

Proposals for advanced temperature control

Coexistence of quality and production capacity in processes requiring precise temperature control

The importance of temperature control is increasing due to the miniaturization and lamination of semiconductors and the high capacity of rechargeable batteries. More precise temperature control is required to improve machining accuracy since temperature variations and fluctuations affect quality of products, but to make it possible it takes more time and effort.



Automatically minimizes surface temperature variation and temperature fluctuations caused by disturbances

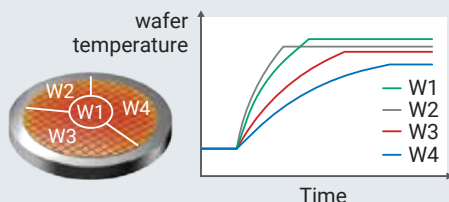
BEFORE

In the multipoint control, the surface temperature variation of the wafer occurs due to the thermal interference of the heater, and it was necessary to adjust the temperature uniformity control by taking a lot of time to suppress it. In addition, the temperature fluctuated due to the routine disturbance*1 during production, and a long waiting time was required until the temperature stabilized.

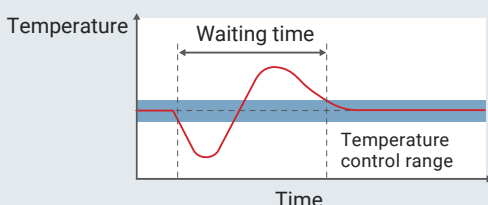
AFTER

When the "Temperature Uniformity Control" is used, the optimized temperature setting that uniformizes the surface temperature of the wafer is automatically calculated. In addition, the "Disturbance suppression function" suppresses temperature fluctuation caused by routine disturbance. With these technologies, we can improve quality and productivity without spending much engineering effort.

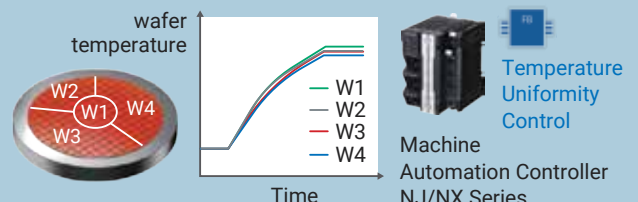
Yield deteriorated due to surface temperature variation of wafer



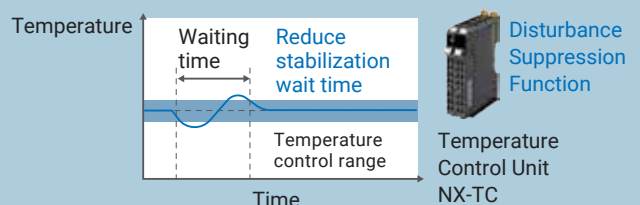
Waiting time is generated by temperature fluctuation caused by routine disturbance*1



Improvement of yield by equalizing wafer surface temperature. with "Temperature Uniformity Control" FB*2



Reduced takt time by suppressing temperature fluctuation with "Disturbance suppression function"



*1. Predictable disturbance such as process gas injection and work input *2. Function Block

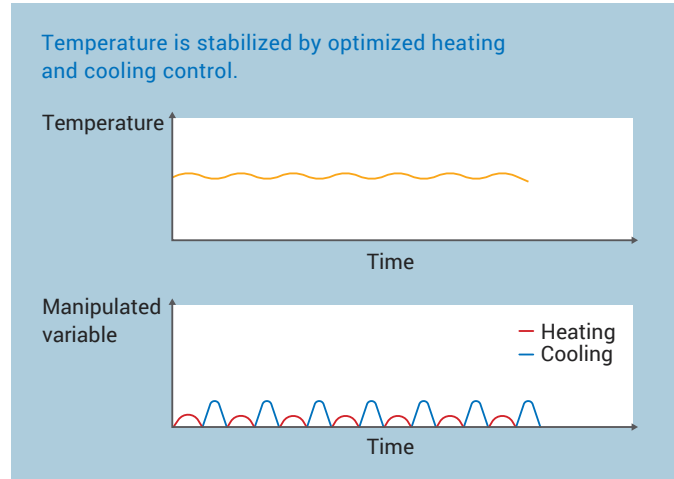
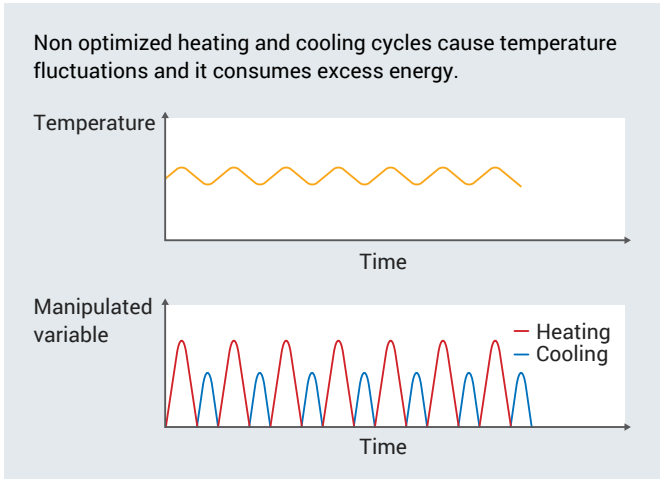
Automatic minimization of fluctuations in temperature and manipulated variable by heating and cooling control

BEFORE

There is a great difference between the heating and cooling capacity of the facility, and it is a challenge to determine the optimum heating and cooling PID. As a result, it took a long time to adjust, and PID was inappropriate. This resulted in excessive cooling, resulting in poor-quality operation and wasted power.

AFTER

With "Heating/Cooling AT (Auto-Tuning)", the optimum PID can be calculated automatically even if the heating and cooling capacities are different significantly. "Heating/Cooling AT" eliminates over-cooling and optimize temperature and manipulated variable.



Range of products that achieve advanced temperature control



Machine Automation
Controller
NJ/NX Series
+
Temperature Uniformity
Control FB
(Function Block)



NX Series
EtherCAT® Coupler Unit/
EtherNet/IP™
Coupler Unit



NX Series
Temperature
Control Unit
NX-TC



Solid State Relays for
Heaters
G3PJ



Single-phase
Power Controller
G3PW

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