

semiconductor die 15 coincide with each other, and the center position D of the semiconductor die 15 sucked by the bonding tool 21 is on the Z directional center line 22z of the bonding head 20.

[0027]

5 As shown in (a) of Fig. 2, at the first position, the position C(x, y) of the optical axis 26z of the camera 25 coincides with the center position S(x, y) of the bonding region. At the first position, the center line 32a of the camera-side encoder head 32 is at a position of an N-th graduation on the linear scale 33. Data indicating that the center line 32a of the camera-side encoder head 32 is at the position of the N-th graduation on
10 the linear scale 33 is input to the control unit 50 from the camera-side encoder head 32. Next, the control unit 50 moves the base 10 in the X direction using the linear motor 12 shown in Fig. 1. At this time, the control unit 50 detects data of a graduation on the linear scale 33 using the bonding head-side encoder head 31. Then, the control unit 50 moves the base 10 in the X direction until the graduation on the linear scale 33 detected
15 by the bonding head-side encoder head 31 reaches the position of the N-th graduation. As shown in (b) of Fig. 2, when the graduation on the linear scale 33 detected by the bonding head-side encoder head 31 reaches the position of the N-th graduation, the graduation on the linear scale 33 for the center line 22z of the bonding head 20 and the center position D of the semiconductor die 15 are located at the position of the N-th
20 graduation, that is, the center position S of the bonding region. In this manner, the mounting device 100 of the present embodiment can make the center position D of the semiconductor die 15 coincide with the center position S of the bonding region.

[0028]

 In (a) of Fig. 2 and (b) of Fig. 2, a linear scale 33' and graduations 34' indicated
25 by broken lines show a state in which the linear scale 33 and graduations 34 are

thermally expanded. When the linear scale 33 is thermally expanded, the position of the graduation detected by the camera-side encoder head 32 at the first position is N' . Then, the control unit 50 moves the base 10 in the X direction until the graduation on the linear scale 33 detected by the bonding head-side encoder head 31 reaches the position of the N' -th graduation. Thus, the graduation on the linear scale 33 for the center position D of the semiconductor die 15 can be adjusted to the position of the N' -th graduation, that is, the center position S of the bonding region.

[0029]

As described above, even when the linear scale 33 is thermally expanded, the mounting device 100 of the present embodiment can adjust the center position D of the semiconductor die 15 to the center position S of the bonding region without calibrating the predetermined interval ΔH which is the offset distance.

[0030]

(a) of Fig. 3 and (b) of Fig. 3 show a case in which the base 10 is thermally expanded in the X direction. In (a) of Fig. 3 and (b) of Fig. 3, a semiconductor die 15', a bonding head 20', a bonding tool 21', a center line 22z', a bonding head-side encoder head 31', and a center line 31a' indicated by broken lines show a state in which the semiconductor die 15, the bonding head 20, the bonding tool 21, the center line 22z, the bonding head-side encoder head 31, and the center line 31a are thermally expanded. As shown in (a) of Fig. 3, at the first position, the position C(x, y) of the optical axis 26z of the camera 25 coincides with the center position S(x, y) of the bonding region. At the first position, the center line 32a of the camera-side encoder head 32 is at the position of the N-th graduation on the linear scale 33. At this time, the center line 22z' of the bonding head 20' is located at a position away from the optical axis 26z of the camera 25 by a predetermined interval $\Delta H'$ in the X direction.

[0031]

As described with reference to (b) of Fig. 2, the control unit 50 moves the base 10 in the X direction until the graduation on the linear scale 33 detected by the bonding head-side encoder head 31' reaches the position of the N-th graduation. Then, the graduation on the linear scale 33 for the center position D of the semiconductor die 15' is located at the position of the N-th graduation, that is, the center position S of the bonding region. In this manner, even when the base 10 is thermally expanded, the mounting device 100 of the present embodiment can adjust the center position D of the semiconductor die 15' to the center position S of the bonding region without calibrating the predetermined interval $\Delta H'_z$ which is the offset distance.

[0032]

<Actual operation of mounting device>

The configuration in which, in Figs. 2 and 3, the first position is the position where the position C(x, y) of the optical axis 26z of the camera 25 coincides with the center position S(x, y) of the bonding region, the center position BH of the bonding tool 21 and the center position D of the semiconductor die 15 coincide with each other, and the center position D of the semiconductor die 15 sucked by the bonding tool 21 is on the center line 22z of the bonding head 20 has been described. However, actually, at the first position, there is a deviation between the position C of the optical axis 26z of the camera 25 and the center position S of the bonding region, and there is also a deviation between the center position D of the semiconductor die 15 sucked by the bonding tool 21 and the center position BH of the bonding tool 21. Accordingly, an actual operation (a method for mounting an electronic component) of the mounting device 100 will be described next with reference to Figs. 4 to 6.

25 [0033]

As shown in step S101 in Fig. 4, the control unit 50 moves the bonding head 20 upward to a wafer holder or an intermediate stage (not shown), causes the bonding tool 21 to suck the semiconductor die 15 to pick up the semiconductor die 15, and holds the semiconductor die 15 using the bonding tool 21 (a holding step).

30 [0034]

the base 10 is moved to a position where the position of the center line 31a of the bonding head-side encoder head 31 reaches the position of the target graduation N2, that is, the position where the position of the graduation on the linear scale 33 detected by the bonding head-side encoder head 31 reaches the position of the target graduation N2 (a positioning step). Thus, the center position $D(x)$ of the semiconductor die 15 can coincide with the center position $S(x)$ of the bonding region. Here, the difference in graduation between the position of the graduation N on the linear scale 33 for the position $C(x, y)$ where the optical axis 26z of the camera 25 was previously located and the position of the target graduation N2 is a correction amount P_x of the position of the base 10.

[0052]

Further, at the same time, the control unit 50 moves the base 10 downward in the Y direction by $(\Delta C(y) - \Delta BH(y))$. Thus, the center position $D(x, y)$ of the semiconductor die 15 can coincide with the center position $S(x, y)$ of the bonding region.

[0053]

According to the operation referring to Fig. 8, since one operation in the X direction can cause the center position $D(x)$ of the semiconductor die 15 to coincide with the center position $S(x)$ of the bonding region, positioning can be performed at a higher speed than that of the operation described with reference to Fig. 4. Further, with this operation, the bonding can also be performed by adjusting the center position D of the semiconductor die 15 to the center position S of the bonding region without calibrating the predetermined interval ΔH that is the offset distance.

[0054]

Fig. 10 shows the operation of Fig. 8, in which, similar to the operation shown in Fig. 7, the lower camera 40 does not detect the position difference $\Delta BH(x, y)$ between