[CLAIMS]

[Claim 1]

A semiconductor device manufacturing device comprising:

a stage that has a loading surface on which a substrate is loaded;

an installing head that has a chip holding surface for holding a chip and disposes the chip on the substrate loaded on the stage;

a measuring mechanism that measures a tilt angle of the chip loaded on an installing surface of the substrate by the installing head with respect to the installing surface as a detection tilt angle;

a holding surface adjusting mechanism that includes a tilt plate that presses the chip holding surface and drives the tilt plate to change a holding surface tilt angle which is a tilt angle of the tilt plate of the chip holding surface with respect to the loading surface; and

a controller that calculates a correction amount of the holding surface tilt angle on a basis of the detection tilt angle and changes the holding surface tilt angle by the holding surface adjusting mechanism according to the correction amount calculated,

the chip holding surface is pressed against the tilt plate whose holding surface tilt angle has been changed to change an angle of the chip holding surface.

[Claim 2]

The semiconductor device manufacturing device according to claim 1,

wherein the controller stores a plurality of the detection tilt angles measured in the past, and

wherein the controller obtains a basic tilt angle by removing an influence of correction of the holding surface tilt angle from each of the plurality of detection tilt angles and changes a calculation policy of the correction amount according to a change tendency of the basic tilt angle between the substrates.

[Claim 3]

The semiconductor device manufacturing device according to claim 2, wherein, in a case in which a variation of the basic tilt angle between the substrates is equal to or less than a specified allowable value, the controller calculates a value to cancel the detection tilt angle obtained for a nearest substrate as the correction amount.

[Claim 4]

The semiconductor device manufacturing device according to claim 2 or 3, wherein, in a case in which the basic tilt angle changes between the substrates with a predetermined regularity, the controller estimates a basic tilt angle of a next substrate according to the regularity and calculates a value to cancel the basic tilt angle as the correction amount.

[Claim 5]

The semiconductor device manufacturing device according to any one of claims 2 to 4, wherein, in a case in which the basic tilt angle changes randomly between the substrates, the controller estimates a representative value of a plurality of the basic tilt angles obtained for a plurality of the substrates as a basic tilt angle of a next substrate and calculates a value to cancel the basic tilt angle as the correction amount.

[Claim 6]

The semiconductor device manufacturing device according to any one of claims 1 to 5, wherein, in a case in which the detection tilt angle is obtained for each of a plurality of chips loaded on one substrate, the controller treats a representative value of a plurality of the detection tilt angles obtained for the plurality of chips as the detection tilt angle of the one substrate.

[Claim 7]

The semiconductor device manufacturing device according to any one of claims 1 to 6, wherein, in a case in which the detection tilt angle is obtained for each of a plurality of chips loaded on one substrate, the controller generates a map in which a correspondence between a position of each chip in the substrate and the detection tilt angle of each chip is recorded and calculates the correction amount for each chip position on a basis of the map.

[Claim 8]

The semiconductor device manufacturing device according to any one of claims 1 to 7,

wherein the installing head has an installing tool that includes the chip holding surface and a spherical air bearing that holds the installing tool,

wherein the spherical air bearing is capable of switching between a free state in which the installing tool is held with its swinging allowed and a locked state in which the installing tool is held with its swinging hindered, and

wherein the holding surface adjusting mechanism has

the tilt plate with which the chip holding surface is brought into contact, and

a plurality of support columns that supports the tilt plate and advances and retreats independently of each other to arbitrarily change an angle of the tilt plate.

[Claim 9]

A semiconductor device manufacturing method comprising:

a bonding step of holding a chip with a chip holding surface of an installing tool and moving the installing tool to load the chip on an installing surface of a substrate loaded on a loading surface of a stage;

a measurement step of measuring a tilt angle between an upper surface of the chip loaded on the installing surface and the installing surface as a detection tilt angle;

a correction amount calculation step of calculating a correction amount of a holding surface tilt angle, which is a tilt angle of a tilt plate of the chip holding surface with respect to the loading surface, on a basis of the detection tilt angle; and

a correction step of changing the holding surface tilt angle according to the correction amount by a holding surface adjusting mechanism that changes the holding surface tilt angle

the holding surface adjusting mechanism includes the tilt plate that presses against the chip holding surface,

the holding surface adjusting mechanism drives the tilt plate to change the holding

surface tilt angle,

the chip holding surface is pressed against the tilt plate whose holding surface tilt angle has been changed to change an angle of the chip holding surface.