT carrying tray to handler apparatus in correct positioning and carrying out the loading/unloading operation of tray to/from the tray loading station easily and safely.

In order to realize the above object of the present invention, the length of tray guide bar 15 is shorten compared to the length of tray adjust bar 25. Tray reference bar (50,51,52,53) is provided to form a whole body with the main base 80 of the handler apparatus over tray guide bar 15.

Therefore, when tray 90 is pushed up to the highest position by elevator 35, the positioning operation previously done by tray guide bar 15 is switched to be carried out by tray reference bar (50,51,52,53). At the positions corresponding to the height of tray reference bar (50,51,52,53), tray pusher 26 are provided in each tray adjust bar 25 in both X and Y direction. The highest tray 90 is pushed to tray reference bar (50,51,52,53) by the air compressed cylinder of tray pusher 26. Since tray reference bar (50,51,52,53) is installed to the main base 80 of handler apparatus to form a whole body, tray 90 can be precisely positioned with respect to the body of handler. In addition, since tray loading station can be pulled out together with tray 90, tray can loaded or unloaded under the pulled-out state. Therefore, when tray is loaded or unloaded, a broad space can be assured over tray loading station so that the operation of exchanging trays can be facilitated.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view showing one embodiment of tray loading station for handler apparatus according to the present invention.

Fig. 2 is a side view showing one embodiment of tray loading station for handler apparatus according to the present invention.

Fig. 3 is a perspective view of a tray loading station according to a first prior art example.

Fig. 4 is a side view of a tray loading station according to the first prior art example.

Fig. 5 is a plane view of elevator 35 for carrying tray 90.

Fig. 6 is a perspective view of a tray loading station according to a



second prior art example.

Fig. 7 is a side view of a tray loading station according to the second prior art example.

DETAILED DESCRIPTION OF THE INVENTION

An embodiment of the present invention is described below with reference to the accompanying drawings.

The tray loading station according to the present invention is shown in Fig. 1 and 2 wherein Fig. 1 shows a perspective view of one embodiment of the tray loading station, and Fig. 2 shows a side view of the embodiment of the tray loading station.

As shown in Fig. 1, tray guide bar 15 is arranged in X and Y two directions which is perpendicular to each other over tray slider base 5 where a plurality of trays 90 are placed. Tray adjust bar 25 pushes tray 90 against tray guide bar 15 in both X and Y direction and positions it, that is, carries out the positioning operation with respect to tray guide bar 15 over tray slider base 5.

Inside tray slider base 5, slider pack 6 is provided which is formed by rail for pulling out and pushing in the tray slider base 5. Therefore, tray slider base 5 can be pulled out to a position in front of handler so as to load or unload the carried tray 90.

In addition, the plane of elevator 35 for pushing up tray 90 up can be attached except the moving portion of tray adjust bar 25. That is to say, it has concave and convex planes a,b,c,d,e,f,g,h,i,j,k and l, and the planes d,e,f,g and i,j,k,l are for the movement of tray adjust bar 25. Therefore, tray 90 can be pushed up horizontally regardless of its size.

In the main base 80 of handler apparatus for picking up and attracting DUT, tray reference bar (50,51,52,53) are provided in both X and Y direction so as to determine the final position of tray 90.

As described above, tray 90 can be positioned by the use of guide bar 15 at first. Then, tray 90 can be pushed up by elevator 35. As shown in Fig. 2, the length of tray guide bar 15 is shorter compared to the length of tray adjust bar 25. Tray reference bar (50,51,52,53) is provided over tray guide bar 15.

When tray 90 is pushed up to the highest position by elevator 35, the positioning operation previously done by tray guide bar 15 is switched to be carried out by tray reference bar (50,51,52,53). At the

positions corresponding to the height of tray reference bar (50,51,52,53), tray pusher 26 are provided in each tray adjust bar 25 in both X and Y direction. The highest tray 90 is pushed to tray reference bar (50,51,52,53) by the air compressed cylinder of tray pusher 26. Since tray reference bars (50,51,52,53) are installed to the main base 80 of handler apparatus to form a whole body, tray 90 can be precisely positioned with respect to the body of handler.

As stated above, tray guide bar 15 has the function of positioning tray 90 to some extent, therefore, the use of expansive linear motion guide can be avoided.

In addition, since the only function of said tray reference bar is to ensure its position consistent with that of main base 80 of handler apparatus, it can be provided only in one direction between X and Y directions opposed to tray reference bar, or divided into several ones.

In addition, since the only function of said tray pusher 26 is to provide pressure pressing tray 90, it can also be formed by flexible material.

Since the present invention has the above—described structure, the following effects can be realized:

According the present invention, tray reference bar is provided in both X and Y direction of main base of the handler apparatus. For this reason, when tray is pushed up by elevator, its positioning operation is switched to be carried out by tray reference bar. As a result, tray can maintain in horizontal state and can be correctly positioned in both X and Y direction. The problems that DUT fails to enter its positioning pocket or the center of DUT can not be attracted will not occur. In addition, since tray loading station can be pulled out together with tray 90, tray can loaded or unloaded in the pulled—out state. Therefore, when tray is loaded or unloaded, a broad space can be assured over tray loading station so that the operation of exchanging trays can be facilitated. Further, because there is no moving portions of handler apparatus near tray loading station, operation can be carried out safely.

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CLAIMS

1. A tray loading station for handler apparatus, comprising a elevator (35) movable up and down where a plurality of trays (90) are placed overlappingly on a tray slider base (5), characterized in that:

slider pack (6) for pulling and pushing tray slider base (5);

a plurality of tray guide bar (15) provided on the two sides of said tray slider base (5) for determining the positions of trays (90);

tray adjust bar (25) movably provided on the other two sides of said tray slider base (5) for determining the position of tray (90) suitable to its shape and size;

tray reference bars (50,51,52,53) provided to form a whole body with the main base (80) of the handler apparatus over tray guide bar (15), for positioning the tray (90) which is pushed up by elevator (35) and transferred from tray guide bar (15) in two direction;

whereby the correct positioning operation can be carried out.

2. The tray loading station for handler apparatus according to claim 1, characterized in that tray pushers (26) formed of flexible material are attached to each of tray adjust bar (25) at the positions corresponding to the height of tray reference bar (50,51,52,53) opposed to the tray adjust bar, so as to correctly carry out the positioning operation. (25).

3. The tray loading station for handler apparatus according to claim 2, characterized in that said tray pusher (26) is a air compressed cylinder.

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