WHAT IS CLAIMED IS:

1. A substrate polishing apparatus comprising:

a rotatably configured polishing table provided with a sensor that outputs a signal related to a thickness;

a rotatably configured polishing head that faces the polishing table, a substrate being attachable to a face of the polishing head that faces the polishing table; and

a controller, wherein

the controller

generates, by use of output signals from the sensor for a reference substrate, a sensor output map representing the magnitude of the output signals from the sensor across an entire polished surface of the reference substrate,

acquires a polishing signal from the sensor when the sensor passes over a surface to be polished of the substrate,

extracts, from the sensor output map, an orbit having a profile that is most similar to a profile of the polishing signal to specify the extracted orbit as an orbit of the sensor with respect to the substrate,

calculates a thickness of the substrate at each point on the specified orbit of the sensor on a basis of the polishing signal, and

creates a thickness map on a basis of the calculated thickness at each point on a plurality of orbits of the sensor.

2. The substrate polishing apparatus according to Claim 1, wherein

the sensor is one or a plurality of eddy current sensors.

3. The substrate polishing apparatus according to Claim 1, wherein

the sensor is one or a plurality of optical sensors.

4. The substrate polishing apparatus according to Claim 1, wherein

the sensor is one or a plurality of eddy current sensors and one or a plurality of optical sensors.

5. The substrate polishing apparatus according to Claim 1, wherein

the controller acquires the polishing signal from the sensor during a water polishing treatment performed after polishing the substrate.

6. The substrate polishing apparatus according to Claim 1, wherein

the controller acquires the polishing signal from the sensor while polishing the substrate.

7. The substrate polishing apparatus according to any one of Claims 1 to 6, wherein the controller additionally

calculates a polishing rate distribution of the substrate based on a thickness distribution of a plurality of orbits of the sensor,

calculates a polishing amount of the substrate that is polished during a predetermined time period on a basis of the polishing rate distribution, and

updates the thickness map by subtracting the polishing amount from the thickness map that has been created at a predetermined point in time and combining the subtracted thickness map with thickness data corresponding to a current orbit.

8. The substrate polishing apparatus according to Claim 4, wherein

the controller additionally creates a dishing map that expresses a distribution of a dishing amount of the substrate on a basis of a comparison between a first thickness map created using a signal from the one or plurality of eddy current sensors and a second thickness map created using a signal from the one or plurality of optical sensors.

9. The substrate polishing apparatus according to Claim 1, wherein

the controller additionally

determines whether or not a desired thickness or a desired thickness profile has been achieved on a basis of the thickness map, and

in a case where the desired thickness or thickness profile has not been achieved, the controller causes the substrate to be repolished using the polishing table and the polishing head, a second polishing table and a second polishing head provided with the substrate polishing apparatus, or a third polishing table and a third polishing head provided with another substrate polishing apparatus different from the substrate polishing apparatus.

10. The substrate polishing apparatus according to Claim 8, wherein

the controller additionally

determines whether or not a desired dishing amount has been achieved on a basis of the dishing map, and

in a case where the desired dishing amount has not been achieved, the controller causes the substrate to be repolished using the polishing table and the polishing head, a second polishing table and a second polishing head provided with the substrate polishing apparatus, or a third polishing table and a third polishing head provided with another substrate polishing apparatus different from the substrate polishing apparatus.

11. The substrate polishing apparatus according to Claim 8, wherein

the controller additionally determines a treatment parameter of a previous step, determines a treatment parameter of a next step, or performs data processing for quality management on a basis of the thickness map or the dishing map.

12. The substrate polishing apparatus according to Claim 8, wherein

the controller additionally optimizes a polishing parameter on a basis of the thickness map or the dishing map.

13. The substrate polishing apparatus according to Claim 1, further comprising:

an airbag configured to adjust a polishing pressure of the substrate, wherein

the controller additionally controls an internal pressure of the airbag on a basis of the thickness map.

14. The substrate polishing apparatus according to Claim 2, wherein the controller additionally:

calculates a polishing progress of the substrate based at least on the polishing signal, and

calculates a thickness at each point of the substrate on a basis of the calculated polishing progress and also an initial thickness and a final thickness of a reference substrate that has been obtained through a thickness measurement on the reference substrate before polishing the substrate.

15. The substrate polishing apparatus according to Claim 14, wherein

the controller calculates the polishing progress on a basis of a comparison of the polishing signal from the eddy current sensor acquired while polishing the substrate, an output signal from the eddy current sensor with respect to the reference substrate in an initial state, and an output signal from the eddy current sensor with respect to the reference substrate in a final state.

16. A method of creating a thickness map of a substrate, executed by a substrate polishing apparatus provided with

a rotatably configured polishing table provided with a sensor that outputs a signal related to a thickness, and

a rotatably configured polishing head that faces the polishing table, a substrate being attachable to a face of the polishing head that faces the polishing table, the method comprising:

generating, by use of output signals from the sensor for a reference substrate, a sensor output map representing the magnitude of the output signals from the sensor across an entire polished surface of the reference substrate;

acquiring a polishing signal from the sensor when the sensor passes over a surface to be polished of the substrate;

extracting, from the sensor output map, an orbit having a profile that is most similar to a profile of the polishing signal to specify the extracted orbit as an orbit of the sensor with respect to the substrate;

calculating a thickness of the substrate at each point on the specified orbit of the sensor on a basis of the polishing signal; and

creating a thickness map on a basis of the calculated thickness at each point on a plurality of orbits of the sensor.

17. A method of polishing a substrate, executed by a substrate polishing apparatus provided with

a rotatably configured polishing table provided with a sensor that outputs a signal related to a thickness, and

a rotatably configured polishing head that faces the polishing table, a substrate being attachable to a face of the polishing head that faces the polishing table, the method comprising:

generating, by use of output signals from the sensor for a reference substrate, a sensor output map representing the magnitude of the output signals from the sensor across an entire polished surface of the reference substrate

rotating the polishing table;

rotating the polishing head having the substrate attached thereto;

polishing the substrate with the substrate pressed against the polishing table;

acquiring a polishing signal from the sensor when the sensor passes over a surface to be polished of the substrate;

extracting, from the sensor output map, an orbit having a profile that is most similar to a profile of the polishing signal to specify the extracted orbit as an orbit of the sensor with respect to the substrate;

calculating a thickness of the substrate at each point on the specified orbit of the sensor on a basis of the polishing signal; and

creating a thickness map on a basis of the calculated thickness at each point on a plurality of orbits of the sensor.