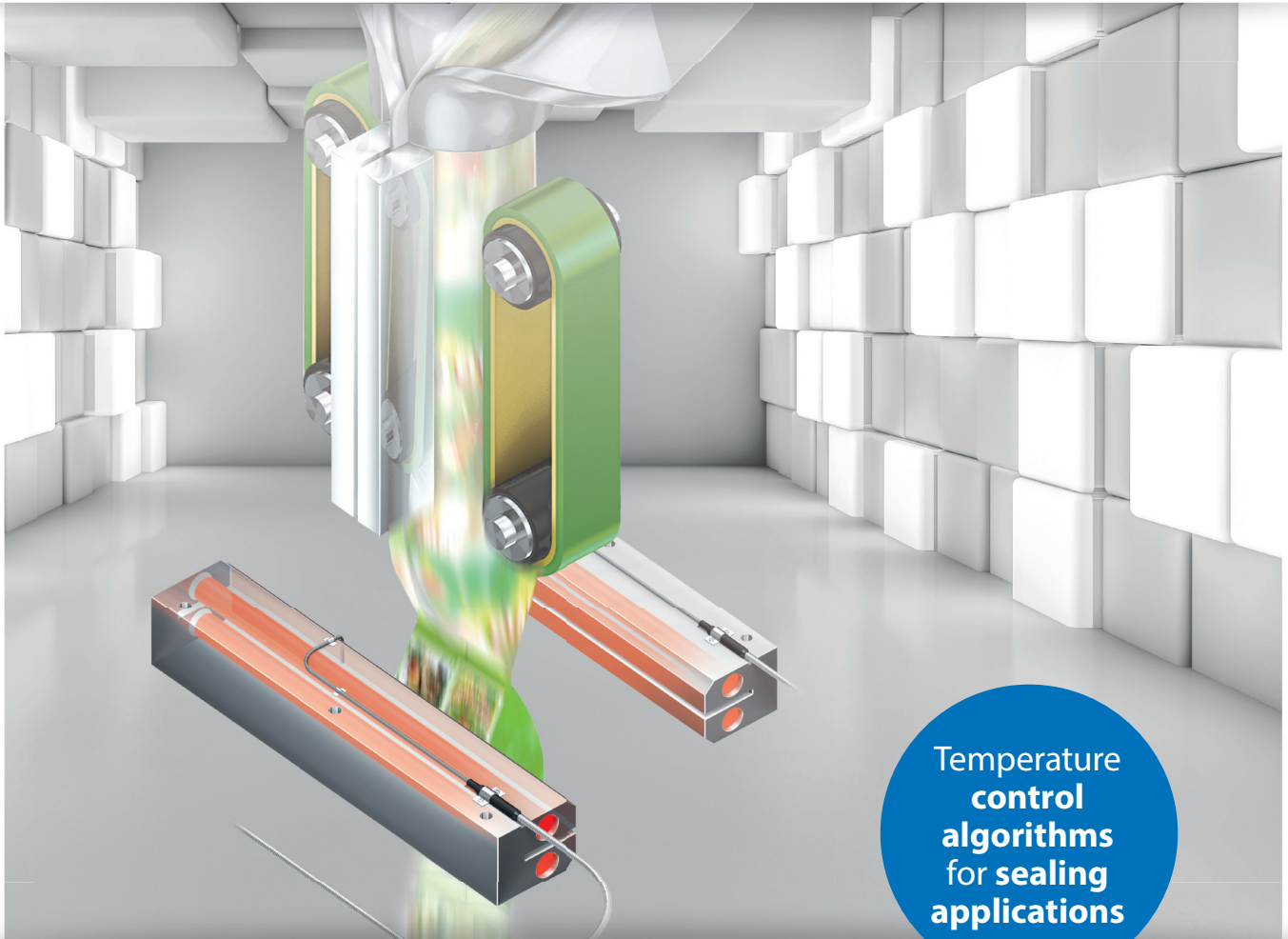# Perfect Sealing

Even with very thin materials

Temperature control algorithms for **sealing applications**

Eliminate product recall costs and possible damage of reputation by tackling temperature control challenges posed by sealing applications even with very thin production materials. These scalable solutions can be used on machines of any complexity - from classic On-panel temperature controllers to PLC integrated control.
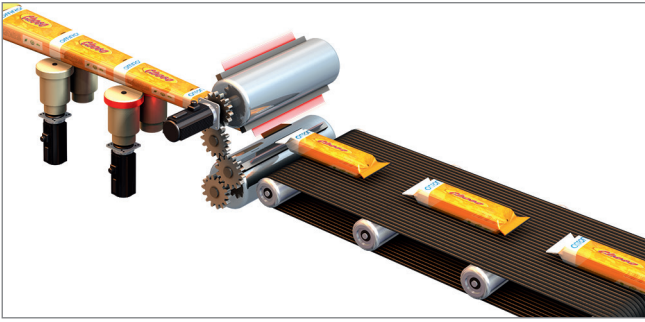
- Increase production by shortening the temperature hunting phase
- Minimize scrap by controlling seal-jaw temperature exactly - even with very thin/echo packaging materials
- Prevent machines stops by Data-driven Maintenance decision-making
- Easier integration thanks to ProfiNet, Ethernet-IP and EtherCAT fieldbuses support

For more information:

📞 +31 (0) 23 568 13 00

industrial.omron.eu

PROFINET®

EtherCAT®

EtherNet/IP™

Increase production by keeping the temperature steady - even when the machine starts
Common challenge in horizontal/vertical flow wrappers machines.
During operation, at each seal, the film absorbs heat from the seal-jaw causing its temperature to drop.
Prevent this fluctuation synching temperature of sealing with machine motion

Product Name	Product Family
Machine controller	NX/NJ series
Remote NX coupler	NX-ECC203 (EtherCAT), NX-EIC202 (EtherNet IP), NX-PNC202 (PROFINET)
NX IO units	NX-TS (Temperature Input) - NX-OD (Digital output)/ NX-TC (Temperature controller)
Sysmac Library for NX/NJ Controller	Direct Power Control (SYSMAC-XR007)
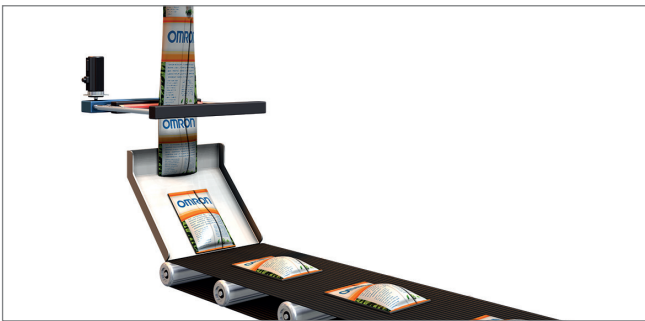
Minimize scrap by exact control of seal-jaw temperature
Common challenge in horizontal/vertical flow wrappers machines

Temperature sensors can often be located too far away from the sealing surface of the heating bar. This causes a difference between the temperature of the sealing surface and the temperature that was actually being controlled. A dedicated sensor and filter algorithm will help keep it under control.

Product Name	Product Family
Remote NX coupler	NX-ECC203 (EtherCAT) NX-EIC202 (EtherNet IP) NX-PNC202 (PROFINET)
In-panel Temperature Controller Units	NX-TC
Temperature Sensors	E52-ETJ1-120-2-P-A E52-ETJ1-100-2-P-B

| Product Name	Product Family
On-panel Temperature Controller	E5ED/E5CD
Temperature Sensors	E52-ETJ1-120-2-P-A E52-ETJ1-100-2-P-B

Data-driven Maintenance decision-making
Common challenge in tray sealers and thermo-form, fill and seal machines: During forming and sealing processes temperature uniformity is critical due to heater degradation, wrong sensor placement or powder adhesion on sealing bar surface.
NX-HTC automatically converts temperature fluctuations and manipulated variables during temperature rise into feature values to immediately detect unusual equipment behaviour.

Product Name	Product Family
In-panel Temperature Controller	NX-HTC
Remote NX coupler	NX-ECC203 (EtherCAT), NX-EIC202 (EtherNet IP), NX-PNC202 (PROFINET)

## Standard P. I. D. control with no-sync

Start Machine — Stop Machine

SP — Defective product below this temperature
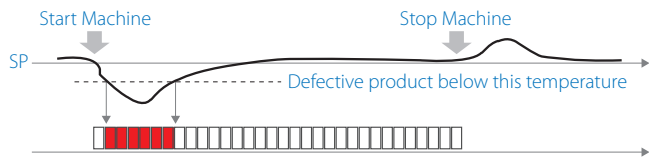
Standard PID control is able to bring the seal-jaw to the right temperature before sealing, as long as the machine is in production. But what if production needs to start or stop?

- Manual PID values adjustment is needed to minimize temperature hunting
- Not suitable for more temperature sensitive materials

P. I. D. control in sync with motion

Start Machine — Stop Machine

SP — Defective product below this temperature
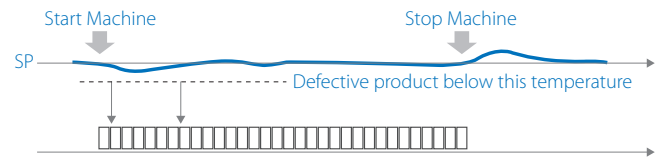
Direct Power Control FB (in NX PLC) and **Pre-boost function** (in NX-TC controller) uses machine start signal to "prepare" the seal -jaw temperature for the soon-coming drop and pre-compensates for that in-sync with motion of the machine

- Higher machine throughput
- Make ready for high-tech packaging materials
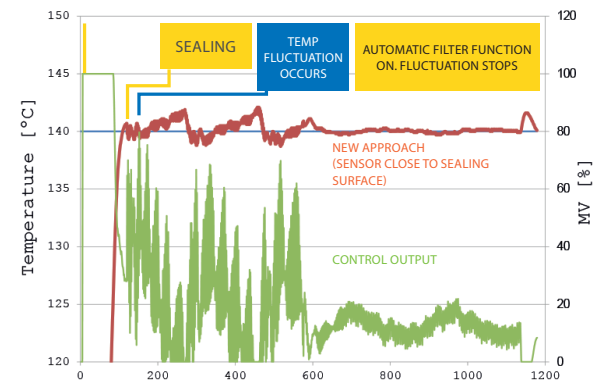
Generic temperature sensors
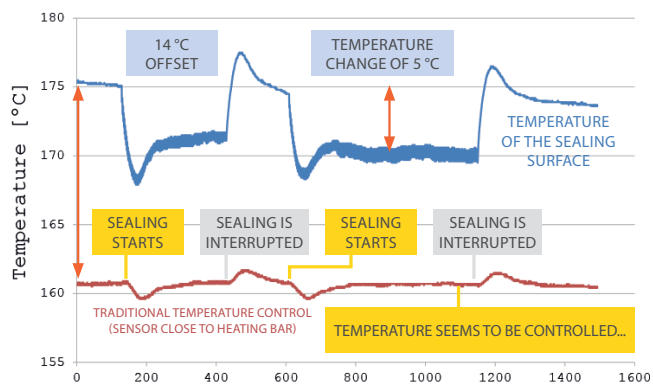
High temperature fluctuation
The sealing surface temperature fluctuates during the sealing process.
Performance affected by machine status.
Very wide offset while the machine starts/stops or when sealing speed changes(pcs/min).

Seal-jaw temperature sensors

Measure and control of the correct temperature
Locating temperature sensor near seal-jaw surface using dedicated sensors (E52-E).
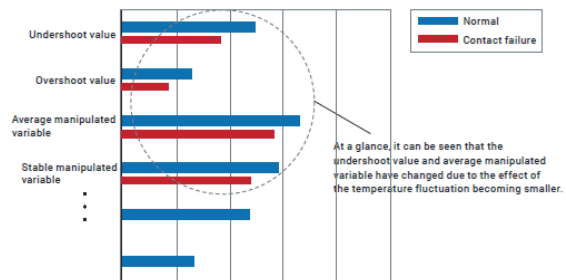**Keep same PID performance as before**
"Automatic filter adjustment function" suppresses seal-jaw surface temperature hunting delivering high temperature control performance.

Slight changes cannot be noticed just by monitoring raw temperature waveforms
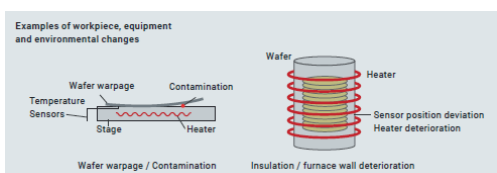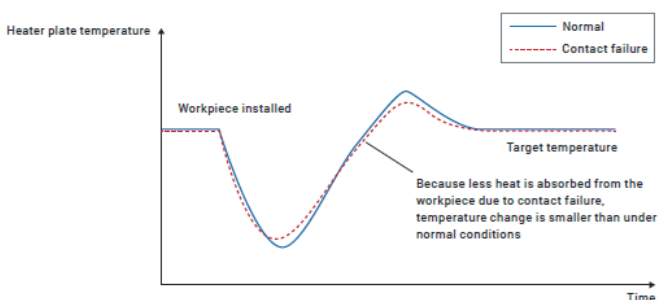
Monitoring feature values enables detection of slight changes

Feature Visualization is a function which automatically calculates 12 types of feature values. Those values are based on Omron's knowledge garnered through our years of experience in temperature control experience, most strongly reflect workpiece, equipment, and environmental changes. The values are calculated from temperature and manipulated variable during production.

Temperature Control facts
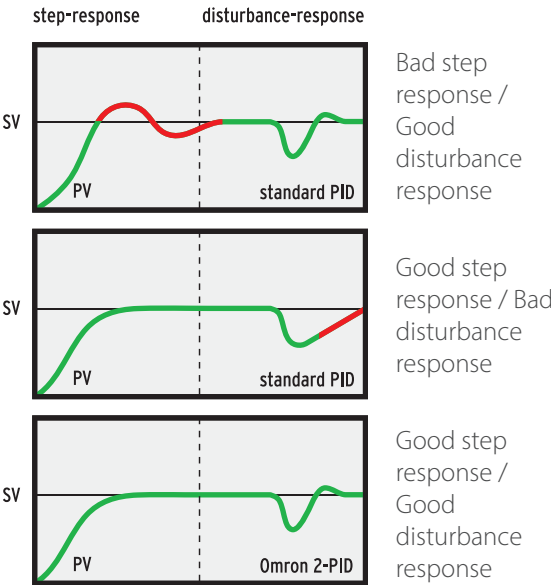
Omron is the world's preferred supplier for TCs

Worldwide every 30 seconds an Omron temperature controller is sold. 24/7

270,000 hours
Reliability is in our DNA

Our Production is of the highest quality standard and the MTBF on for example the E5CC at 270,000 hours is exceptionally high

2-PID Control

Omron's 2-PID algorithm provide 2 degrees of freedom: you get both good step response and good disturbance response. What's even better is that you do not need to take any special action: the controller's built-in technology does all the work.

step-response   disturbance-response

SV — PV — standard PID

Bad step response / Good disturbance response

SV — PV — standard PID

Good step response / Bad disturbance response

SV — PV — Omron 2-PID

Good step response / Good disturbance response

Would you like to know more?

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