Description

Title of Invention: DIE BONDING DEVICE, SETTING METHOD OF BOND COORDINATES, AND MANUFACTURING METHOD OF SEMICONDUCTOR DEVICE

Technical Field

[0001]

The present disclosure relates to a die bonding device, and is applicable, for example, to a die bonder which bonds a plurality of dice to one product area of a substrate.

Background Art

[0002]

As one step in a manufacturing process of a semiconductor device, a die separated from a wafer is picked up by a die bonding device (semiconductor manufacturing device) such as a die bonder, and the picked-up die is bonded to a substrate. Device regions are provided in a matrix on a device mounting surface of a substrate, and a plurality of semiconductor chips (dice) are die-bonded to each device region (for example, Japanese Unexamined Patent Application Publication No. 2010-225956).

Citation List

Patent Literature

[0003]

PTL 1: Japanese Unexamined Patent Application Publication No. 2010-225956

Summary of Invention

Technical Problem

[0004]

The position where the die is to be bonded (bond coordinates) is set in advance. When there are a plurality of bond coordinates to be set, it is time consuming for an operator to manually input all the bond coordinates.

[0005]

An object of the present disclosure is to provide a technique capable of reducing the effort required for setting bond coordinates. Objects and novel features other than the above will be apparent from the description of the present specification and accompanied drawings.

Solution to Problem

[0006]

Among this disclosure, a typical one of summary is briefly described as follows.

That is, a die bonding device includes a display device displaying a bond coordinate setting screen that has: a first display window displaying an image of a substrate; a second display window displaying images of a plurality of dice; a third display window capable of inputting and outputting bond coordinates of a base die bonded to a surface of the substrate; and a fourth display window capable of inputting and outputting bond coordinates of a die bonded offset to the base die.

Advantageous Effects of Invention

[0007]

According to the present disclosure, it is possible to provide a technique capable of reducing the effort required for setting bond coordinates.

Brief Description of Drawings

[0008]

FIG. 1 is a schematic top view illustrating a configuration example of a die bonder according to an embodiment.

FIG. 2 is a view describing a schematic configuration as viewed from the direction of an arrow A in FIG. 1.

FIG. 3 is a block diagram illustrating a schematic configuration of a control system of the die bonder illustrated in FIG. 1.

FIG. 4 is a flowchart illustrating a method of manufacturing a semiconductor device using the die bonder illustrated in FIG. 1.

FIG. 5 is a view illustrating an example of a stacked bond pattern.

FIG. 6 is a view illustrating another example of a stacked bond pattern.

FIG. 7 is a view illustrating a monitor screen according to the embodiment.

FIG. 8 is a flowchart illustrating the operation of setting bond coordinates in the embodiment.

FIG. 9 is a flowchart illustrating the operation of setting XY coordinates in Step S15 illustrated in FIG. 8.

FIG. 10 is a flowchart illustrating the operation of setting Z coordinates in Step S15 illustrated in FIG. 8.

FIG. 11 is a flowchart illustrating the operation of setting θ coordinates in Step S15 illustrated in FIG. 8.

FIG. 12 is a view (part 1) illustrating an example of a screen displayed in accordance with the flow of the operations illustrated in FIG. 8.

FIG. 13 is a view (part 2) illustrating an example of a screen displayed in accordance with the flow of the operations illustrated in FIG 8.

FIG. 14 is a view (part 3) illustrating an example of a screen displayed in accordance with the flow of the operations illustrated in FIG. 8.

FIG. 15 is a view (part 4) illustrating an example of a screen displayed in accordance with the flow of the operations illustrated in FIG. 8.

FIG. 16 is a view (part 1) illustrating another example of a screen displayed in accordance with the flow of the operations illustrated in FIG. 8.

FIG. 17 is a view (part 2) illustrating a further example of a screen displayed in accordance with the flow of the operations illustrated in FIG. 8.

FIG. 18 is a view (part 3) illustrating a still further example of a screen displayed in accordance with the flow of the operations illustrated in FIG. 8.

FIG. 19 is a view (part 4) illustrating a still further example of a screen displayed in accordance with the flow of the operations illustrated in FIG. 8.

Description of Embodiments

[0009]

An embodiment will be described below with reference to the drawings. It should be noted that in the following description, the same components are indicated by the same reference numerals, and the repeated description thereof may be omitted. It should be noted that to make the description more clearly, the drawings may

be schematically represented for the widths, thicknesses, shapes, and the like of the respective portions as compared with the actual form. In addition, also between a plurality of mutual drawings, the dimension relationships between the respective elements, the ratios between the respective elements, and the like do not always coincide with each other.

[0010]

The configuration of a die bonder which is an embodiment of a semiconductor manufacturing device will be described with reference to FIGS. 1 and 2. FIG. 1 is a schematic top view illustrating a configuration example of a die bonder according to an embodiment. FIG. 2 is a view describing a schematic configuration when viewed from the direction of an arrow A in FIG. 1.

[0011]

The die bonder 1 roughly includes a wafer supply section 10, a pick-up section 20, an intermediate stage section 30, a bonding section 40, a transport section 50, a substrate supply section 60, a substrate delivery section 70, and a controller 80. A Y2-Y1 direction is the front-rear direction of the die bonder 1, an X2-X1 direction is the left-right direction, and a Z1-Z2 direction is the up-down direction. The wafer supply section 10 is disposed on the front side of the die bonder 1, and the bonding section 40 is disposed on the rear side thereof.

[0012]

The wafer supply section 10 includes a wafer cassette lifter 11, a wafer holding table 12, a peeling unit 13, and a wafer recognition camera 14.

[0013]

The wafer cassette lifter 11 moves a wafer cassette (not illustrated) in which a plurality of wafer rings WR are stored, up and down to a wafer transport height. A wafer correction chute (not illustrated) aligns the wafer ring WR supplied from the wafer cassette lifter 11. A wafer extractor (not illustrated) extracts the wafer ring WR from the wafer cassette and supplies it to the wafer holding table 12, or extracts the same from the wafer holding table 12 and stores it in the wafer cassette.

[0014]

A wafer W is adhered (attached) onto a dicing tape DT, and the wafer W is divided into a plurality of dice D. The dicing tape DT is held by the wafer ring WR. The wafer W is, for example, a semiconductor wafer, and the die D is a semiconductor chip. A film-like adhesive material DF called a die attach film (DAF) is attached between the wafer W and the dicing tape DT. The adhesive material DF is cured by heating.

[0015]

The wafer holding table 12 is moved in an X1-X2 direction (X direction) and a Y1-Y2 direction (Y direction) by an unillustrated drive section, and move the die D to be picked up to the position of the peeling unit 13. Further, the wafer holding table 12 rotates the wafer ring WR within an XY plane by the unillustrated drive section. The peeling unit 13 is moved up and down by the unillustrated drive section. The peeling unit 13 peels off the die D from the dicing tape DT.

[0016]

The wafer recognition camera 14 grasps the pick-up position

of the die D to be picked up from the wafer W and inspects the surface of the die D.

[0017]

The pick-up section 20 includes a pick-up head 21 and a Y drive unit 23. The pick-up head 21 is provided with a collet 22 which sucks and holds the peeled die D at its tip. The pick-up head 21 picks up the die D from the wafer supply section 10 and places it on an intermediate stage 31. The Y drive unit 23 moves the pick-up head 21 in the Y1-Y2 direction. The pick-up section 20 has respective drive units (not illustrated) which raise and lower, rotate, and move the pick-up head 21 in the X direction.

[0018]

The intermediate stage section 30 includes an intermediate stage 31 on which the die D is placed, and a stage recognition camera 34 for recognizing the die D on the intermediate stage 31. The intermediate stage 31 has a suction hole which adsorbs the placed die D. The placed die D is temporarily held on the intermediate stage 31. The intermediate stage 31 is a placement stage on which the die D is placed, and also a pick-up stage on which the die D is picked up.

[0019]

The bonding section 40 includes a bond head 41, a Y drive unit 43, a substrate recognition camera 44, and a bond stage 46. The bond head 41 is provided with a collet 42 which adsorbs and holds the die D at it tip. The Y drive unit 43 moves the bond head 41 in the Y1-Y2 direction. The substrate recognition camera 44 captures an image of a position recognition mark (for example, a position reference point illustrated in FIG. 5) on the

substrate S, and recognizes a bond position. Here, a plurality of product areas (hereinafter referred to as package areas P) which will ultimately become one package are formed on the substrate S. A position recognition mark is provided for each package area P. When the die D is placed on the substrate S, the bond stage 46 is raised and supports the substrate S from below. The bond stage 46 has a suction port (not illustrated) for vacuum-adsorbing the substrate S, and is capable of fixing the substrate S. The bond stage 46 has a heating portion (not illustrated) for heating the substrate S. The bonding section 40 has drive units (not illustrated) which raise and lower, rotate and moves the bond head 41 in the X direction.

[0020]

With this configuration, the bond head 41 corrects the pick-up position and posture, based on the imaged data of the stage recognition camera 34 and picks up the die D from the intermediate stage 31. Then, the bond head 41 bonds on the package area P of the substrate S based on the imaged data of the substrate recognition camera 44, or bonds in a stacked form on the die already bonded on the package area P of the substrate S.

[0021]

The transport section 50 includes transport claws 51 which grip and transport the substrate S, and a transport lane 52 along which the substrate S moves. The substrate S is moved in the X1 direction by driving an unillustrated nut of the transport claw 51 provided on the transport lane 52 by an unillustrated ball screw provided along the transport lane 52. With this configuration, the substrate S moves from the substrate supply

section 60 to the bond position along the transport lane 52, and after bonding, moves to the substrate delivery section 70 and passes the substrate S to the substrate delivery section 70.

[0022]

The substrate supply section 60 removes the substrate S which has been stored in a transport jig and carried in, from the transport jig and supplies it to the transport section 50. The substrate delivery section 70 stores the substrate S transported by the transport section 50 in a transport jig.

[0023]

Next, the controller 80 will be described with reference to FIG. 3. FIG. 3 is a block diagram illustrating a schematic configuration of the control system of the die bonder illustrated in FIG. 1.

[0024]

The control system 8 includes the controller 80, a drive unit 86, a signal unit 87, and an optical system 88. The controller 80 is configured as a computer including, broadly, a control/arithmetic unit 81 mainly comprised of a CPU (Central Processing Unit), a storage device 82, an input/output device 83, a bus line 84, and a power supply unit 85. The storage device 82 has a main storage device 82a and an auxiliary storage device 82b. The main storage device 82a is comprised of a RAM (Random Access Memory) which stores a processing programs and the like. The auxiliary storage device 82b is comprised of a hard disk drive (HDD) or a solid state drive (SSD) which stores control data and image data necessary for control. Further, the controller 80 can be connected with an external storage device.

The control/arithmetic device 81 and the storage device 82 are also referred to as a control device.

[0025]

The input/output device 83 includes a monitor (display device) 83a which displays a device state, information, etc., an input device 83b such as a touch panel or a keyboard for inputting operator instructions, a mouse 83c for operating the monitor 83a, and an image capturing device 83d which captures image data from the optical system 88. The input/output device 83 further includes a motor control device 83e and an I/O signal control device 83f. The motor control device 83e controls an XY table (not illustrated) of the wafer supply section 10, a ZY drive shaft of a bond head table, a drive part of the peeling unit 13, and the like. The I/O signal control device 83f takes in or controls signals from the signal unit 87 which includes various sensors, switches for controlling the brightness of lighting devices or the like, and volumes. The optical system 88 includes a wafer recognition camera 14, a stage recognition camera 34, and a substrate recognition camera 44. The control/arithmetic device 81 takes in necessary data via the bus line 84, performs calculations thereof, controls the pick-up head 21 and the like, and sends information to the monitor 83a and the like.

[0026]

The controller 80 stores image data captured by the wafer recognition camera 14, the stage recognition camera 34, and the substrate recognition camera 44 in the storage device 82 via the image capturing device 83d. Using software programmed based on

the stored image data, the control/arithmetic device 81 determines the positions of the die D and the package area P of the substrate S, and performs a visual inspection of the die D and the substrate S. Based on the positions of the die D and the package area P of the substrate S calculated by the control/arithmetic device 81, the drive unit 86 is operated by the software via the motor control device 83e. By this process, the die on the wafer is positioned, and the Y drive unit 23 and the Y drive unit 43 are operated to bond the die D onto the package area P of the substrate S.

[0027]

The controller 80 can be configured by installing the above-described programs stored in the external storage device 89 into a computer. The external storage device 89 includes, for example, an HDD, a USB memory, an SSD, etc. The auxiliary storage device 82b and the external storage device 89 are configured as computer-readable recording media. Hereinafter, these are also collectively simply called recording media. In the present specification, when the term “recording medium” is used, it may include only the auxiliary storage device 82b, or only external storage device 89 alone, or it may include both of them. Incidentally, the provision of programs and data to the computer and the provision of programs and data from the computer to an external device may be performed using communication means such as Internet or a dedicated line, without using the external storage device 89.

[0028]

A part of a manufacturing process of a semiconductor device

using the die bonder 1 (a method of manufacturing a semiconductor device) will be described with reference to FIG. 4. FIG. 4 is a flowchart illustrating a method of manufacturing a semiconductor device using the die bonder illustrated in FIG. 1. In the following description, the operation of each component which constitutes the die bonder 1 is controlled by the controller 80.

[0029]

(Wafer Carry-In Process: Step S1)

A wafer cassette (not illustrated) having a wafer ring WR stored therein is placed into the wafer cassette lifter 11. The wafer supply section 10 removes the wafer ring WR from the wafer cassette in which the wafter ring WR is loaded, and carries it onto the wafer holding table 12.

[0030]

(Substrate Carry-In Process: Step S2)

The transport jig having stored the substrate S is inserted into the substrate supply section 60. The substrate supply section 60 takes out the substrate S from the transport jig. The removed substrate S is carried into the bonding section 40 via the transport section 50.

[0031]

(Pick-Up Process: Step S3)

After Step S1, the wafer holding table 12 is moved so that a desired die D can be picked up from the dicing tape DT. The die D is photographed by the wafer recognition camera 14, and the die D is positioned and its surface is inspected on the basis of the image data acquired by photographing. By performing image processing on the image data, the amount of deviation (in the X,

Y, and θ directions) of the die D on the wafer holding table 12 from a die position reference point of the die bonder is calculated, and thereby positioning is carried out. Note that the die position reference point is held in advance at a predetermined position of the wafer holding table 12 as an initial setting for the device. The image data is subjected to image processing to perform surface inspection of the die D.

[0032]

The positioned die D is peeled off from the dicing tape DT by the peeling unit 13 and the pick-up head 21. The die D peeled off from the dicing tape DT is adsorbed to and held by the collet 22 provided on the pick-up head 21, and is transported to and placed on the intermediate stage 31.

[0033]

The die D on the intermediate stage 31 is photographed by the stage recognition camera 34, and the positioning and surface inspection of the die D are carried out based on the image data acquired by photographing. By performing image processing on the image data, the amount of deviation (X, Y, and θ directions) of the die D on the intermediate stage 31 from the die position reference point of the die bonder is calculated, and thereby positioning is performed. Note that the die position reference point is held in advance at a predetermined position of the intermediate stage 31 as an initial setting for the device. The image data is subjected to image processing to perform surface inspection of the die D.

[0034]

The pick-up head 21 having transported the die D to the

intermediate stage 31 is returned to the wafer supply section 10. According to the above-described procedure, the next die D is peeled off from the dicing tape DT, and thereafter, the dice D are peeled off one by one from the dicing tape DT according to the same procedure.

[0035]

(Bond Process: Step S4)

The substrate S is transported to the bond stage 46 by the transport section 50. The substrate S placed on the bond stage 46 is imaged by the substrate recognition camera 44, and the substrate S is positioned and its surface is inspected based on the image data acquired by imaging. With the image data subjected to image processing, the amount of deviation (X, Y, and θ directions) of the substrate S from the substrate position reference point of the die bonder 1 is calculated. Note that the substrate position reference point is held in advance at a predetermined position of the bonding section 40 as an initial setting for the device. The image data is subjected to image processing, whereby the surface inspection of the substrate S is performed.

[0036]

The suction position of the bond head 41 is corrected from the amount of deviation of the die D on the intermediate stage 31 calculated in Step S3, and the die D is adsorbed by the collet 42. The bond head 41 having adsorbed the die D from the intermediate stage 31 bonds the first-layer die D to a predetermined location on the substrate S supported by the bond stage 46. The die D bonded to the substrate S is photographed by

the substrate recognition camera 44, and a visual inspection as to whether the die D has been bonded to the desired position is performed based on the image data acquired by photographing. In other words, the visual inspection is an inspection of the relative position between the die D and the substrate S (inspection of whether the mounting position and direction fall within a tolerance range).

[0037]

The bond head 41 having bonded the die D to the substrate S is returned to the intermediate stage 31. According to the above-mentioned procedure, the second-layer die D is picked up from the intermediate stage 31 and bonded onto the first-layer die D, and then a visual inspection is carried out. This is repeated until all the dice D are stacked and bonded in one package area P.

[0038]

Once the stacking of the dice D into one package area P is completed, stacking bonding to another package area P in the substrate S is carried out. This is repeated until the dice D are stacked and bonded to all the package areas P of the substrate S.

[0039]

(Substrate Delivery Process: Step S5)

The substrate S with the die D bonded thereto is delivered to the substrate delivery section 70. At the substrate delivery section 70, the substrate S is removed from the transport claws 51 and stored in the transport jig. The transport jig in which the substrate S is stored is carried out from the die bonder 1.

[0040]

As described above, the die D is stacked on the substrate S

and is carried out from the die bonder 1. Thereafter, for example, the transport jig storing the substrate S therein on which the die D is stacked is transported to a wire bonding process, and the electrodes of the die D are electrically connected between the electrodes of the stacked dice D or to the electrodes of the substrate S via Au wires or the like. Then, the substrate S is transported to a molding process, where the stacked die D and the Au wires are sealed with a molding resin (not illustrated), thereby completing a semiconductor package.

[0041]

The stacking bond of the die D will be described with reference to FIGS. 5 and 6. FIG. 5 is a view illustrating an example of a stacked bond pattern. FIG. 6 is a view illustrating another example of a stacked bond pattern.

[0042]

The substrate S is comprised of, for example, a wiring substrate. As illustrated in FIG. 1, the substrate S has a plurality of package areas P, which are arranged in a matrix. In the package area P, a plurality of dice D are mounted in a stacked manner. FIG. 1 illustrates an example in which three package areas are arranged in a column direction (Y direction) and five package areas are arranged in a row direction (X direction), for a total of 15 package areas P.

[0043]

As illustrated in FIG. 5, in the vicinity of the corners of each package area P on the main surface (device surface) of the substrate S illustrated in FIG. 1, there are a pair of reference points or refence patterns for recognizing the positions on the

substrate S, that is, a first position reference point Pa and a second position reference point Pb. The first position reference point Pa and the second position reference point Pb are also collectively referred to as a substrate recognition mark.

[0044]

As illustrated in FIG. 5, each die D forms a rectangle and has a main surface with four sides on its outer edge. The main surface has, for example, a first area CA in which a memory circuit and the like are formed, and a second area PA in which a plurality of pads being external terminals of the die D are formed. Further, the second area PA of each die D is arranged, for example, on one of the four short sides of the main surface. All the dice D in each row are of the same type. All the dice D are similarly arranged even in a pad array. Here, the patterns at the corners of the die D are a pair of reference points or reference patterns for die position recognition, i.e., a first position reference point Da and a second position reference point Db (including a registered recognition pattern). The first position reference point Da and the second position reference point Db are together called a die recognition mark.

[0045]

As illustrated in FIG. 5, the package area P has two device regions P1 and P2. The device region P2 is disposed on the X1 side of the device region P1. The die D stacked and bonded in the device region P2 is arranged on the Y1 side of the die D stacked and bonded in the device region P1.

[0046]

For example, as illustrated in FIG. 5 as one example, the

multiple dice D are stacked as follows. In each of the device regions P1 and P2, the die D is arranged such that the short side on the side in which the second region PA is arranged extends along the X direction, and the second region PA is arranged on the Y2 side of the first region CA. The dice D are stacked in sequence along the X1 and Y1 directions while the positions of the multiple dice D are offset at predetermined intervals. That is, the dice D are stacked in a stepped manner.

[0047]

As another example, as illustrated in FIG. 6, multiple dice D are stacked as follows. In the device region P1, stacking and bonding are performed in a manner similar to FIG. 5. In the device region P2, the die D is arranged such that the short side on the side in which the second region PA is arranged extends along the Y direction, and the second region PA is arranged on the X1 side of the first region CA. The die D in the second region PA is arranged with rotated 90 degrees counterclockwise in the horizontal direction with respect to the die D in the first region CA. The dice D are stacked in sequence along the X2 and Y2 directions while the positions of the multiple dice D are offset at predetermined intervals.

[0048]

In the storage device 82, a planned position (bond coordinates) for mounting the die D is set and registered in advance based on position data of the recognition mark (for example, information in the X direction, Y direction, and θ direction). The die D is mounted based on this planned mounting position data (bond coordinate data).

[0049]

As described above, since the die D is stacked in the stepped manner in the stacking bonding, it is necessary to set the bond coordinates of the die D for each layer. First, the monitor screen used for setting the bond coordinates will be described with reference to FIG. 7. FIG. 7 is a view illustrating the monitor screen in the embodiment.

[0050]

The bond coordinates are set using a screen displayed on the monitor 83a illustrated in Fig. 7. This monitor screen is called a bond coordinate setting screen 100. The bond coordinate setting screen 100 has a first display window 101, a second display window 102, a third display window 103, and a fourth display window 104. The monitor 83a is capable of performing drag and drop (DnD) which is one operation of a graphical user interface.

[0051]

In FIG. 7, an image of a package area P on a substrate S is displayed in the display window 101. An image of the die D to be bonded is displayed in the display window 102. In FIG. 7, ten dice D are illustrated as an example. The image of each die D is displayed with a number attached thereto. The numbers attached to the dice D indicate the order of bonding. The position where the displayed die D is to be bonded in the package area P in the display window 101 can be specified by the DnD operation. The DnD-operated die D can be rotated **based** on the θ coordinate of the display window 103 and the offset in the θ direction of the display window 104.

[0052]

The display window 103 displays the number of a base die (base number (Base No.) and the bond coordinates (X, Y, Z, and θ) of the base die. The display window 103 is also capable of input operation via the input device 83b by an operator operating the mouse 83c to move the pointer and click. Here, the base die is a die D bonded to the surface of the package area P of the substrate S. The origin (O) of the coordinates is the center position of the package area P. Further, the position of the center of the DnD-operated die D is detected as bond coordinates.

[0053]

The display window 104 displays the numbers (Nos.) of the stacked dice and the bond coordinates of the stacked dice. Here, the bond coordinates of the stacked dice are expressed by an offset in the X direction (offset X), an offset in the Y direction (offset Y), an offset in the Z direction (offset Z), and an offset in the θ direction (θ). The display window 104 is also capable of input operation via the input device 83b by the operator operating the mouse 83c to move the pointer and click. Here, the stacked die is a die D which is bonded on the upper surface of the base die or the die stacked on the base die. Further, the difference between the coordinates of the center position of the DnD-operated die D and the bond coordinates of the base die is detected as an offset.

[0054]

Note that the offset in the X direction is an offset relative to the X coordinate of the base die, the offset in the Y direction is an offset relative to the Y coordinate of the base

die. The offset in the Z direction is an offset relative to the surface of the substrate S, i.e., the Z coordinate. The offset in the θ direction is an offset relative to the Y direction of the substrate S, i.e., the θ coordinate.

[0055]

The operation of setting the bond coordinate by the controller 80 will be described with reference to FIG. 8. FIG. 8 is a flowchart illustrating the operation of setting bond coordinates in the embodiment.

[0056]

(Step S11)

According to an operator’s instruction, the controller 80 acquires tab information such as the shape and size of the package area P from the substrate S and stores it in the storage device 82, and displays an image (picture) of the package area P of the substrate S in the display window 101 on the basis of the acquired tab information.

[0057]

(Step S12)

In response to an instruction from the operator, the controller 80 reads bond coordinates from a CAD (Computer Aided Design) drawing or a product image and stores the same in the storage device 82. Here, the CAD drawing draws a diagram of a die D to be bonded to the substrate S. The product image is an image of a substrate S and a die D bonded to the substrate S. The bond coordinates are calculated by reading CAD drawings or product images as text data or binary data. Incidentally, there are cases in which the bond coordinates are not read.

[0058]

When the operator determines that the bond coordinates read in Step S12 are used (YES), the operation flow proceeds to Step S13. When the operator determines that the bond coordinates are not used (NO), the operation flow proceeds to Step S14. Incidentally, when the bond coordinates are not read in Step S12, it is determined that the read bond coordinates are not used.

[0059]

(Step S13)

The controller 80 inputs (sets) the bond coordinates read in Step S12 into the coordinate table of the storage device 82 and also reflects the same in the image in the display window 101. In other words, the controller 80 displays an image of the die in the position of the display window 101 which corresponds to the bond coordinates, and also displays the bond coordinates in the display windows 103 and 104.

[0060]

(Step S14)

The operator performs a DnD operation on the die D displayed in the display window 102 to the package area P displayed in the display window 101. The controller 80 displays the DnD-operated die D in the display window 101.

[0061]

(Step S15)

The controller 80 inputs (automatically inputs) bond coordinates into the coordinate table based on the position of the die subjected to the DnD operation, and displays the same in the display windows 101, 103, and 104. The details will be

described later with reference to FIGS. 9 to 11.

[0062]

The operator determines whether creation (input, setting) of the coordinate table of the bond coordinates of all dice to be bonded is completed. When the creation is completed (YES), the operation flow proceeds to the next step. When the creation is not completed (NO), the operation flow returns to Step S14.

[0063]

When the creation is completed, the operator determines whether or not to compare the bond coordinates read in Step S12 with the bond coordinates entered in the coordinate table in Step S15. When the match is found (YES), the operation flow proceeds to Step S16. When the match is not found (NO), the operation flow is terminated. When the bond coordinates are not read in Step S12, it is determined that no matching is performed.

[0064]

(Step S16)

The controller 80 compares the bond coordinates (information) read in Step S12 with the bond coordinates (input value) input in Step S15 to determine success or failure.

[0065]

The input of the X and Y coordinates of the base die and the X-direction and Y-direction offsets of the stacked die among the bond coordinates in Step S15 will be described with reference to FIG. 9. FIG. 9 is a flowchart illustrating the operation of setting the XY coordinates in Step S15 illustrated in FIG. 8.

[0066]

(Step 21: Judgement)

The controller 80 determines whether the die subjected to the DnD operation in Step S14 is a base die. When it is the base die (YES), the operation flow proceeds to Step S22. When it is not the base die (NO), the operation flow proceeds to Step S23.

[0067]

(Step S22: XY Base Coordinate Automatic Input)

The controller 80 detects the coordinates of the position of the die which has been DnD operated, and inputs (automatically inputs) the detected coordinates into the bond coordinates (X, Y) of the base die in the coordinate table, and also displays the coordinates in “X” and “Y” of the display window 103. Here, the X and Y coordinates of the base die are referred to as XY base coordinate.

[0068]

(Step S23: Determination)

The controller 80 determines whether the die subjected to the DnD operation in Step S14 is a die in the second layer. When the die is the die in the second layer (YES), the operation flow proceeds to Step S24. When the die is not the die in the second layer (a die in the third layer or later) (NO), the operation flow proceeds to Step S25.

[0069]

(Step S24: XY Offset Automatic Input A)

The controller 80 detects the coordinates of the position of the die subjected to the DnD operation, calculates an offset value based on the detected coordinates and the bond coordinates of the base die, and inputs (automatically inputs) the offset value into the coordinate table. The controller 80 displays the

calculated offsets in “offset X” and “offset Y” in the display window 104. Here, the offset in the X direction and the offset in the Y direction are referred to as XY offsets.

[0070]

(Step S25: XY Offset Automatic Input B)

The controller 80 calculates an offset based on the offset of the die in the previous layer and inputs (automatically inputs) the same to the coordinate table. For example, the offset of a die in the third layer is calculated based on the offset of a die in the second layer. The controller 80 displays the offset in the “offset X” and “offset Y” of the fourth display window 104.

[0071]

The operator determines whether or not to manually change the bond coordinates input by the controller 80 (the bond coordinates input in Steps S22, S24, and S25). When the change is to be made manually (YES), the operation flow proceeds to Step S26. When the change is not to be made manually (NO), the operation flow is terminated.

[0072]

(Step S26: Input and Display of Bond Coordinates)

The controller 80 inputs the manually changed bond coordinates to the coordinate table, and also reflects (displays) the same in the image (picture) of the display window 101. Then, the controller 80 displays the coordinates in “X” and “Y” of the display window 103, and displays the offset in “offset X” and “offset Y” of the display window 104.

[0073]

The input of the Z coordinate of the base die and the offset in the Z direction of the stacked die among the bond coordinates in Step S15 will be described with reference to FIG. 10. FIG. 10 is a flowchart illustrating the operation of setting the Z coordinate in Step S15 illustrated in FIG. 8.

[0074]

(Step S31: Determination)

The controller 80 determines whether the die subjected to the DnD operation in Step S14 is a base die. When the die is the base die (YES), the operation flow proceeds to Step S32. When the die is not the base die (NO), the operation flow proceeds to Step S33.

[0075]

(Step S32: Z coordinate Automatic Input)

The controller 80 detects the coordinates of the position of the die subjected to the DnD operation, inputs (automatically inputs) the detected coordinates into the bond coordinates (Z) of the base die in the coordinate table, and also displays the coordinates in “Z” in the display window 103. Here, the Z coordinate of the base die is called a Z base coordinate.

[0076]

(Step S33: Determination)

The controller 80 determines whether the die subjected to the DnD operation in Step S15 is a stacked die. When it is the stacked die (YES), the operation flow proceeds to Step S34. When it is not the stacked die (flat die) (NO), the operation flow proceeds to Step S35.

[0077]

(Step S34: Z Offset Automatic Input A)

The controller 80 detects the coordinates of the position of the die subjected to the DnD operation, calculates an offset based on the detected coordinates and the bond coordinates of the base die, and inputs (automatically inputs) the offset into the coordinate table. The controller 80 displays the offset in “offset Z” of the display window 104.

[0078]

(Step S35: Z offset Automatic Input B)

The controller 80 inputs (automatically inputs) the Z coordinate acquired in Step S32 into the coordinate table as the Z offset, and displays the offset in “offset Z” of the display window 104.

[0079]

The operator determines whether or not to manually change the bond coordinates input by the controller 80 (bond coordinates input in Steps S32, S34, and S35). When the change is made manually (YES), the operation flow proceeds to Step S36. When the change is not to be made manually (NO), the operation flow is terminated.

[0080]

(Step S36: Input and Display of Bond Coordinates)

The controller 80 inputs the manually changed bond coordinates to the coordinate table, and also reflects (displays) the same in the image (picture) of the display window 101. Then, the controller 80 displays the coordinates in “Z” of the display window 103 and displays the offset in “offset Z” of the display window 104.

[0081]

The input of the θ coordinate of the base die and the offset in the θ direction of the stacked die among the bond coordinates in Step S15 will be described with reference to FIG. 11. FIG. 11 is a flowchart illustrating the operation of setting the θ coordinate in Step S15 illustrated in FIG. 8.

[0082]

(Step S41: Determination)

The controller 80 determines whether the die subjected to the DnD operation in Step S14 is a base die. When the die is a base die (YES), the operation flow proceeds to Step S42. When the die is not the base die (NO), the operation flow proceeds to Step S43.

[0083]

(Step S42: θ Base Coordinate Automatic Input)

The controller 80 detects the angle of the die subjected to the DnD operation, inputs (automatically inputs) the detected angle into the θ coordinate of the bond coordinates of the base die in the coordinate table, and also displays the coordinate in "θ" in the display window 103. Here, the θ coordinate of the base die is called the θ base coordinates. Typically, the θ coordinate is 0 degrees, 90 degrees, 180 degrees, or 270 degrees (-90 degrees). The θ coordinate of the die D in the device region P1 illustrated in FIG. 6 is 0 degrees, and the θ coordinate of the die D in the device region P2 is 90 degrees.

[0084]

(Step S43: Determination)

The controller 80 determines whether the die subjected to

the DnD operation in Step S14 is a die in the second layer. When the die is a die in the second layer (YES), the operation flow proceeds to Step S44. When the die is not the die in the second layer (a die in the third layer or later) (NO), the operation flow proceeds to Step S45.

[0085]

(Step S44: θ Offset Automatic Input A)

The controller 80 detects the angle of the die subjected to the DnD operation, and inputs (automatically inputs) the detected angle into the coordinate table. The controller 80 displays the offset at "θ" in the display window 104.

[0086]

(Step S45: θ Offset Automatic Input B)

The controller 80 inputs (automatically inputs) the same offset as the offset of the die in the second layer into the coordinate table. The controller 80 displays the offset at "θ" in the display window 104.

[0087]

The operator determines whether or not to manually change the bond coordinates input by the controller 80 (the bond coordinates input in Steps S42, S44, and S45). When the bond coordinates are changed manually (YES), the operation flow proceeds to Step S46. When the bond coordinates are not changed manually (NO), the operation flow is terminated.

[0088]

(Step S46: Input and Display of Bond Coordinates)

The operator inputs (manually inputs) the bond coordinates to be changed into the display window 103 or the display window

104. The controller 80 inputs the manually changed bond coordinates to the coordinate table, and also reflects (displays) the same in the image (picture) of the display window 101. Then, the controller 80 displays the coordinates at "θ" in the display window 103 and displays the offset at "θ" in the display window 104.

[0089]

The X, Y, Z and θ coordinates of the base die are automatically input, but can be manually changed when it is necessary to perform correction thereof. The offsets in the X, Y, Z and θ directions of the die are automatically input, but can be manually changed when it is necessary to perform correction thereof.

[0090]

Next, the setting of the bond coordinates in the example of the stacked bonds as illustrated in FIG. 5 will be described with reference to FIGS. 12 to 15. FIGS. 12 to 15 are views illustrating examples of screens displayed in accordance with the flow of the operations illustrated in FIG. 8.

[0091]

Here, the number (base number (Base No.)) of the die D which is first bonded to the device region P1 is set to "1", and the number of the die D which is bonded onto the die D with number "1" is set to "2". The number of the die D bonded on the die D numbered "2" is set to "3", and the number of the die D bonded on the die D numbered "3" is set to "4". The number (base number (Base No.)) of the die D which is first bonded to the device region P2 is set to "5", and the number of the die D

bonded on the die D with number “5” is set to “6”. The number of the die D bonded on the die D numbered “6” is set to “7”, and the number of the die D bonded on the die D numbered “7” is set to “8”. The dice are stacked and bonded in the order of numbers “1” to “8”. In the stacking bonding illustrated in FIG. 5, the die D is not rotated and bonded, so that the input of the θ coordinate and the θ offset can be omitted.

[0092]

FIG. 12 is a view illustrating a display state of a bond coordinate setting screen when a die numbered “3” is placed. The display window 101 displays an image in which a die D with number “2” is stacked on a die D with number “1”, and a die D with number “3” is stacked on the die D with number “2”. In the display window 102, dice D numbered “4” to “10” are displayed. The die D with number “1” is a base die.

[0093]

In the display window 103, the X coordinate of the base die is displayed as “-24.5”, the Y coordinate as “-36.2”, and the Z coordinate as “0”. In the display window 104, the offset in the X direction of the die D numbered “3” is displayed as “2.5”, the offset in the Y direction is displayed as “3.2”, and the offset in the Z direction is displayed as “0.3”.

[0094]

Since the die D numbered “3” is in the third layer, the XY offsets are automatically input in Step S25. The Z offset is also automatically input in Step S34. Incidentally, in the stack bonding illustrated in FIG. 6, all the dice have the same orientation, so that the θ coordinate and the θ offset are left

blank.

[0095]

When the operator drags and drops the die D numbered “4” onto the die D numbered “3”, the screen is displayed as a bond coordinate setting screen 100 illustrated in FIG. 13.

[0096]

FIG. 13 is a view illustrating the display state of the bond coordinate setting screen when the die numbered “4” is placed. The display window 101 displays an image of the die numbered “4” stacked on the die number “3”. In the display window 102, dice D numbered “5” to “10” are displayed.

[0097]

The display window 103 displays the same bond coordinates as those in FIG. 12. In the display window 104, the offset in the X direction of the die D numbered “4” is displayed as “5.5”, the offset in the Y direction is displayed as “6.2”, and the offset in the Z direction is displayed as “0.4”.

[0098]

Since the die D numbered “4” is in the fourth layer, the XY offsets are automatically input in Step S26. The Z offset value is also automatically input in Step S34. When the operator drags and drops the die D numbered “5” onto the substrate S, the screen is displayed as a bond coordinate setting screen 100 illustrated in FIG. 14.

[0099]

FIG. 14 is a view illustrating the display state of the bond coordinate setting screen when the die numbered “5” is placed. In the display window 101, an image of the numbers “1” to

“4” stacked and an image of the die D numbered “5” placed on the substrate S are displayed. In the display window 102, dice D numbered “6” to “10” are displayed. The die D numbered “5” is the base die.

[0100]

In the display window 103, the X coordinate of the base die is displayed as “17.1”, the Y coordinate as “23.2”, and the Z coordinate as “0”. At this time, the display window 104 is blank.

[0101]

Since the die D numbered “5” is the base die, the XY base coordinates are automatically input in Step S22. The Z base coordinate is automatically input in Step S32. When the operator drags and drops the die D numbered “6” onto the die D numbered “5”, the screen is displayed like a bond coordinate setting screen 100 illustrated in FIG. 15.

[0102]

FIG. 15 is a view illustrating the display state of the bond coordinate setting screen when the die numbered “6” is placed. The display window 101 displays an image of numbers “1” to “4” stacked and an image of a die numbered “6” stacked on a number “5”. In the display window 102, dice D numbered “7” to “10” are displayed.

[0103]

The display window 103 displays the same bond coordinates as those in FIG. 14. In the display window 104, the offset in the X direction of the die D numbered “6” is displayed as “2.5”, the offset in the Y direction is displayed as “3.2”, and the offset in the Z direction is displayed as “0.1”.

[0104]

Since the die D numbered “6” is a die in the second layer, the XY offset values are automatically input in Step S24. The Z offset is automatically input in Step S32.

[0105]

Next, the bond coordinate setting screen 100 in the example of the stacked bonds as illustrated in FIG. 6 will be described with reference to FIGS. 16 to 19. FIGS. 16 to 19 are views illustrating other examples of screens displayed in accordance with the flow of the operations illustrated in FIG. 8.

[0106]

Here, the number (base number (Base No.)) of the die D which is first bonded to the device region P1 is set to “1”, and the number of the die D bonded on the die D numbered “1” is set to “3”. The number of the die D bonded on the die D numbered “3” is set to “5”, and the die D bonded on the die D numbered “5” is set to “7”. The number (base number (Base No.)) of the die D which is first bonded to the device region P2 is set to “2”, and the number of the die D bonded on the die D numbered “2” is set to “4”. The number of the die D bonded on the die D numbered “4” is set to “6”, and the number of the die D bonded on the die D numbered “6” is set to “8”. The dice are stacked and bonded in the order of numbers “1” to “8”. In other word, the device region P1 and the device region P2 are alternately bonded.

[0107]

FIG. 16 is a view illustrating the display state of the bond coordinate setting screen when the die numbered “5” is placed. The display window 101 displays an image in which a die D

numbered “3” is stacked on a die D numbered “1”, and the die D numbered “5” is stacked on the die D numbered “3”. Further, the display window 101 displays an image in which a die D numbered “4” is stacked on a die D numbered “2”. In the display window 102, dice s D numbered “6” to “10” are displayed. The die D with number “1” is a base die.

[0108]

In the display window 103, the X coordinate of the base die is displayed as “-24.5”, the Y coordinate as “-36.2”, the Z coordinate as “0”, and the θ coordinate as “0”. In the display window 104, the offset in the X direction of the die D numbered “5” is displayed as “5.0”, the offset in the Y direction as “6.4”, the offset in the Z direction as “0.4”, and the θ offset as “0”.

[0109]

Since the die D numbered “5” is in the third layer, the XY offsets are automatically input in Step S25. The Z offset is also automatically input in Step S34. The θ offset is also automatically input in Step S45.

[0110]

When the operator drags and drops the die D numbered “6” onto the die D numbered “4”, the screen is displayed like a bond coordinate setting screen 100 illustrated in FIG. 17.

[0111]

FIG. 17 is a view illustrating the display state of the bond coordinate setting screen when the die numbered “6” is placed. The display window 101 displays an image in which dice D numbered “1”, “3”, and “5” are stacked. Further, the display

window 101 displays an image in which dice D numbered “2”, “4”, and “6” are stacked. In the display window 102, dice D numbered “7” to “10” are displayed. The die D numbered “2” is a base die.

[0112]

The display window 103 displays the X coordinate of the base die as “32.1”, the Y coordinate as “43.2”, the Z coordinate as 0”, and the θ coordinate as “90”. In the display window 104, the offset in the X direction of the die D numbered “6” is displayed as “-5”, the offset in the Y direction as “-6.4”, the offset in the Z direction as “0.4”, and the θ offset as “90”.

[0113]

Since the die D numbered “6” is in the third layer, the XY offsets are automatically input in Step S25. The Z offset is also automatically input in Step S34. The θ offset is also automatically input in Step S45.

[0114]

When the operator drags and drops the die D numbered “7” onto the die D numbered “5”, the screen is displayed like a bond coordinate setting screen 100 illustrated in FIG. 18.

[0115]

FIG. 18 is a view illustrating the display state of the bond coordinate setting screen when the die numbered “7” is placed. The display window 101 displays an image in which dice D numbered “1”, 3”, “5”, and “7” are stacked. Further, the display window 101 displays an image in which dice D numbered “2”, “4”, and “6” are stacked. In the display window 102, dice D numbered “8” to “10” are displayed. The die D with number “1” is a base die.

[0116]

The display window 103 displays the same bond coordinates as those in FIG. 16. In the display window 104, the offset in the X direction of the die D numbered “7” is displayed as “7.5”, the offset in the Y direction as “9.7”, the offset in the Z direction as “0.5”, and the θ offset as “0”.

[0117]

Since the die D numbered “7” is in the fourth layer, the XY offsets are automatically input in Step S25. The Z offset value is also automatically input in Step S34. The θ offset is also automatically input in Step S45.

[0118]

When the operator drags and drops the die D numbered “8” onto the die D numbered “6”, the screen is displayed like a bond coordinate setting screen 100 illustrated in FIG. 19.

[0119]

FIG. 19 is a view illustrating the display state of the bond coordinate setting screen when the die numbered “8” is placed. The display window 101 displays an image in which dice D numbered “1”, 3”, “5”, and “7” are stacked. Further, the display window 101 displays an image in which dice D numbered “2”, “4”, “6”, and “8” are stacked. In the display window 102, dice D numbered “9” and “10” are displayed. The die D numbered “2” is a base die.

[0120]

The display window 103 displays the same bond coordinates as those in FIG. 17. In the display window 104, the offset in the X direction of the die D numbered “8” is displayed as “-7.5”, the

offset in the Y direction as “-9.7”, the offset in the Z direction as “0.5”, and the θ offset as “90”.

[0121]

Since the die D numbered “8” is in the fourth layer, the XY offsets are automatically input in Step S25. The Z offset is also automatically input in Step S34. The θ offset is also automatically input in Step S45.

[0122]

According to the present embodiment, at least one of the following effects (a) to (f) is achieved.

[0123]

(a) The trouble of inputting four offsets of an X-direction offset, a Y-direction offset, a Z-direction offset, and a θ-direction offset can be saved. This makes it easier to input bond coordinates and allows for a reduction in time.

[0124]

(b) Since manual input is reduced, it is possible to reduce errors in bond coordinates.

[0125]

(c) The dice are numbered and displayed, thereby making it easy to see at a glance in what order to bond. This makes it easier to input bond coordinates when alternately stacking and bonding.

[0126]

(d) It is possible to reduce input errors when inputting bond coordinates when alternately stacking and bonding.

[0127]

(e) There is no restriction on bonding order, thereby

making it easier to input bond coordinates in any order.

[0128]

(f) Even when the die exists on the tab from the beginning, it is possible to create an image of the stacking bonding from thereabove.

[0129]

The disclosure made by the present inventors has been specifically described above based on the embodiments, but it goes without saying that the present disclosure is not limited to the above-described embodiments and can be modified in various ways.

[0130]

In the embodiment, there has been described an example in which the package area has two device regions, but the number of device regions is not limited to two, and for example, the number of device regions may be one.

[0131]

In the embodiment, there has been described an example in which the origin of the bond coordinates is the center of the package area P, but it can be set arbitrarily, and may be, for example, the first position reference point Pa or the second position reference point Pb.

[0132]

In the embodiment, stacking bonding has been described as an example, but the present invention can also be applied to the setting of bond coordinates when bonding a die to each of plural device regions in one package area (when stacking bonding is not performed).

[0133]

Although there has been described an example in which the bond coordinates of the third display window include the X coordinate, the Y coordinate, the Z coordinate, and the θ coordinate, it is sufficient if at least one of the X coordinate, the Y coordinate, the Z coordinate, and the θ coordinate is included.

[0134]

Although there has been described an example in which the bond coordinates of the fourth display window include on offset in the X direction, an offset in the Y direction, an offset in the Z direction, and an offset in the θ direction, it is sufficient if at least one of the offset in the X direction, the offset in the Y direction, the offset in the Z direction, and the offset in the θ direction is included.

[0135]

In the embodiment, there has been described an example in which a die attach film is used, but it is also possible to provide a preform portion for applying an adhesive to the substrate, eliminating the need for the die attach film. The preform portion includes a preform head which applies a paste adhesive and a preform table which drives the preform head in vertical and horizontal directions.

[0136]

In the embodiment, there has been described a die bonder in which a die is picked up from a wafer supply section by a pick-up head and placed on an intermediate stage, and the die placed on the intermediate stage is bonded to a substrate by a bond head.

The present invention is not limited to this, and can also be applied to a die bonder which picks up a die from a wafer supply section by a bond head and bonds it to a substrate.

Reference Signs List

[0137]

1: die bonder (die bonding device)

83a: monitor (display device)

100: bond coordinate setting screen

101: first display window

102: second display window

103: third display window

104: fourth display window

Claims

[Claim 1]

A die bonding device, comprising:

a display device displaying a bond coordinate setting screen that includes: a first display window displaying an image of a substrate; a second display window displaying images of a plurality of dice; a third display window capable of inputting and outputting bond coordinates of a base die bonded to a surface of the substrate; and a fourth display window capable of inputting and outputting bond coordinates of a die bonded offset to the base die; and

a control device which controls the bond coordinate setting screen.

[Claim 2]

The die bonding device according to Claim 1, wherein

the die bonded offset to the base die is a stacked die which is offset and stacked on the base die.

[Claim 3]

The die bonding device according to Claim 2, wherein

the control device is configured to be capable of:

detecting a position where a die displayed in the second display window is dragged and dropped onto the first display window,

calculating the bond coordinates based on the detected position, and

displaying the calculated bond coordinates in the third display window or the fourth display window.

[Claim 4]

The die bonding device according to Claim 3, wherein

the control device is configured to be capable of inputting the calculated bond coordinates and the bond coordinates input from the bond coordinate setting screen into a coordinate table of a storage device.

[Claim 5]

The die bonding device according to Claim 4, wherein

each of the images of the plural dice has a number indicating a bonding order,

the third display window has an area displaying the number of the base die and an area displaying the bond coordinates, and the bond coordinates include an X coordinate, a Y coordinate, a Z coordinate, and a θ coordinate, and

the fourth display window has an area displaying the number of the stacked die and an area displaying the bond coordinates, and the bond coordinates include an offset in the X direction relative to the base die (X offset), an offset in the Y direction relative to the base die (Y offset), an offset in the Z direction relative to the base die (Z offset) or an offset in the θ direction relative to the base die (θ offset).

[Claim 6]

The die bonding device according to Claim 5, wherein

the control device is configured to be capable of acquiring tab information including a shape and a size of a package area of the substrate, and displaying an image of the substrate in the first display window on the basis of the tab information.

[Claim 7]

The die bonding device according to Claim 5, wherein

the control device is configured to be capable of, when the dragged and dropped die is the base die, inputting the X coordinate, the Y coordinate, and the θ coordinate acquired on the basis of the detected position into the coordinate table, and inputting the bond coordinates input from the third display window into the coordinate table.

[Claim 8]

The die bonding device according to Claim 5, wherein

the control device is configured to be capable of, when the dragged and dropped die is the stacked die in the second layer, inputting the X offset, the Y offset, the Z offset, and the θ offset acquired based on the detected position into the coordinate table, and inputting the X offset, the Y offset, the Z offset, and the θ offset input from the fourth display window into the coordinate table.

[Claim 9]

The die bonding device according to Claim 5, wherein

the control device is configured to be capable of, when the dragged and dropped die is the stacked die in the third or subsequent layer, inputting an offset calculated on the basis of the X offset, the Y offset, the Z offset, and the θ offset acquired on the basis of the detected position of the die in the previous layer into the coordinate table, and inputting the X offset, the Y offset, the Z offset, and the θ offset input from the fourth display window into the coordinate table.

[Claim 10]

The die bonding device according to Claim 4, wherein

the control device is configured to be able to compare bond

coordinates read from a CAD drawing or an image of a product as text data or binary data with the bond coordinates input into the coordinate table.

[Claim 11]

A method for setting bond coordinates in a die bonding device which has a display device displaying a bond coordinate setting screen, bonds a base die to a surface of a substrate, and offsets and bonds a die onto the base die to perform stacking bonding, comprising:

displaying an image of the substrate in a first display window of the bond coordinate setting screen;

displaying images of a plurality of dice in a second display window of the bond coordinate setting screen;

detecting that the die displayed in the second display window has been dragged and dropped into the first display window; and

when the dragged and dropped die is a die to be stacked on the base die and is a die in the third layer or later, inputting an offset calculated based on the offset relative to the base die into a coordinate table.

[Claim 12]

A method for manufacturing a semiconductor device, comprising the steps of:

setting bond coordinates by the bond coordinate setting method according to Claim 11; and

bonding a die to a substrate and a die already bonded to the substrate, based the set bond coordinates.