What is claimed is:

1. A separation apparatus for separating a superposed substrate in which a processing target substrate and a supporting substrate are joined together with an adhesive, into the processing target substrate and the supporting substrate, the separation apparatus comprising:

a first holding unit which holds the processing target substrate;

a second holding unit which holds the supporting substrate;

a moving mechanism, which includes a horizontal moving unit that ~~relatively~~ moves the first holding unit or the second holding unit in a horizontal direction, and a vertical moving unit that moves the first holding unit or the second holding unit in a vertical direction;

a control unit which controls operations of the horizontal moving unit and the vertical moving unit; and

a load measurement unit which measures a load acting on the processing target substrate and the supporting substrate when the processing target substrate and the supporting substrate, which are joined together in the superposed substrate, are being separated from each other by the moving mechanism, the load measurement unit includes

a first load measurement unit which measures the load acting on the processing target substrate and the supporting substrate in the horizontal direction, the first load measurement unit outputs the load measured in the horizontal direction to the control unit; and

a second load measurement unit which measures the load acting on the processing target substrate and the supporting substrate in the vertical direction, the second load measurement unit outputs the load measured in the vertical direction to the control unit;

the ~~a~~ control unit ~~which~~ controls a rotation speed or torque of the horizontal moving unit ~~mechanism~~, based on feedback of the load measured in the horizontal direction by the first load measurement unit when the processing target substrate and the supporting substrate are being separated from each other, to be a first predetermined load, and

the control unit controls a rotation speed or torque of the vertical moving unit, based on feedback of the load measured in the vertical direction by the second load measurement unit when the processing target substrate and the supporting substrate are being separated from each other, to be a second predetermined load.

2. The separation apparatus according to claim 1,

wherein the control unit controls the moving mechanism so that the load measured by the load measurement unit is constant.

3. The separation apparatus according to claim 1 ~~or 2~~,

wherein the control unit controls the moving mechanism to decrease a speed of relative movement of the first holding unit or the second holding unit when the load measured by the load measurement unit exceeds an allowable load.

4. The separation apparatus according to ~~any one of~~ claims 1 ~~to 3~~,

wherein the load measurement unit is a load cell.

5. The separation apparatus according to ~~any one of~~ claims 1 ~~to~~ 4, further comprising:

a load calibration unit which is higher in accuracy of measuring the load than the load measurement unit, for performing calibration of the load measurement unit.

6. The separation apparatus according to claim 5,

wherein the load calibration unit is a load cell.

~~7. A separation system comprising the separation apparatus according to any one of claims 1 to 6, comprising:~~

~~a processing station comprising the separation apparatus, a first cleaning apparatus which cleans the processing target substrate separated in the separation apparatus, and a second cleaning apparatus which cleans the supporting substrate separated in the separation apparatus;~~

~~a transfer-in/out station which transfers in/out the processing target substrate, the supporting substrate, or the superposed substrate to/from processing station; and~~

~~a transfer apparatus which transfers the processing target substrate, the supporting substrate, or the superposed substrate between the processing station and the transfer-in/out station.~~

~~8. A separation method of separating a superposed substrate in which a processing target substrate and a supporting substrate are joined together with an adhesive, into the processing target substrate and the supporting substrate, the separation method comprising:~~

~~relatively moving a first holding unit which holds the processing target substrate or a second holding unit which holds the supporting substrate in a horizontal direction by a moving mechanism to separate the processing target substrate and the supporting substrate;~~

~~measuring a load acting on the processing target substrate and the supporting substrate by a load measurement unit when separating the processing target substrate and the supporting substrate; and~~

~~controlling the moving mechanism based on the load measured by the load measurement unit.~~

~~9. The separation method according to claim 8,~~

~~wherein the moving mechanism is controlled so that the load measured by the load measurement unit is constant.~~

~~10. The separation method according to claim 8 or 9,~~

~~wherein the moving mechanism is controlled to decrease a speed of relative movement of the first holding unit or the second holding unit when the load measured by the load measurement unit exceeds an allowable load.~~

~~11. The separation method according to any one of claims 8 to 10,~~

~~wherein the load measurement unit is a load cell.~~

~~12. The separation method according to any one of claims 8 to 11, further comprising:~~

~~performing calibration of the load measurement unit using a load calibration unit which is higher in accuracy of measuring the load than the load measurement unit.~~

~~13. The separation method according to claim 12,~~

~~wherein the load calibration unit is a load cell.~~

~~14. A program operating on a computer of a control unit which controls a separation apparatus to cause the separation apparatus to execute the separation method according to any one of claims 8 to 13.~~

~~15. A computer-readable storage medium storing the program according to claim 14.~~