OpreX™ Data Acquisition | **Application Note**

YOKOGAWA
Co-innovating tomorrow™

Sterilizer application:
SMARTDAC+ AI-Based
Equipment/Quality Easy Predictive Detection

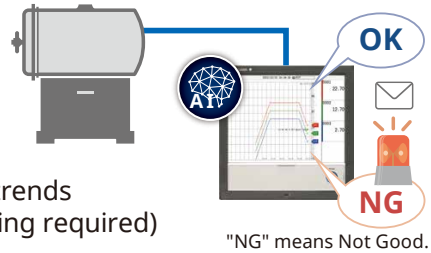
Having any of these problems?

- Want to prevent unexpected product quality degradation
- Unexpected production line shutdown due to equipment malfunction impacts the production plan
- Preventive maintenance is expensive
- Fewer skilled personnel, insufficient skill transfer
- Past recorded data is stored, but not effectively utilized

Solutions with Easy Predictive Detection

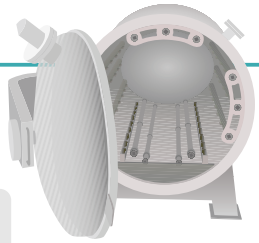
SMARTDAC+ AI notifies you of the deterioration of equipment and product quality degradation!

- Always monitor the status with Health Score
- AI notifies you of prediction of abnormalities on site
- Optimizing costs by performing predictive maintenance rather than preventive maintenance
- AI makes a steady judgment like experienced operator
- Easy to create predictive detection models and profile trends from past recorded data (no AI knowledge and consulting required)



"NG" means Not Good.

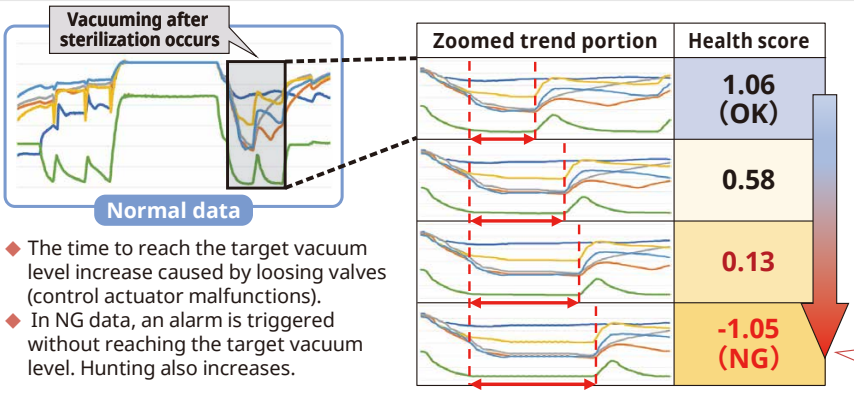
Sterilizer application



Measured data: Temperature, pressure, and others

<<< Example: Applying the Health Monitor function >>>

Requirement: Want to avoid lot rejection by capturing prediction of faulty vacuuming after sterilization (from loose valves, weakened packing, and other causes) before an alarm occurs



- The time to reach the target vacuum level increase caused by loosing valves (control actuator malfunctions).
- In NG data, an alarm is triggered without reaching the target vacuum level. Hunting also increases.

Health score decreases as the time until the vacuum level reaches the target increases

The health score enables you predictive detection of abnormalities!

Email is sent when health score falls below the specified threshold

- ☑ **Before a quality defect occurs, detect abnormal prediction by the changes in the health score**
- ☑ **Enables maintenance and repair before equipment malfunctions**
- ☑ **Can be used as a timing index for packing replacement, etc**

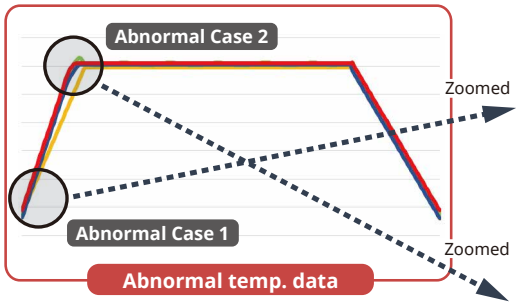
SMARTDAC+ AI-Based Equipment/Quality Easy Predictive Detection

Sterilizer application

Measured data: temperature and others

<<< Example: Applying the Profile function >>>

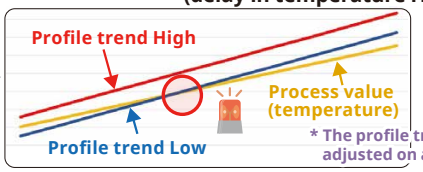
Requirement: Want to detect product quality defects at an early stage by detecting temperature abnormalities during the sterilization process



Profile trend created with a dedicated tool from past recorded data (normal data) can be used as **upper/lower limit thresholds for process values.**

Zoomed

Abnormal Case 1 Does not reach the set sterilization temperature (delay in temperature rise)

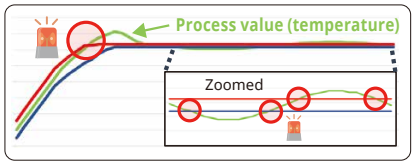


* The profile trend can be easily adjusted on a dedicated tool

Immediately detects a delay in temperature rise before reaching the set temperature

Zoomed

Abnormal Case 2 Overshoot and hunting during sterilization



Immediately detects temperature deviations and issues an alarm

☑ Immediately detects when temperature deviates from an allowable range in real time

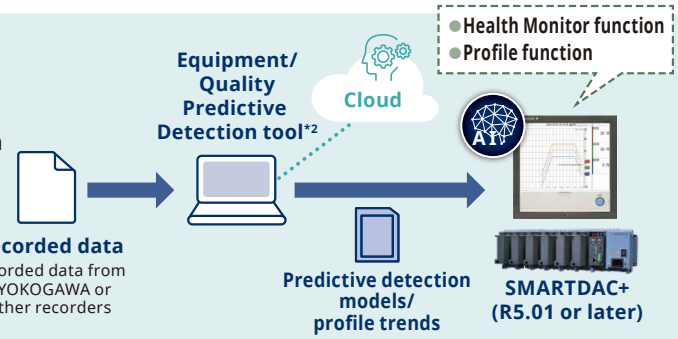
System overview and configuration

SMARTDAC+ Equipment/Quality Easy Predictive Detection is an industry-first feature*1 that uses AI in a recorder or data logger to utilize past recorded data for predictive detection of abnormalities. This function can be easily used without knowledge of AI, and it is possible to directly check the deterioration status of equipment and product quality that could only be judged by experts.

*1 Based on in-house research of April 2022

Easy to use in 2 steps!

1. Using the Equipment/Quality Predictive Detection tool*2, create predictive detection models and profile trends from past recorded data
2. Load your predictive detection models and profile trends onto SMARTDAC+



*2 Tools are available in a cloud version and offline version.
The cloud version is available for Japan, US, Canada, EU, and UK only.

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