

DESCRIPTION

[Title of the Invention] SHEET PASTING METHOD

[Field of the Invention]

5 [0001]

The present invention relates to a sheet pasting method.

[Background of the Invention]

[0002]

10 A sheet pasting method of forming a united product in which a work is supported by a frame member through a first sheet and a second sheet has been conventionally known (see, for example, Patent Document 1).

[Description of Related Art]

[Patent Document]

[0003]

15 [Patent Document 1] Japanese Unexamined Patent Application Publication No. 2007-165363

[Summary of the Invention]

[Problems to Be Solved by the Invention]

[0004]

20 However, in the conventional mounting method (sheet pasting method) described in Patent Document 1, if one that is changed to a prescribed state by the application of prescribed energy while undergoing prescribed deformation such as contraction deformation or expansion deformation is adopted as the die bonding sheet section DS (first sheet),
25 there occurs a problem that, when a united product in which the wafer W (work) is supported by the ring frame RF (frame member) through the first sheet and the dicing tape DT (second sheet) is formed and the prescribed energy is applied to change the first sheet to the prescribed state, the deformation of the first sheet causes the formation of wrinkles WV in the
30 second sheet as illustrated in FIG. 1(C).

[0005]

It is an object of the present invention to provide a sheet pasting

method that prevents wrinkles from being formed in a second sheet even if one that is changed to a prescribed state by the application of prescribed energy while undergoing prescribed deformation is adopted as a first sheet, a united product in which a work is supported by a frame member through the first sheet and the second sheet is formed, and the prescribed energy is applied to change the first sheet to the prescribed state.

[Means for Solving the Problems]

[0006]

The present invention adopts the configurations described in the claims.

[Effect of the Invention]

[0007]

According to the present invention, in consideration of the prescribed deformation that the first sheet undergoes when the prescribed energy is applied, the first sheet preparing step prepares the first sheet that is shaped not to protrude from the one surface of the work, and the first pasting step pastes the first sheet on the one surface of the work while preventing the first sheet from protruding from the one surface of the work, thereby preventing the formation of wrinkles in the second sheet even if one that is changed to a prescribed state by the application of prescribed energy while undergoing prescribed deformation is adopted as the first sheet, the united product in which the work is supported by the frame member through the first sheet and the second sheet is formed, and the prescribed energy is applied to change the first sheet to the prescribed state.

[Brief Description of the Drawings]

[0008]

[FIG. 1] (A) to (C) are explanatory views of the present invention.

[Detailed Description of the Invention]

[0009]

Embodiments of the present invention will be hereinafter described based on the drawings.

It should be noted that X-axis, Y-axis, and Z-axis in the embodiment

are orthogonal to one another, where the X-axis and the Y-axis are within a predetermined plane while the Z-axis is orthogonal to the predetermined plane. Further, in the embodiment, FIG. 1 as viewed from the near side in terms of the direction parallel to the Y-axis is used as a reference for direction, and when a direction is mentioned without any designation of a drawing, an "upper" direction means a direction indicated by an arrow along the Z-axis, a "lower" direction means a direction opposite the upper direction, a "left" direction means a direction indicated by an arrow along the X-axis, a "right" direction means a direction opposite the "left" direction, a "front" direction means a direction toward the near side in FIG. 1 in terms of a direction parallel to the Y-axis, and a "rear" direction means a direction opposite the "front" direction.

[0010]

A sheet pasting method of the present invention can be executed by the following sheet pasting device EA, for instance.

Specifically, the sheet pasting device EA includes: a first pasting means 10 which executes a first sheet preparing step of preparing a first sheet AS1 that is changed to a prescribed state, more specifically, is cured, by the application of heat as prescribed energy and executes a first pasting step of pasting the first sheet AS1 on one surface WK1 of a work WK; a second pasting means 20 which executes a second sheet preparing step of preparing a second sheet AS2 and executes a second pasting step of pasting the second sheet AS2 on the first sheet AS1 pasted on the work WK and a ring frame RF as a frame member, to form a united product UP in which the work WK is supported by the ring frame RF through the first sheet AS1 and the second sheet AS2; and an energy applying means 30 which executes an energy applying step of applying the heat to the united product UP to cure the first sheet AS1, and the sheet pasting device EA is disposed near a carrying means 40 which executes a carrying step of carrying the work WK and the ring frame RF.

Note that the first sheet AS1 adopted is one that is cured by the application of the heat while undergoing prescribed deformation, more

specifically, contraction deformation.

Further, the work WK has rigidity high enough not to deform with the contraction deformation of the first sheet AS1. The rigidity means an object's property of being hardly deformed by external force such as compression, displacement, and torsion.
[0011]

As the first preparing step, the first pasting means 10 executes a first cutting step which uses a first raw sheet RS1 in which a first sheet base BS1 is temporarily bonded to a first release liner RL1, forms a first cut CU1 in a closed-loop shape in the first sheet base BS1, and forms the first sheet AS1 in a region demarcated by the first cut CU1 to prepare the first sheet AS1 while forming a first unnecessary sheet US1 in a region other than the first sheet AS1.

Specifically, the first pasting means 10 includes: a support roller 11 which supports the first raw sheet RS1; a guide roller 12 which guides the first raw sheet RS1; a cutting means 13 which forms the first cut CU1 in the first sheet base BS1; a releasing roller 14 around which the first unnecessary sheet US1 is to be wound; an unnecessary sheet recovering roller 15 as a recovering means which constantly applies a predetermined tension to the first unnecessary sheet US1 present between itself and the releasing roller 14 while automatic operation of the sheet pasting device EA is performed, to recover the first unnecessary sheet US1; a releasing plate 16 as a releasing means which releases the first sheet AS1 from the first release liner RL1 by folding the first release liner RL1 at its releasing edge 16A; a press roller 17 as a pressing means which presses the first sheet AS1 against the one surface WK1 of the work WK; a drive roller 18 which is supported by a not-illustrated output shaft of a rotary motor 18A as a drive device and sandwiches the first release liner RL1 between itself and a pinch roller 18B; a recovering roller 19 as a recovering means which is supported by an output shaft of a not-illustrated drive device and constantly applies a predetermined tension to the first release liner RL1 present between itself and the pinch roller 18B while the automatic operation of the sheet pasting device EA is

performed, to recover the first release liner RL1; and a not-illustrated direct-acting motor as a drive device which moves the whole first pasting means 10 in a front-rear direction.

5 The cutting means 13 includes: a die cut roller 13C supported by an output shaft 13B of a rotary motor 13A as a drive device; a cutting blade 13E as a cutting member in a flat and loop shape supported by a circumferential surface 13D of the die cut roller 13C; and an anvil roller 13F which rotates simultaneously with the die cut roller 13C.

[0012]

10 As the second sheet preparing step, the second pasting means 20 executes a second cutting step which uses a second raw sheet RS2 in which a second sheet base BS2 is temporarily bonded to a second release liner RL2, forms a second cut CU2 in a closed-loop shape in the second sheet base BS2, forms the second sheet AS2 in a region demarcated by the second cut CU2 to
15 prepare the second sheet AS2 while forming a second unnecessary sheet US2 in a region other than the second sheet AS2.

Specifically, the second pasting means 20 includes: a support roller 21 which supports the second raw sheet RS2; a guide roller 22 which guides the second raw sheet RS2; a cutting means 23 which forms the second cut
20 CU2 in the second sheet base BS2; a releasing roller 24 around which the second unnecessary sheet US2 is to be wound; an unnecessary sheet recovering roller 25 as a recovering means which constantly applies a predetermined tension to the second unnecessary sheet US2 present between itself and the releasing roller 24 while the automatic operation of the sheet
25 pasting device EA is performed, to recover the second unnecessary sheet US2; a releasing plate 26 as a releasing means which releases the second sheet AS2 from the second release liner RL2 by folding the second release liner RL2 at its releasing edge 26A; a press roller 27 as a pressing means which presses the second sheet AS2 against the first sheet AS1 pasted on the
30 work WK and the ring frame RF to paste the second sheet AS2; a drive roller 28 which is supported by a not-illustrated output shaft of a rotary motor 28A as a drive device and sandwiches the second release liner RL2 between itself

and a pinch roller 28B; and a recovering roller 29 as a recovering means which is supported by an output shaft of a not-illustrated drive device and constantly applies a predetermined tension to the second release liner RL2 present between itself and the pinch roller 28B while the automatic operation
5 of the sheet pasting device EA is performed, to recover the second release liner RL2.

The cutting means 23 includes a die cut roller 23C supported by an output shaft 23B of a rotary motor 23A as a drive device; a cutting blade 23E as a cutting member in a flat loop shape supported by a circumferential
10 surface 23D of the die cut roller 23C; and an anvil roller 23F which rotates simultaneously with the die cut roller 23C.

[0013]

The energy applying means 30 includes: a main body case 31 capable of housing a plurality of united products UP; a case cover 32 supported by an
15 output shaft 32B of a direct-acting motor 32A as a drive device and capable of opening/closing an opening 31A of the main body case 31; and heating means 33 as energy generators, such as coil heaters or heating sides of heat pipes, which are supported by a bottom surface 31B of the main body case 31 and a top surface 32C of the case cover 32 respectively.

20 [0014]

The carrying means 40 includes a holding table 42 supported by a slider 41A of a linear motor 41 as a drive device and having a holding surface 42A on which suction holding is enabled by a not-illustrated pressure-reducing means (holding means) such as a pressure-reducing pump
25 or a vacuum ejector.

[0015]

The sheet pasting method of the present invention executed by the above-described sheet pasting device EA will be described.

First, a user of the sheet pasting device EA (hereinafter, simply
30 referred to as the "user") inputs an operation start signal through a not-illustrated operation means such as an operation panel or a personal computer to the sheet pasting device EA whose members are arranged at

initial positions indicated by the solid lines in FIG. 1(A), after setting the first and second raw sheets RS1, RS2 as illustrated in this drawing. Then, the first and second pasting means 10, 20 drive the rotary motors 13A, 18A and 23A, 28A to rotate the die cut rollers 13C, 23C and form first and second cuts CU1, CU2 in the first and second bases BS1, BS2 to form first and second sheets AS1, AS2 and first and second unnecessary sheets US1, US2 while feeding out the first and second raw sheets RS1, RS2.

[0016]

Here, in the first sheet preparing step, in consideration of the contraction deformation that the first sheet AS1 undergoes when the heat is applied in the energy applying step, the first sheet AS1 shaped not to protrude from the one surface WK1 of the work WK is formed and prepared (the same applies to the following). Specifically, if the first sheet AS1 is shaped to protrude from the one surface WK1 of the work WK, it is expected that, when the heat is applied by the energy applying means 30, the contraction deformation of the first sheet AS1 causes the formation of wrinkles WV in the second sheet AS2 as illustrated in FIG. 1(C). Therefore, in this embodiment, if the one surface WK1 of the work WK has a circular shape with a 300 mm diameter, the first pasting means 10 forms the first sheet AS1 in a circular shape with a 299 mm diameter. Next, as illustrated in FIG. 1(A), when feeding-direction leading ends of the first and second sheets AS1, AS2 at the heads are released by a predetermined length at the releasing edges 16A, 26A of the releasing plates 16, 26, the first and second pasting means 10, 20 stop driving the rotary motors 13A, 18A and 23A, 28A.

[0017]

Thereafter, as illustrated in FIG. 1, when the user or a not-illustrated conveying means such as a multi-joint robot or a belt conveyor places a ring frame RF and the work WK on the holding table 42 with the work WK being disposed inside an opening RF1 of the ring frame RF, the carrying means 40 drives the not-illustrated pressure-reducing means to start the suction holding of the ring frame RF and the work WK on the holding surface 42A. Next, the carrying means 40 drives the linear motor 41 to move the holding table 42

leftward, and when the work WK reaches a predetermined position relative to the releasing plate 16, the first pasting means 10 drives the rotary motors 13A, 18A and feeds out the first raw sheet RS1 in pace with the moving speed of the holding table 42 while forming a new cut CU1 in the first sheet base BS1. Consequently, as indicated by the two-dot chain line in FIG. 1, the first sheet AS1 is released from the first release liner RL1, and the first sheet AS1 released from the first release liner RL1 is pressed against the work WK by the press roller 17 to be pasted.

[0018]

Here, in the first pasting step, in consideration of the contraction deformation that the first sheet AS1 undergoes when the heat is applied in the energy applying step, the first sheet AS1 is pasted on the one surface WK1 of the work WK without protruding from the one surface WK1 of the work WK. Specifically, if the first sheet AS1 protrudes from the one surface WK1 of the work WK when pasted, it is expected that, when the energy applying means 30 applies the heat, the contraction deformation of the first sheet AS1 causes the formation of the wrinkles WV in the second sheet AS2 as illustrated in FIG. 1(C). Therefore, in this embodiment, if the one surface WK1 has a circular shape with a 300 mm diameter, the first sheet AS1 is pasted on the one surface WK1 of the work WK such that the outer edge of the circular first sheet AS1 with a 299 diameter is located within a range of 0 mm to 1 mm from the outer edge position of the one surface WK1. At this time, the first pasting means 10 drives the not-illustrated direct-acting motor so that the whole first pasting means 10 moves in the front-rear direction to adjust the front-rear direction position of the first sheet AS1 relative to the one surface WK1 of the work WK, and also adjusts the drive start timing of the rotary motors 13A, 18A relative to the holding table 42 moving leftward to adjust the left-right direction position of the first sheet AS1 relative to the one surface WK1 of the work WK. Then, when a predetermined length of a feeding-direction leading end of a first sheet AS1 next to the first sheet AS1 at the head is released at the releasing edge 16A of the releasing plate 16, the first pasting means 10 stops driving the rotary motors 13A, 18A.

[0019]

Next, the carrying means 40 keeps moving the holding table 42 leftward and when the ring frame RF reaches a predetermined position relative to the releasing plate 26, the second pasting means 20 drives the rotary motors 23A, 28A, and feeds out the second raw sheet RS2 in pace with the moving speed of the holding table 42 while forming a new second cut CU2 in the second sheet base BS2. Consequently, as indicated by the two-dot chain line in FIG. 1, a second sheet AS2 is released from the second releasing sheet RL2, and the second sheet AS2 released from the second release liner RL2 is pressed against the ring frame RF and the first sheet AS1 by the press roller 27 to be pasted, resulting in the formation of a united product UP. Thereafter, when a feeding-direction leading end of a second sheet AS2 next to the second sheet AS2 at the head is released by a predetermined length at the releasing edge 26A of the releasing plate 26, the second pasting means 20 stops driving the rotary motors 23A, 28A.

[0020]

Next, the whole second sheet AS2 is pasted on the ring frame RF and the first sheet AS1, and when the holding table 42 supporting the united product UP reaches a predetermined position on the left of the press roller 27, the carrying means 40 stops driving the linear motor 41 and thereafter stops driving the not-illustrated pressure-reducing means to cancel the suction holding of the ring frame RF and the work WK on the holding surface 42A. Then, after the user or the not-illustrated conveying means holds the united product UP to store the united product UP in the main body case 31, the carrying means 40 drives the linear motor 41 to return the holding table 42 to the initial position. Next, when a predetermined number of the united products UP are stored in the main body case 31 as a result of the repetition of the above-described operation, the energy applying means 30 drives the direct-acting motor 32A to close the opening 31A of the main body case 31 with the case cover 32 as illustrated in FIG. 1(B). Thereafter, the energy applying means 30 drives the heating means 33 to apply the heat to the united products UP at a predetermined temperature for a predetermined time,

and when the predetermined time passes, it stops driving the heating means 33 and thereafter drives the direct-acting motor 32A to open the opening 31A of the main body case 31.

[0021]

5 Here, the first sheet AS1 cures when the heat is applied at the predetermined temperature for the predetermined time. Specifically, its modulus of elasticity, which is about 3 GPa (gigapascal) before the curing, changes to an about 10 GPa modulus of elasticity after the curing. At this time, the first sheet AS1 tries to cure while undergoing the contraction deformation, but since the work WK has rigidity high enough not to deform with the contraction deformation of the first sheet AS1, the rigidity of the work WK restrains the contraction deformation of the first sheet AS1 to prevent the formation of the wrinkles WV in the second sheet AS2. Next, the user or the not-illustrated conveying means takes out the united products UP stored in the main body case 31 and conveys these united products UP to the next step, and the same operation as above is thereafter repeated.

[0022]

According to the embodiment described above, in consideration of the contraction deformation that the first sheet AS1 undergoes when the heat is applied, the first sheet preparing step prepares the first sheet AS1 that is shaped not to protrude from the one surface WK1 of the work WK, and the first pasting step pastes the first sheet AS1 on the one surface WK1 of the work WK while preventing the first sheet AS1 from protruding from the one surface WK1 of the work WK, thereby preventing the formation of the wrinkles in the second sheet AS even if one that is cured by the application of heat while undergoing contraction deformation is adopted as the first sheet AS1, the united product UP in which the work WK is supported by the ring frame RF through the first sheet AS1 and the second sheet AS2 is formed, and the heat is applied to cure the first sheet AS1.

30 [0023]

The invention is by no means limited to the above means and processes as long as the above operations, functions, or processes described

regarding the means and processes are achievable, still less to the above merely exemplary structures and processes described in the embodiment. For instance, the energy applying step may be any step within the technical scope in light of the common general technical knowledge at the time of the
 5 filing of the application as long as it is capable of applying energy to the united product to change the first sheet to a prescribed state (the same applies to other means and processes).

[0024]

In the first and second pasting steps: the first and second unnecessary
 10 sheets US1, US2 do not necessarily have to be released from the first and second release liners RL1, RL2; at the time of supporting the first and second sheets AS1, AS2, the first and second sheets AS1, AS2 may be supported in, for example, a fan-folded state instead of the wound state; at the time of recovering the first and second release liners RL1, RL2, they may
 15 be recovered in, for example, a fan-folded state or in a state in which they are torn by a shredder or the like, instead of in the wound state, or may be recovered in a state in which they are merely accumulated without being wound or fan-folded; the first and second cuts CU1, CU2 may be formed along the whole shorter width direction in the first and second sheet bases
 20 BS1, BS2 to form the first and second sheets AS1, AS2 in regions demarcated by the first and second cuts CU1, CU2 while forming the first and second unnecessary sheets US1, US2 in other regions; and at the time of forming the first and second cuts CU1, CU2 in the first and second sheet bases BS1, BS2, the cutting members may be moved while the first and
 25 second raw sheets RS1, RS2 are not moved or are moved. In the first and second pasting steps: for example, what is called flat blades as the cutting members that separate from/approach the first and second sheet bases BS1, BS2 may be adopted; the cutting blades 13E, 23E detachable from or non-detachable from the die cut rollers 13C, 23C may be adopted; the press
 30 rollers 17, 27 may be separated from/made to approach the work WK to prevent the work WK from being given stress or damaged; and instead of the press roller 17, 27, holding members supported by output shafts of direct-

acting motors as drive devices and enabled to suction-hold by not-illustrated pressure-reducing means such as pressure-reducing pumps or vacuum ejectors may hold the first and second sheets AS1, AS2 to press the first and second sheets AS1, AS2 held by the holding members against the work WK
 5 to paste them.

The first pasting step may be configured such that the position of the one surface WK1 of the work WK moving leftward and the position of the fed first sheet AS1 are detected by a detecting means such as an imaging means, for example, a camera or a projector or such as any of various sensors,
 10 for example, an optical sensor or an ultrasonic sensor, the first pasting means 10 drives the not-illustrated direct-acting motor based on the detection result of the detecting means and adjusts the drive start timing of the rotary motors 13A, 18A to paste the first sheet AS1 while preventing the first sheet AS1 from protruding from the one surface WK1 of the work WK. Note that, in a
 15 case where the position of the one surface WK1 of the work WK moving leftward is constant, the detecting means need not detect the position of the one surface WK1 of the work WK, in a case where the position of the fed first sheet AS1 is constant, the detecting means need not detect the position of the first sheet AS1, and in a case where the position of the one surface
 20 WK1 of the work WK moving leftward and the position of the fed first sheet AS1 are constant, the detecting means needs to detect neither the position of the one surface WK1 of the work WK nor the position of the first sheet AS1.
 [0025]

The first sheet preparing step does not necessarily have to be
 25 executed by the first pasting means 10, and for example, the first raw sheet RS1 in which the first sheet AS1 in a predetermined shape is temporarily bonded to the first release liner RL1 in advance may be adopted, and in this case, the first cutting step need not be executed. In this case as well, in consideration of the contraction deformation that the first sheet AS1
 30 undergoes when the heat is applied in the energy applying step, the first sheet AS1 that is shaped not to protrude from the one surface WK1 of the work WK is prepared.

The second sheet preparing step does not necessarily have to be executed by the second pasting means 20, and for example, the second raw sheet RS2 in which the second sheet AS2 in a predetermined shape is temporarily bonded to the second release liner RL2 in advance may be adopted, and in this case, the second cutting step need not be executed.
[0026]

The energy applying step may be executed using one energy generator or three or more energy generators, and may be executed by one without the main body case 31 or the case cover 32. The energy applying step may be configured to apply the energy by the energy generator to the first sheet AS1 part by part and by relatively moving the energy generator and the first sheet AS1, apply the energy to the whole first sheet AS1, or may be configured to apply the energy to the whole first sheet AS1 at a time. In the energy applying step, the time for irradiating the first sheet AS1 with the energy and the energy quantity can be decided as desired in consideration of the characteristics, properties, nature, material, composition, configuration, and so on of the first sheet AS1. The energy applying step may be executed using one that applies, as the prescribed energy, an electromagnetic wave such as ultraviolet rays, infrared rays, visible rays, an acoustic wave, X-rays, or gamma rays, heat of hot water, hot air, or the like, or negative heat of cold water, cold air, or the like, and the prescribed energy can be decided as desired in consideration of the characteristics, properties, nature, material, composition, configuration, and so on of the first sheet AS1. In the energy applying step: the energy may be applied to the first sheet AS1 in a focused manner using a focusing means such as a condenser plate or a collecting plate; and an LED (Light Emitting Diode) lamp, a high-pressure mercury lamp, a low-pressure mercury lamp, a metal halide lamp, a xenon lamp, a halogen lamp, or the like may generate the energy to apply the energy to the first sheet AS1 or an appropriate combination of these may generate the energy to apply the energy to the first sheet AS1. In a case where another device executes the energy applying step, the energy applying step need not be executed in the sheet pasting method of the present invention.

[0027]

At the time of pasting the first and second sheets AS1, AS2 on the work WK, the first and second pasting means 10, 20 may be moved while the work WK is not moved or is moved in the carrying step, or in the carrying
5 step, the holding table 42 does not necessarily have to suction-hold the work WK, the ring frame RF, and so on. In a case where another device executes the carrying step, the carrying step need not be executed in the sheet pasting method of the present invention.

[0028]

10 The one surface WK1 of the work WK may have a circular shape with 300 mm or more or may have a circular shape with less than 300 mm. For example, for the work WK whose one surface WK1 has a circular shape with a 300 mm diameter, the first sheet AS1 prepared in the first sheet preparing step may have a circular shape with a 300 mm diameter, a circular
15 shape having a less than 300 mm diameter, such as a 299.5 mm or 280 mm diameter, or may have a shape other than the circular shape, such as a triangular shape, a polygonal shape having four sides or more, or an elliptical shape.

The one surface WK1 of the work WK may have any shape other
20 than the circular shape, such as a triangular shape, a polygonal shape having four sides or more, or an elliptical shape. The first sheet AS1 prepared for the work WK whose one surface WK1 has such a shape may have a shape other than the circular shape, such as a triangular shape, a polygonal shape having four sides or more, or an elliptical shape. For example, for the one
25 surface WK1 having a quadrangular shape, the first sheet AS1 having an elliptical shape may be prepared, and for the one surface WK1 having an elliptical shape, the first sheet AS1 having a pentagonal shape may be prepared.

The prescribed deformation of the first sheet AS1 due to the
30 application of the energy may be any deformation such as expansion deformation, enlargement deformation, contraction deformation, reduction deformation, wavy deformation, or distortion deformation.

The change of the first sheet AS1 to the prescribed state due to the application of the energy may be any change, for example, an increasing or decreasing change of the hardness or strength of the first sheet, an increasing or decreasing change of the capacity or volume of the first sheet, an increasing or decreasing change of the adhesion of the first sheet to the work, a color change of the first sheet, a rising or dropping change of the temperature of the first sheet, or a softening or melting change of the first sheet.

Examples of the first sheet that is changed to the prescribed state by the application of the energy while undergoing the prescribed deformation include one that is increased in volume by the application of heat or infrared rays as the prescribed energy while undergoing expansion deformation, enlargement deformation, or the like, one that is decreased in volume by the application of cold air or a coolant as the prescribed energy while undergoing contraction deformation, reduction deformation, or the like, one that is decreased in adhesion to the work or is peeled by the application of ultraviolet rays as the prescribed energy while undergoing expansion deformation, contraction deformation, enlargement deformation, reduction deformation, wavy deformation, distortion deformation, or the like, and one that is increased in temperature or is melted by the application of infrared rays or an ultrasonic wave as the prescribed energy while undergoing expansion deformation, enlargement deformation, or the like, and the first sheet may be any as long as it is changed to a prescribed state by the application of the energy while undergoing prescribed deformation.

The frame member may have a ring shape or a shape other than the ring shape, and may have any shape.

The sheet pasting method of the present invention may be executed by a device other than the sheet pasting device EA or manually.

[0029]

The materials, types, shapes, and so on of the first and second sheets AS1, AS2 and the work WK in the present invention are not limited. For example, the bonding type of the first and second sheets AS1, AS2 may be a

pressure-sensitive bonding type or a heat-sensitive bonding type, and if the first and second sheets AS1, AS2 are of the heat-sensitive bonding type, they may be bonded by an appropriate method, for example, by appropriate heating means for heating the first and second sheets AS1, AS2, such as coil heaters or heating sides of heat pipes. Further, such first and second sheets AS1, AS2 each may be, for example, a single-layer one having only an adhesive layer, one having an intermediate layer between a base and an adhesive layer, a three or more-layer one having a cover layer on the upper surface of a base, or one such as what is called a double-faced adhesive sheet in which a base can be released from an adhesive layer, and the double-faced adhesive sheet may be one having one intermediate layer or more or may be a single-layer one or a multilayer one not having an intermediate layer. Further, the work WK may be, for example, a simple item such as food, a resin container, a semiconductor wafer such as a silicon semiconductor wafer or a compound semiconductor wafer, a circuit board, an information recording substrate such as an optical disk, a glass plate, a steel sheet, pottery, a wood board, or a resin, or may be a composite made up of two of these or more, and it may also be a member, an article, or the like of any form. The first and second sheets AS1, AS2 each may be read as one indicating its function or application, and may be, for example, any sheet, film, tape, or the like such as an information entry label, a decoration label, a protect sheet, a dicing tape, a die attach film, a die bonding tape, or a recording layer forming resin sheet.

[0030]

As each of the drive devices in the above-described embodiment, an electric machine such as a rotary motor, a direct-acting motor, a linear motor, a uniaxial robot, or a multi-joint robot having two joints or three or more joints, an actuator such as an air cylinder, a hydraulic cylinder, a rodless cylinder, or a rotary cylinder, or the like is adoptable, and one in which some of these are directly or indirectly combined is also adoptable.

In the above-described embodiment: in a case where a rotating member such as a roller is adopted, a drive device that drives the rotation of

the rotating member may be provided, the surface of the rotating member or the rotating member itself may be formed of a deformable member such as rubber or resin or the surface of the rotating member or the rotating member itself may be formed of a non-deformable member, and another member that

5 rotates or does not rotate, such as a shaft or a blade, may be adopted instead of the roller; in a case where one that presses an object to be pressed, such as a pressing means or a press member such as a press roller or a press head, is adopted, a member such as a roller, a round bar, a blade member, rubber, resin, or sponge may be adopted or a structure that sprays gaseous substance

10 such as the atmospheric air or gas for pressing may be adopted, instead of or in addition to those exemplified in the above, and the one that presses may be formed of a deformable member such as rubber or resin or may be formed of a non-deformable member; in a case where one that releases an object to be released, such as a releasing means or a releasing member such as a

15 releasing plate or a releasing roller is adopted, a member such as a plate-shaped member, a round bar, or a roller may be adopted instead of or in addition to those exemplified above, and the one that releases may be formed of a deformable member such as rubber or resin or may be formed of a non-deformable member; in a case where one that supports (holds) a member to

20 be supported (member to be held), such as a support (holding) means or a support (holding) member, is adopted, the member to be supported may be supported (held) by a gripping means such as a mechanical chuck or a chuck cylinder, Coulomb force, an adhesive (adhesive sheet, adhesive tape), a tackiness agent (tacky sheet, tacky tape), magnetic force, Bernoulli

25 adsorption, suction/adsorption, a drive device, or the like; in a case where one that cuts a member to be cut or that forms a cut or a cutting line in a member to be cut, such as a cutting means or a cutting member, is adopted, one that cuts using a cutter blade, a laser cutter, ion beams, thermal power, heat, water pressure, a heating wire, or the spraying of gas, liquid, or the like

30 may be adopted instead of or in addition to those exemplified above, and at the time of the cutting, an appropriate combination of drive devices may move the one that cuts the object to be cut.

[Reference Signs List]

[0031]

	AS1	first sheet
	AS2	second sheet
5	BS1	first sheet base
	BS2	second sheet base
	CU1	first cut
	CU2	second cut
	RF	ring frame (frame member)
10	RL1	first release liner
	RL2	second release liner
	RS1	first raw sheet
	RS2	second raw sheet
	UP	united product
15	WK	work

Claims:

[Claim 1]

- A sheet pasting method which executes:
- a first sheet preparing step of preparing a first sheet that is changed to
 - 5 a prescribed state by the application of prescribed energy;
 - a second sheet preparing step of preparing a second sheet;
 - a first pasting step of pasting the first sheet on one surface of a work;
 - a second pasting step of pasting the second sheet on the first sheet
 - pasted on the work and a frame member to form a united product in which
 - 10 the work is supported by the frame member through the first sheet and the
 - second sheet; and
 - an energy applying step of applying the energy to the united product
 - to change the first sheet to the prescribed state,
 - wherein the first sheet is changed to the prescribed state by the
 - 15 application of the energy while undergoing prescribed deformation,
 - wherein the first sheet preparing step prepares the first sheet that is
 - shaped not to protrude from the one surface of the work in consideration of
 - the prescribed deformation that the first sheet undergoes when the energy is
 - applied in the energy applying step, and
 - 20 wherein the first pasting step pastes the first sheet on the one surface
 - of the work while preventing the first sheet from protruding from the one
 - surface of the work in consideration of the prescribed deformation that the
 - first sheet undergoes when the energy is applied in the energy applying step.

[Claim 2]

- 25 The sheet pasting method of claim 1, wherein, in the first sheet
- preparing step, a first cutting step is executed which uses a first raw sheet in
- which a first sheet base is temporarily bonded to a first release liner, forms a
- first cut in a closed-loop shape in the first sheet base, and forms the first
- sheet in a region demarcated by the first cut to prepare the first sheet.

30 [Claim 3]

- The sheet pasting method of claim 1 or 2, wherein, in the second
- sheet preparing step, a second cutting step is executed which uses a second

raw sheet in which a second base is temporarily bonded to a second release liner, forms a second cut in a closed-loop shape in the second sheet base, and forms the second sheet in a region demarcated by the second cut to prepare the second sheet.