CLAIMS

[Claim 1] An information processing apparatus comprising:

an information acquisition section configured to acquire operating condition information indicating operating conditions of a substrate processing device having a substrate holder that includes a substrate holding mechanism configured to hold a substrate and a substrate rotating mechanism configured to rotate the substrate, the operating condition information including substrate rotating condition information indicating a rotating condition of the substrate, a substrate holding position information indicating a substrate holding position of the substrate holder, and a substrate pressing load information indicating a substrate pressing load of the substrate holder; and

a state prediction section configured to predict substrate-holding-mechanism state information corresponding to the operating condition information by inputting the operating condition information acquired by the information acquisition section to a learning model that has been generated by machine learning that causes the learning model to learn a correlation between the operating condition information and the substrate-holding-mechanism state information indicating a state of the substrate holding mechanism when the substrate processing device operates under the operating conditions indicated by the operating condition information.

[Claim 2] The information processing apparatus according to claim 1, wherein the substrate rotating condition information includes at least one of:

substrate rotation speed information indicating a rotation speed of the substrate; and

substrate rotation torque information indicating a rotation torque of the substrate.

[Claim 3] The information processing apparatus according to claim 2, wherein the substrate rotation speed information included in the operating condition information includes at least one of:

the number of rotations of the substrate;

the count number of a measurement target formed on the substrate; and

the number of rotations of the substrate rotating mechanism.

[Claim 4] The information processing apparatus according to claim 2 or 3, wherein the substrate rotation torque information included in the operating condition information includes a rotation torque of the substrate rotating mechanism.

[Claim 5] The information processing apparatus according to any one of claims 1 to 4, wherein the substrate holding position information included in the operating condition information includes a holding position where the substrate is held by the substrate holding mechanism.

[Claim 6] The information processing apparatus according to any one of claims 1 to 5, wherein the substrate-holding-mechanism state information includes at least one of:

information on a degree of contamination of the substrate holding mechanism;

information on a degree of wear of the substrate holding mechanism; and

information on a degree of damage to the substrate holding mechanism.

[Claim 7] The information processing apparatus according to any one of claims 1 to 5, wherein the substrate-holding-mechanism state information includes remaining service life information of the substrate holding mechanism.

[Claim 8] An inference apparatus comprising:

a memory; and

a processor configured to perform:

an information acquisition process of acquiring operating condition information indicating operating conditions of a substrate processing device having a

substrate holder that includes a substrate holding mechanism configured to hold a substrate and a substrate rotating mechanism configured to rotate the substrate, the operating condition information including substrate rotating condition information indicating a rotating condition of the substrate, a substrate holding position information indicating a substrate holding position of the substrate holding mechanism, and a substrate pressing load information indicating a substrate pressing load of the substrate holding mechanism; and

an inference process of inferring substrate-holding-mechanism state information indicating a state of the substrate holding mechanism of the substrate processing device when operating under the operating conditions indicated by the operating condition information when the operating condition information is acquired in the information acquisition process.

[Claim 9] A machine-learning apparatus comprising:

a learning-data storage section storing multiple sets of learning data including operating condition information and substrate-holding-mechanism state information, the operating condition information indicating operating conditions of a substrate processing device having a substrate holder that includes a substrate holding mechanism configured to hold a substrate and a substrate rotating mechanism configured to rotate the substrate, the operating condition information including substrate rotating condition information indicating a rotating condition of the substrate, a substrate holding position information indicating a substrate holding position of the substrate holding mechanism, and a substrate pressing load information indicating a substrate pressing load of the substrate holding mechanism, the substrate-holding-mechanism state information indicating a state of the substrate holding mechanism when the substrate processing device operates under the operating conditions indicated by the operating condition information;

a machine-learning section configured to cause a learning model to learn a correlation between the operating condition information and the substrate-holding-

mechanism state information by inputting the multiple sets of learning data to the learning model; and

a learned-model storage section configured to store the learning model that has learned the correlation by the machine-learning section.

[Claim 10] An information processing method comprising:

an information acquisition process of acquiring operating condition information indicating operating conditions of a substrate processing device having a substrate holder that includes a substrate holding mechanism configured to hold a substrate and a substrate rotating mechanism configured to rotate the substrate, the operating condition information including substrate rotating condition information indicating a rotating condition of the substrate, a substrate holding position information indicating a substrate holding position of the substrate holding mechanism, and a substrate pressing load information indicating a substrate pressing load of the substrate holding mechanism; and

a state prediction process of predicting substrate-holding-mechanism state information corresponding to the operating condition information by inputting the operating condition information acquired by the information acquisition process to a learning model that has been generated by machine learning that causes the learning model to learn a correlation between the operating condition information and the substrate-holding-mechanism state information indicating a state of the substrate holding mechanism when the substrate processing device operates under the operating conditions indicated by the operating condition information.

[Claim 11] An inference method executed by an inference apparatus including a memory and a processor, the processor performing:

an information acquisition process of acquiring operating condition information indicating operating conditions of a substrate processing device having a substrate holder that includes a substrate holding mechanism configured to hold a substrate and a substrate

rotating mechanism configured to rotate the substrate, the operating condition information including substrate rotating condition information indicating a rotating condition of the substrate, a substrate holding position information indicating a substrate holding position of the substrate holding mechanism, and a substrate pressing load information indicating a substrate pressing load of the substrate holding mechanism; and

an inference process of inferring substrate-holding-mechanism state information indicating a state of the substrate holding mechanism of the substrate processing device when operating under the operating conditions indicated by the operating condition information when the operating condition information is acquired in the information acquisition process.

[Claim 12] A machine-learning method comprising:

a learning-data storage process of storing multiple sets of learning data including operating condition information and substrate-holding-mechanism state information, the operating condition information indicating operating conditions of a substrate processing device having a substrate holder that includes a substrate holding mechanism configured to hold a substrate and a substrate rotating mechanism configured to rotate the substrate, the operating condition information including substrate rotating condition information indicating a rotating condition of the substrate, a substrate holding position information indicating a substrate holding position of the substrate holding mechanism, and a substrate pressing load information indicating a substrate pressing load of the substrate holding mechanism, the substrate-holding-mechanism state information indicating a state of the substrate holding mechanism when the substrate processing device operates under the operating conditions indicated by the operating condition information;

a machine-learning process of causing a learning model to learn a correlation between the operating condition information and the substrate-holding-mechanism state information by inputting the multiple sets of learning data to the learning model; and

a learned-model storage process of storing the learning model that has learned

the correlation by the machine-learning section.