

WHAT IS CLAIMED IS:

1. A polishing apparatus for polishing a polishable object, the polishing apparatus comprising:

a polishing table that can hold a polishing pad;

a first electric motor that can drive to rotate the polishing table;

a holding section that can hold the polishable object and press the polishable object against the polishing pad;

a second electric motor that can drive to rotate the holding section;

a swing arm for holding the holding section;

a third electric motor that can swing the swing arm around a swing center of the swing arm;

a detection section that can detect at least one of a current value of one electric motor of the first, second and third electric motors, a torque command value of the one electric motor, a position command of the one electric motor, and a speed command of the one electric motor and generate a first output;

a first processing section that can obtain a contact pressure corresponding to the first output from the first output using first data indicating a correspondence relationship between the contact pressure applied to the polishable object by the holding section and the first output; and

a second processing section that can obtain a second output corresponding to the contact pressure obtained by the first processing section using second data indicating a correspondence relationship between the contact pressure obtained by the first processing section and the second output.

2. The polishing apparatus according to claim 1, wherein the first data is a first relational expression expressing a correspondence relationship between the contact pressure applied to the polishable object by the holding section and the first output and/or the second data is a second relational expression expressing a correspondence relationship between the

contact pressure applied to the polishable object by the holding section and the second output.

3. The polishing apparatus according to claim 2, wherein the first relational expression is an expression expressing the first output using a polynomial of degree N regarding the contact pressure and the second relational expression is an expression expressing the second output using a polynomial of degree N regarding the contact pressure, where N is an integer equal to or greater than 2.

4. The polishing apparatus according to any one of claims 1 to 3, wherein the one electric motor is provided with a three-phase winding, and
the detection section can detect current values in three phases of the one electric motor and generate the first output.

5. The polishing apparatus according to claim 3, wherein the detection section can generate a sum of absolute values of the current values in three phases of the one electric motor as the first output.

6. The polishing apparatus according to claim 3, wherein the detection section can generate a sum of squares of absolute values of the current values in three phases of the one electric motor as the first output.

7. The polishing apparatus according to any one of claims 1 to 6, further comprising an end point detection section that can detect a polishing end point indicating an end of polishing based on the second output.

8. A polishing system comprising a plurality of the polishing apparatuses according to any one of claims 1 to 7, wherein the second data is data common to the plurality of polishing apparatuses.

9. A substrate processing apparatus comprising a plurality of the polishing apparatuses according to any one of claims 1 to 7, wherein the second data is data common to the plurality of polishing apparatuses and the substrate processing apparatus comprises a cleaning apparatus that can clean a plurality of polishable objects polished by the plurality of

polishing apparatuses and a housing for housing the plurality of polishing apparatuses and the cleaning apparatus.

10. A polishing method for polishing a polishable object, the polishing method comprising:

holding a polishing pad by a polishing table;

driving to rotate the polishing table by a first electric motor;

driving to rotate a holding section that can hold the polishable object and press the polishable object against the polishing pad by a second electric motor;

holding the holding section by a swing arm;

swinging the swing arm around a swing center on the swing arm by a third electric motor;

detecting at least one of a current value of one electric motor of the first, second and third electric motors, a torque command value of the one electric motor, a position command of the one electric motor and a speed command of the one electric motor and thereby generating a first output;

performing a first process of obtaining a contact pressure corresponding to the first output from the first output using first data indicating a correspondence relationship between the contact pressure applied to the polishable object by the holding section and the first output; and

performing a second process of obtaining a second output corresponding to the contact pressure obtained in the first process using second data indicating a correspondence relationship between the contact pressure obtained in the first process and the second output.

11. The polishing method according to claim 10, comprising changing the contact pressure applied to the polishable object by the holding section, detecting the current value of the one electric motor, the torque command value of the one electric motor, the position command of the one electric motor and/or the speed command of the one electric motor and generating the first data indicating a correspondence relationship between the contact pressure applied to the polishable object by the holding section and the first output.

12. A computer-readable recording medium storing a program for a computer controlling a polishing apparatus that polishes a polishable object, the polishing apparatus comprising:

- a first electric motor that can drive to rotate a polishing table for holding a polishing pad;

- a second electric motor that can drive to rotate a holding section that holds the polishable object and presses the polishable object against the polishing pad;

- a third electric motor that can swing a swing arm that holds the holding section around a swing center on the swing arm; and

- a detection section that can detect at least one of a current value of one electric motor of the first, second and third electric motors, a torque command of the one electric motor, a position command of the one electric motor and a speed command of the one electric motor and generate a first output, the program causing the computer to function as:

- first processing means for obtaining a contact pressure corresponding to the first output from the first output using first data indicating a correspondence relationship between the contact pressure applied to the polishable object by the holding section and the first output;

- second processing means for obtaining a second output corresponding to the contact pressure obtained by the first processing means using second data indicating a correspondence relationship between the contact pressure obtained by the first processing means and a second output; and

- control means for controlling the polishing by the polishing apparatus.

13. A polishing apparatus for polishing a polishable object, the polishing apparatus comprising:

- a polishing table that can hold a polishing pad;

- a first electric motor that can drive to rotate the polishing table;

- a holding section that can hold the polishable object and press the polishable object against the polishing pad;

a film thickness sensor that can measures an amount dependent on a film thickness of the polishable object and generate a first output;

a first processing section that can obtain the film thickness corresponding to the first output from the first output using first data indicating a correspondence relationship between the film thickness and the first output; and

a second processing section that can obtain a second output corresponding to the film thickness obtained by the first processing section using second data indicating a correspondence relationship between the film thickness obtained by the first processing section and the second output.