

EA-SAS Digital Twin in Dairy Manufacturing



CLIENT	AB Rokiškio sūris
INDUSTRY	Dairy Manufacturing
TECHNOLOGY	Refrigeration
PRODUCT	EA-SAS Cooling

Key result:
19.6% reduction of refrigeration system electricity consumption

AB Rokiškio sūris is one of the largest manufacturers of the dairy projects in Lithuania. Company's Cooling system is based on the two-stage refrigeration system, there are 4 compressors at first stage and 2 compressors at second stage. Cooling capacity is 6 MW. Refrigeration system must ensure such technological requirements: produce iced water of +5°C temperature and refrigerant (ammonia) of -20°C for the technological process and -4°C for iced water preparation. Compressor station is equipped with standard compressors with automation controllers and has installed SCADA system. System is in rather good condition and relatively high automation level as in common practice in the industry.

Why EA-SAS Cooling Digital Twin?

EA-SAS Cooling was chosen in pursuit to solve such challenges:

- **High energy consumption.** The strategic target to reduce electricity consumption for refrigeration.
- **Lack of understanding of saving potential for Refrigeration process.** How to determine actual minimal costs needed to ensure technological requirements?
- **Company CO₂ emissions reduction targets.**
- **Maintenance costs optimization.** How to optimize maintenance costs for compressors, evaporator, condenser?

What EA-SAS Cooling Digital Twin does?

EA-SAS Cooling Digital Twin reduces system energy consumption through optimal control:

- EA-SAS Cooling Digital Twin collects system data from smart metering and SCADA and analyses it in real-time;
- Mass and energy balance is calculated for each 5 minutes;
- **Optimum control Set points for refrigeration compressors operation are calculated and sent to refrigeration control system automatically without human interaction.**

What is the difference between Digital Twin and standard Control system (SCADA)?

Traditional control systems rely on data collection from equipment and PLC control logic, however human is responsible for setpoint decision and changes. Human day-by-day make setpoints changes, and operation results depends on human decision.

Digital Twin together with Artificial Intelligent based algorithms deliver setpoints to the PLC instead of operator. Optimized control Setpoints are delivered each minute, instead of humans with hourly delay.



What was achieved with EA-SAS Cooling Digital Twin?



- ➊ **Reduced refrigeration system electricity consumption:**
 - Refrigeration energy consumption needed to process 1 kg of milk decreased by 31,6 %.
 - **Up to 19,6 % savings from compressors electricity consumption.**
- ➋ **Optimized iced water temperature control:**
 - Optimized cooling off of iced water during night (accumulation);
 - Average iced water temperature increased by ~1-1.5° C and scheduled according to cooling demand.
- ➌ **Online monitoring of Compressor room operation and system's COP in real time;**
- ➍ **Data driven maintenance decisions.**



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