

WAFER CASSETTE HANDLE

FIELD OF THE INVENTION

The present invention relates generally to a handle, and particularly to a wafer cassette handle disposed on the outer surface of a wafer cassette.

BACKGROUND OF THE INVENTION

In a semiconductor production line, when wafers are processed, they will be loaded in a wafer cassette for storing dust-free and batch transiting to subsequent processes. In order to facilitate exerting force on wafer cassettes by manipulators or operators during transit, there are wafer cassette handles outside the wafer cassette and used as the point of force application by manipulators or operators.

Figure 1 shows the wafer cassette handle according to the prior art, which is disposed on a wafer cassette 1' having a bottom lid 10', an inner cassette 12' (in dashed lines), and a top lid 14'. The top lid 14' is disposed on the bottom lid 10' and thus forming an accommodating space 140'. The accommodating space 140' is contained in the inner cassette 12', which accommodates a plurality of wafers (not shown in the figure). The wafer cassette handle 2' according to the prior art is disposed in pairs and symmetrically on the outer surfaces of both sides of the top lid 14'. Each wafer cassette handle 2' comprises a body 20' and a grip part 22'. Two ends of the body 20' are connected with the top lid 14'; the grip part 22' is provided for manipulators or operators to hold and exerting force for moving the wafer cassette 1'. There is a recess 220' on the bottom surface of the grip part 22' of the wafer cassette handle 2' according to the prior art. The recess 220' is provided for operators to position their fingers while holding the grip part 22' and thus facilitating the operators to apply force and raise the wafer cassette 1'. Nonetheless, while holding the grip part 22' using a manipulator, because the sensing ability of the sensor at the front end of the manipulator is inferior for nonplanar structures, the recess 220' may cause bad sensing condition for the sensor in the manipulator. If the sensing result of the sensor in the manipulator is inaccurate, the manipulator cannot align to the grip part 22' correctly or the manipulator may slip off the grip part 22' while moving the wafer

cassette 1' and cause the wafer cassette 1' to fall and damage the plurality of wafers carried in the wafer cassette 1'. In addition, before holding, the manipulator cannot keep the correct distance with the grip part 22'. Hence, the manipulator may hit the grip part 22' and damage the wafer cassette handle 2' or the manipulator.

For solving the problem of bad sensing ability of the sensor at the front end of a manipulator, and thus influencing the transit flow of a wafer cassette 1', due to the recess 220' at the bottom of the grip part 22' while moving wafer cassettes 1' using a manipulator and the wafer cassette handle 2' according to the prior art, the present invention provide a wafer cassette handle disposed on an outer surface of a wafer cassette. The wafer cassette handle comprises a body and a grip part. A bottom surface of the grip part is flat. Thereby, when a manipulator holds the grip part bottom-up, the sensing ability of the sensor at the front end of the manipulator on the grip part is superior. Thereby, damages in the wafer cassette, the wafer cassette handle, the manipulator, or the wafers loaded in the wafer cassette due to errors in positioning or distance calculation can be avoided.

Furthermore, while moving the wafer cassette 1', because the wafer cassette 1' is pulled downwards by the gravity and the wafer cassette handle 2' is held upwards by mechanical or human force, stress occurs at the junction of the wafer cassette 1' and the wafer cassette handle 2' and inside the wafer cassette handle 2'. The stress may cause breakage at the junction of the wafer cassette 1' and the wafer cassette handle 2' or deformation of the wafer cassette handle 2'. Accordingly, the present further dispose at least a propping bump on the side of the body facing the wafer cassette. The propping bump can be against the outer surface of the wafer cassette and thus dispersing the stress and preventing the stress from damaging the junction of the wafer cassette and the wafer cassette handle 2' or the wafer cassette handle. Besides, because the contact area between the propping bump and the outer surface is relatively small, the friction area between the wafer cassette handle and the outer surface of the wafer cassette is reduced. Hence, damages caused by the friction on the wafer cassette handle and the outer surface of the wafer cassette can be decreased.

SUMMARY

An objective of the present invention is to provide a wafer cassette handle. The bottom surface of the grip part of wafer cassette handle is flat. When a manipulator raise the handle for moving the wafer cassette, the flat bottom surface can improve the sensing ability of the sensor at the front end of the manipulator and hence facilitating the manipulator to move the wafer cassette accurately and stably.

Another objective of the present invention is to provide a wafer cassette handle. Propping bumps contacting the wafer cassette are disposed on the body of the wafer cassette handle for dispersing the stress at the junction of the wafer cassette and the handle or inside the handle while raising the wafer cassette. Besides, the contact area between the handle and the wafer cassette can be reduced and thus decreasing the friction between the handle and the wafer cassette.

Still another objective of the present invention is to provide a wafer cassette handle. The grip part has a grip opening for accommodating the fingers of the operator. The grip opening has curved edges to match the fingers of the operator. By complying with ergonomics, the operators can transit the wafer cassette with ease.

For achieving the objectives described above, the present invention discloses a wafer cassette handle disposed on a wafer cassette and comprising a body and a grip part. The body is disposed on an outer surface of the wafer cassette and has a first surface and a second surface opposite to the first surface. In addition, the first surface faces the outer surface. The grip part is disposed on the second surface of the body and has a flat bottom surface.

Moreover, the present invention further discloses at lease a propping bump disposed on the first surface of the body and against the outer surface of the wafer cassette.

Furthermore, the grip part can have a grip opening. The grip opening can have at least a curved edge on a sidewall corresponding to the second surface of the body.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows an appearance view according to the prior art;

Figure 2 shows an appearance view of the wafer cassette according to the first

embodiment of the present invention;

Figure 3 shows a schematic diagram of the components of the wafer cassette according to the first embodiment of the present invention;

Figure 4 shows an appearance view according to the first embodiment of the present invention; and

Figure 5 shows a partial assembly diagram according to the first embodiment of the present invention.

DETAILED DESCRIPTION

In order to make the structure and characteristics as well as the effectiveness of the present invention to be further understood and recognized, the detailed description of the present invention is provided as follows along with embodiments and accompanying figures.

The wafer cassette handle according to the present invention has the following features. The flat bottom surface of the grip part improves the sensing ability of the sensor in manipulator. The body has at least a propping bump against the outer surface of the wafer cassette for dispersing stress and reducing the overall friction area. In addition, the grip part includes a grip opening for accommodating the fingers of operator and facilitating holding and applying force. The grip opening further has at least a curved edge for matching the fingers of operator and thus facilitating force application as well as relieving the burden of the fingers.

Figure 2 and Figure 3 show an appearance view and a schematic diagram of the components of the wafer cassette according to the first embodiment of the present invention. As shown in the figures, the wafer cassette handle 2 according to the present invention is disposed in a wafer cassette 1, which comprises a bottom lid 10, an inner cassette 12, and a top lid 14. The inner cassette 12 is disposed on the bottom lid 10 and includes a plurality of partitions 120. An accommodating layer 122 is formed between any two adjacent partitions 120. Each accommodating layer 122 can accommodate a wafer (not shown in the figure). The top lid 14 is disposed on the bottom lid 10 and forming an accommodating space 140. The accommodating space 140 accommodates the inner cassette 12. Besides, two wafer cassette handles 2 are

disposed symmetrically on both sides of an outer surface of the top lid 14.

By holding the two wafer cassette handles 2 using an manipulator or manually, the wafer cassette 1 can be transited. Accordingly, the plurality of wafers loaded in the wafer cassette 1 can be transited.

Please refer to Figures 3 to 5. Figure 4 and Figure 5 show an appearance view and a partial assembly diagram according to the first embodiment of the present invention. As shown in the figures, the present invention provides a wafer cassette handle 2 disposed in the wafer cassette 1 described above and comprising a body 20 and a grip part 22. The body 20 is disposed on the outer surface 142 of the top lid 14 of the wafer cassette 1 and has a first surface 200 and a second surface 202. The second surface 200 is opposite to the first surface 200. The first surface 200 faces the outer surface 142. The grip part 22 is disposed on the second surface 202 of the body 20.

The grip part 22 has a bottom surface 220, which is flat. When a manipulator holds the grip part 22 bottom-up for transiting the wafer cassette 1, because the bottom surface 220 is flat, the sensing ability of a sensor at the front of the manipulator on the bottom surface 220 is superior. Before the manipulator holds the grip part 22 upwards, the sensor needs to sense the bottom surface and position so that the manipulator can align to the grip part 22 and estimate the distance by which the manipulator needs to raise. The sensing ability of the sensor on the grip part 22 is inferior and the manipulator cannot align to the grip part 22, after the manipulator is raised, it can neither hold the grip part 22 nor transit the wafer cassette 1. Alternatively, the manipulator may hold the grip part 22. But a bad holding position may make the manipulator slip off the grip part 22 while moving the wafer cassette and the wafer cassette 1 falls down, which will damage the plurality of wafers loaded in the wafer cassette 1. In addition, the bad sensing ability of the sensor on the grip part 22 will also make the estimation of the distance between the manipulator and the grip part 22 wrong and drive the manipulator over raised. Consequently, the wafer cassette handle 2, the manipulator, or the sensor may be damaged by hits.

Moreover, the grip part 22 has grip opening 222. The grip opening 222 is connected with the second surface 202 of the body 20 and extending to the body 20.

When an operator holds the grip part 22 for transiting the wafer cassette 1, the grip opening 22 allows the fingers of the operator to pass through and accommodates the fingers. The rear four fingers of the operator can pass through the grip opening 222 bottom-up and touch the thumb, so that the operator can hold the grip part stably and raise the wafer cassette 1 with ease. Because the fingers of the operator clench, during the process of transiting the wafer cassette 1, the situation of fingers slipping off the wafer cassette handle 2, which cause the wafer cassette 2 to fall down, will hardly happen.

In addition, a plurality of curved edges 2222 are further disposed on a sidewall 2220 of the grip opening 222 corresponding to the second surface 202 of the body 20. The plurality of curved edges 2222 can be disposed according to the holding spot for the fingers of the operator. As shown in the figures, there are three curved edges 2222 in the grip opening 222. The plurality of curved edges 222 produce four recesses with respect to the curved projections, suitable for laying the rear four fingers of the operator. This structure complies with ergonomics and facilitates force application by the operator. Besides, the recessed and projective curves of the plurality of curved edges can match the fingers of the operator and thus relieving the burden caused by bearing the weight of the wafer cassette 1.

Furthermore, a fixing part 206 is disposed on each of the both ends of the body 20, respectively. The body 20 is fixed on the two installing parts 144 of the top lid 14 by the two fixing parts 206. The top lid 14 has four installing parts 144 located on each of the four corners of the top lid 14. Each installing part 144 is a trench formed by recessing the top lid 14 outside-in. The trench of the installing part 144 can match the shape of the fixing part 206 and assemble with the fixing part 206 by using a screw or other means. Thereby, when the manipulator or the operator transits the wafer cassette 1, support with stable strength can be provided.

Moreover, the wafer cassette handle 2 according to the present invention can further comprise at least a propping bump 204. As shown in the figures, two propping bumps 204 are disposed on the first surface 200 of the body 20. The two propping bumps 204 are against the outer surface 142 of the wafer cassette 1 and contact the outer surface 142. When the manipulator or operator holds the two wafer cassette

handles 2 for transiting the wafer cassette 1, by means of the contact between the two propping bumps 204 and the outer surface 142, the stress generated at the junction between the wafer cassette handle 2 and the outer surface 142 and inside the wafer cassette handle 2 by the downward gravity and the upward raising force can be dispersed. Thereby, the situation of the wafer cassette handle 2 coming off the outer surface 142 due to the damages by the stress at the junction between the wafer cassette handle 2 and the outer surface 142 can be prevented. Alternatively, deformation of the wafer cassette handle 2 by the stress can be avoided. In addition, the contact area between the propping bumps 204 and the outer surface is relatively small, which reduces the friction area between the wafer cassette handle 2 and the outer surface 142. Thereby, damages in the wafer cassette handle 2 and in the outer surface 142 caused by friction can be prevented.

To sum up, the present invention provides a wafer cassette handle, which comprises a body and a grip part. By using a flat bottom surface of the grip part, the sensing ability of the sensor of the manipulator on the grip part is improved. In addition, by using at least a propping bump disposed on the body, the stress in the wafer cassette handle and at the junction between the wafer cassette handle and the wafer cassette can be dispersed and the friction between the wafer cassette handle and the wafer cassette can be reduced for avoiding falling down, deformation, or wear of the wafer cassette. By using the present invention, the drawbacks of the wafer cassette handle according to the prior art can be improved. Thereby, the present invention provides a wafer cassette handle facilitating sensing ability for the sensor of a manipulator and avoiding damages by stress or friction,

Accordingly, the present invention conforms to the legal requirements owing to its novelty, nonobviousness, and utility. However, the foregoing description is only embodiments of the present invention, not used to limit the scope and range of the present invention. Those equivalent changes or modifications made according to the shape, structure, feature, or spirit described in the claims of the present invention are included in the appended claims of the present invention.

CLAIMS

1. A wafer cassette handle, disposed in a wafer cassette, and comprising:
a body, disposed on an outer surface of said wafer cassette, having a first surface and a second surface opposite to said first surface, and said first surface facing said outer surface; and
a grip part, disposed on said second surface of said body, said grip part having a bottom surface, and said bottom surface being flat.
2. The wafer cassette handle of claim 1, wherein said first surface of said body further has at least a propping bump against said outer surface of said wafer cassette.
3. The wafer cassette handle of claim 1, wherein said grip part has a grip opening.
4. The wafer cassette handle of claim 3, wherein a sidewall of said grip opening corresponding to said second surface of said body has at least a curved edge.
5. The wafer cassette handle of claim 3, wherein said grip opening is connected with said second surface of said body and extending to said body.
6. The wafer cassette handle of claim 1, wherein each of the both ends of said body has a fixing part, respectively, and said two fixing parts are fixed to two installing parts of said wafer cassette parts.
7. A wafer cassette handle, disposed in a wafer cassette, and comprising:
a body, disposed on an outer surface of said wafer cassette, having a first surface and a second surface opposite to said first surface, said first surface facing said outer surface, and said first surface of said body having at least a propping bump against said outer surface of said wafer cassette; and
a grip part, disposed on said second surface of said body.

8. The wafer cassette handle of claim 7, wherein said grip part has a grip opening.
9. The wafer cassette handle of claim 8, wherein a sidewall of said grip opening corresponding to said second surface of said body has at least a curved edge.
10. The wafer cassette handle of claim 9, wherein said grip opening is connected with said second surface of said body and extending to said body.
11. The wafer cassette handle of claim 7, wherein each of the both ends of said body has a fixing part, respectively, and said two fixing parts are fixed to two installing parts of said wafer cassette parts.