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DESCRIPTION

MEASURING DEVICE

Technical Field



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[0001] The present invention relates to a measuring device measuring each chip interval and shift angle of a plate-shaped member bonded to an adhesive sheet.

Background Art

[0002] Conventionally, in the manufacturing process of a semiconductor element and a light emitting diode element, a semiconductor wafer or a compound wafer supported by ring frames via sheets is separated into a form of chips by dicing, and thereafter, in order to pick up the chips, the above described adhesive sheet is expanded by an expander to expand chip intervals of the semiconductor wafer or the compound wafer separated into the form of chips, by predetermined amounts (see, for example, Patent Document 1).

[0003] However, according to the above described expander, when expanding the chip intervals of the semiconductor wafer or the compound wafer which is separated into the form of chips, the chip intervals and the shift angle between the cut line by the above described dicing and the ring frame are not measured. Therefore, when positions of the chips are confirmed with a recognition unit, for example, a camera, of the pickup device at the time of picking up the chips, much time is taken for processing of recognizing the positions of the

chips, and correction processing of aligning the position of a collet for pickup with the recognized positions, and there arises the problem of reduction in throughput.

[0004] Patent Document 1: Japanese Patent No. 3064979

Disclosure of the Invention

Problems to be Solved by the Invention

[0005] The present invention is made to solve the above described problem, and its object is to provide a measuring device preferable for enhancing the capability of pickup processing when picking up each chip of a plate-shaped member separated into a form of chips.

Means for Solving the Problems

[0006] In order to attain the above described object, a measuring device according to the present invention is a measuring device setting a plate-shaped member supported by a support with an adhesive sheet bonded to an opening of a ring frame and separated into a form of chips by cutting as a measurement target, and measuring each chip interval, and characterized in that the aforesaid measuring device includes image processing means measuring the aforesaid chip interval, and storage means storing the aforesaid chip interval measured by the aforesaid image processing means as measurement data.

[0007] Further, in order to attain the above described object, a measuring device according to the present invention is a measuring device setting a plate-shaped member supported by a support with an adhesive sheet

bonded to an opening of a ring frame and separated into a form of chips by cutting as a measurement target, and measuring a shift angle between a cut line by the aforesaid cutting and a reference direction of the aforesaid ring frame, and characterized in that the aforesaid measuring device includes image processing means measuring the aforesaid shift angle, and storage means storing the aforesaid shift angle measured by the aforesaid image processing means as measurement data.

[0008] Further, in order to attain the above described object, a measuring device according to the present invention is a measuring device setting a plate-shaped member supported by a support with an adhesive sheet bonded to an opening of a ring frame and separated into a form of chips by cutting as a measurement target, and measuring each chip interval and a shift angle between a cut line by the aforesaid cutting and a reference direction of the aforesaid ring frame, and characterized in that the aforesaid measuring device includes image processing means measuring the aforesaid chip interval and the aforesaid shift angle, and storage means storing the aforesaid chip interval and the aforesaid shift angle measured by the aforesaid image processing means as measurement data.

[0009] The above described measuring device according to the present invention may be constituted to further

include output means outputting the aforesaid measurement data stored in the aforesaid storage means.

[0010] The above described measuring device according to the present invention may be constituted to further include print means converting the aforesaid measurement data into an optical reading code and printing it onto a label, and bonding means bonding the label attached with the aforesaid optical reading code to the aforesaid support.

[0011] The above described measuring device according to the present invention may be constituted to further store the aforesaid measurement data stored in the aforesaid storage means into an electronic recording medium and output it to another device.

[0012] The above described measuring device according to the present invention may be constituted to further include write means writing the aforesaid measurement data stored in the aforesaid storage means into an RFID tag, and bonding means bonding the RFID tag in which the aforesaid measurement data is written to a predetermined position.

Advantage of the Invention

[0013] The measuring device according to the present invention adopts the constitution in which a plate-shaped member supported by a support with an adhesive sheet bonded to an opening of a ring frame and separated into a form of chips by cutting is set as a measurement target,

measures the chip interval or/and the shift angle of a chip is or are measured by the image processing means, and the measurement data is stored in the storage means, as described above. Therefore, the chips can be picked up based on the chip intervals or/and chip shift angles stored in the above described storage means. Therefore, time for position recognition processing at the time of confirming the position of a chip with the recognition unit, for example, a camera of the pickup device and correction processing of aligning the position of a collet for pickup with the recognized position can be shortened, and the operational effect of being able to enhance the capability of pickup processing can be obtained.

Best Mode for Carrying Out the Invention

[0014] Hereinafter, the best mode for carrying out the present invention will be described in detail with reference to the attached drawings.

[0015] Figure 1 is an explanatory view of a measuring device according to the present invention, Figure 2 is an explanatory view of a measurement target, a shift angle and a bonding configuration of a bar code, and Figure 3 is an explanatory view of a measurement position of a chip interval.

[0016] A measuring device 1 of Figure 1 sets a plate-shaped member (a semiconductor wafer which has been subjected to dicing in the present embodiment

(hereinafter, abbreviated as "wafer 4")) which is supported by a support H with an adhesive sheet 3 bonded to an opening of a ring frame 2 as shown in Figure 2 and separated into a form of chips by cutting, as a measurement target, and measures each chip interval G (see Figure 3) and a shift angle θ which will be described later.

[0017] Each chip interval G of the above described wafer 4 is expanded by a predetermined amount with an expander not illustrated in advance before start of measurement by the measuring device 1. The reason why the chip interval G is expanded by a predetermined amount like this is to pick up the chips C one by one with a collet of a pickup device not illustrated, after the measurement with the measuring device 1 is finished.

[0018] In order to carry out the measurement as described above, the measuring device 1 includes an image processing unit (image processing means) 5, a host computer 6, a printer 7 and a monitor 8, and adopts the constitution in which the image processing unit 5, the printer 7 and the monitor 8 are connected to the host computer 6.

[0019] The image processing unit 5 is constituted to photograph the wafer 4 on the above described adhesive sheet 3 with its camera 9, capture the image and measure the chip interval G and the shift angle θ from the captured image. The above described "chip interval G" is

a distance between the two adjacent chips C as shown in Figure 3, and the above described "shift angle θ " is an angle formed by a predetermined axis Y (reference direction of the ring frame) set with two notches 10 and 10 provided in the ring frame 2 as the reference, and a dicing line (cut line) 11 cut by dicing as shown in Figure 2. As the reference of the above described predetermined axis Y, a flat part 29 of the ring frame 2 may be set as the reference instead of the above described notches 10 and 10.

[0020] The present embodiment is constituted so that measurement of the chip interval G is performed at a plurality of spots as shown by the arrows in Figure 3. As measurement data D, measurement data Da of the individual chip intervals, mean value data Db of the chip intervals and measurement data Dc of the shift angle θ are obtained. In order to enhance reliability of the mean value when obtaining the mean value data Db, processing of rejecting the measurement data (D1 to D9 in Figure 3) relating to a defective portion C1 of the chip C and an omitted portion C2 of the chip C is performed in the image processing unit 5.

[0021] Each measurement data D is outputted from the image processing unit 5 to the host computer 6, and is stored in storage means 12, for example, a hard disk, of the host computer 6. The stored measurement data D can be outputted from the host computer 6 to another device.

As the storage means 12, a floppy (registered trademark) disk, a USB memory, a CD-R, a CD-RW, a DVD-R, a DVD-RW, a DVD-RAM, an MO, a magnetic tape and the like are conceivable in addition to the above described hard disk.

[0022] The above described printer 7 functions as the means for printing out the measurement data D of the chip C sent to the host computer 6 as described above, and the above described monitor 8 functions as the means for displaying the measurement data D.

[0023] The above described measurement data D can be bonded to the above described support H as the bar code 13 as shown in Figure 2 by adopting the constitution shown in Figure 4.

[0024] More specifically, as shown in Figure 4, a CPU 14 takes in the above described measurement data D from the image processing unit 5, and converts the measurement data D into bar code data BD known as an optical reading code and outputs it to a bar code printer 15 (print means). In the bar code printer 15, a label material 18 formed by temporarily attaching a plurality of labels 17 at predetermined pitches on a band-shaped release sheet 16 is conveyed to a peel plate 19, and a print head 22 prints the bar code 13 on the label 17 during the conveyance. The label 17 on which the bar code 13 is printed is folded back in a direction opposite from the conveying direction with the peel plate 19, and thereby, is peeled from the release sheet 16 to be held by a

suction grid 21 of a bonding device 20. Thereafter, the label 17 is bonded to the adhesive sheet 3 of the support H by descent of the suction grid 21. The above described CPU 14 may be a CPU (not illustrated) of the host computer 6. As the print means, a dot impact printer, a thermal printer, a laser printer and the like are conceivable.

[0025] Instead of the above described bar code 13 (one-dimensional code), a known QR code (two-dimensional code) (not illustrated) can be adopted as an optical reading code. In this case, the above described CPU 14 is constituted to convert the measurement data D of the above described chip C into QR code data and outputs it to the bar code printer 15, so that the bar code printer 15 prints the QR code onto the label 17 with a print head 22 based on the QR code data.

[0026] The wafer 4 which is the measurement target in which the label 17 attached with a bar code or the label with a QR code is bonded to the support H as described above is conveyed to a pickup device not illustrated, and the chips C are picked up with a collet for pickup. At this time, the pickup device reads the bar code 13 or the QR code from the label 17 by a bar code reader or a QR code reader first, acquires the measurement data D of the chip C from the bar code 13 or the QR code, and can use the measurement data D for preparation of pickup, correction of the position of the collet for pickup and

the like by performing alignment based on the measurement data D.

[0027] As the method in which the other device (pickup device in this embodiment) acquires the measurement data D as described above, for example, the host computer 6 may output the measurement data D stored in its storage means 12 to the other device by radio or wire communication. In this case, the host computer 6 functions as the output means which outputs the measurement data D to the other device. Further, the measurement data D which is stored in the storage means 12 of the host computer 6 can be provided to the other device by being stored in an electronic recording medium such as a floppy (registered trademark) disk, and a USB memory.

[0028] Further, by adopting the constitution shown in Figure 5, more measurement data D can be stored in an RFID tag 24 and the RFID tag 24 is bonded to a predetermined position.

[0029] More specifically, as shown in Figure 5, a CPU 25 takes in the above described measurement data D from the image processing unit 5, and outputs the measurement data D to an RFID tag issuing machine 26. In the RFID tag issuing machine 26, a tag material 30 formed by temporarily attaching a plurality of RFID tags 24 at predetermined pitches on the belt-shaped release sheet 16 is being conveyed to the peel plate 19, and during the

conveyance, an RFID writer 27 writes the measurement data D to a storing part (not illustrated) of the RFID tag 24. The RFID tag 24 in which the measurement data D is written is folded back in a direction opposite from the conveying direction with the peel plate 19, and thereby, is peeled from the release sheet 16 to be held by the suction grid 21 of the bonding device 20. Thereafter, the tag 24 is bonded to a predetermined position by descent of the suction grid 21. The above described CPU 25 may be a CPU (not illustrated) of the host computer 6.

[0030] As shown in Figure 5, when a plurality of wafers 4 that are the measurement targets are collectively handled by being loaded into a cassette 28, the RFID tag 24 may be bonded to the cassette 28. In this case, the measurement data D of all the wafers 4 present in the cassette 28 are stored in the storing part of the RFID tag 24. The place for bonding the RFID tag 24 is not limited to only a top board 28a of the cassette 28, but can be properly changed in accordance with necessity.

[0031] The measuring device 1 described above adopts the constitution in which the wafer 4 which is supported by the support H with the adhesive sheet 3 bonded to the opening of the ring frame 2 and separated into a form of chips by cutting is used as the measurement target, the chip interval G and the shift angle θ are measured by the image processing unit 5, and the measurement data D is stored in the storage means 12. Therefore, preparation

for picking up the chip C can be made based on the measurement data D of the chip intervals G and the shift angle θ stored in the storage means 12, time for position recognition processing at the time of confirming the position of the chip with a recognition unit of the pickup device, for example, a camera, and correction processing of aligning the collet for pickup with the recognized position can be shortened, and capability of pickup processing can be enhanced.

Brief Description of the Drawings

[0032] [Figure 1] Figure 1 is an explanatory view of a measuring device according to the present invention.

[Figure 2] Figure 2 is an explanatory view of a measurement target, a shift angle and a bonding constitution of a bar code.

[Figure 3] Figure 3 is an explanatory view of a measuring position of a chip interval.

[Figure 4] Figure 4 is an explanatory view of a constitution for bonding measurement data to a support.

[Figure 5] Figure 5 is an explanatory view of another constitution for bonding measurement data to a predetermined adherend.

Description of Symbols

- [0033] 1 Measuring device
- 2 Ring frame
- 3 Adhesive sheet
- 4 Wafer (plate-shaped member)

- 5 Image processing unit (image processing means)
- 11 Dicing line (cut line)
- 12 Storage means
- 13 Bar code (optical reading code)
- 15 Bar code printer (print means)
- 17 Label
- 20 Bonding device (bonding means)
- 24 RFID tag
- 26 RFID tag issuing machine (write means)
- G Chip interval
- θ Shift angle
- D Measurement data
- Da Measurement data of individual chip intervals
- Y Axis (reference direction of ring frame)

CLAIMS

[1] A measuring device setting a plate-shaped member supported by a support with an adhesive sheet bonded to an opening of a ring frame and separated into a form of chips by cutting as a measurement target, and measuring each chip interval, characterized in that

said measuring device comprises:

image processing means measuring said chip interval;
and

storage means storing said chip interval measured by said image processing means as measurement data.

[2] A measuring device setting a plate-shaped member supported by a support with an adhesive sheet bonded to an opening of a ring frame and separated into a form of chips by cutting as a measurement target, and measuring a shift angle between a cut line by said cutting and a reference direction of said ring frame, characterized in that

said measuring device comprises:

image processing means measuring said shift angle;
and

storage means storing said shift angle measured by said image processing means as measurement data.

[3] A measuring device setting a plate-shaped member supported by a support with an adhesive sheet bonded to an opening of a ring frame and separated into a form of chips by cutting as a measurement target, and measuring

each chip interval and a shift angle between a cut line by said cutting and a reference direction of said ring frame, characterized in that

said measuring device comprises:

image processing means measuring said chip interval and said shift angle; and

storage means storing said chip interval and said shift angle measured by said image processing means as measurement data.

[4] The measuring device according to any one of claims 1 to 3, characterized in that

said measuring device further comprises:

output means outputting said measurement data stored in said storage means.

[5] The measuring device according to any one of claims 1 to 4, characterized in that

said measuring device further comprises:

print means converting said measurement data into an optical reading code and printing it onto a label; and

bonding means bonding the label attached with said optical reading code to said support.

[6] The measuring device according to any one of claims 1 to 5, characterized in that

said measuring device further stores said measurement data stored in said storage means into an electronic recording medium and outputs it to another device.

[7] The measuring device according to any one of claims 1 to 6, characterized in that

said measuring device further comprises:

write means writing said measurement data stored in said storage means into an RFID tag; and

bonding means bonding the RFID tag in which said measurement data is written to a predetermined position.