KELLOGG'S USES DATA TO TRANSFORM FOOD PRODUCTION LINES

Kellogg's, like many name-brand food and beverage producers, is adjusting to a world with tighter regulations and safety standards and increased public scrutiny of its products. The company's international assets require infrastructure upgrades to reduce recalls, meet more stringent regulations and sustain consumer trust.

Over the past three years, a PI System™ deployment at Kellogg's manufacturing plant in Valls, Spain, has supported multiple use cases for a plant-wide digital transformation. Data analytics have delivered cost reductions and improved operational standards while enabling a smoother compliance process.

USE CASE #1: DATA MAINTAINS IN LINE WEIGHT

BRC Global Standards conducts an annual audit of the Valls packaging plant, which produces 12 Kellogg cereal brands. Until recently, the weight control system on the plant's packing lines was manual: workers collected data samples twice per shift. "All this equipment was without any connectivity," said Valls PC & IS Manager Emilio Angles at the 2018 PI World in Barcelona. "It created problems with compliance and non-conformity."

The Valls engineers ultimately connected their in-line control to the PI System through Modbus TCP/IP and an OPC DA interfaces. The digitized data could now be channeled to the PI Server, where they were contextualized within Asset Framework and basic calculations were configured as Asset Analytics for "all the variables we need," said Angles, including average weight, the number of cartons rejected for weight irregularities, and other metrics tracked during compliance audits. Production lines now produce samples every 20 seconds in real time – the equivalent of 1440 samples per shift. Non-conformities due to human input error have been all but eliminated.

USE CASE #2: REDUCING FOOD RECALLS AND PRODUCT HOLDS

Food manufacturers must monitor specified critical control points, or CCPs, to guarantee product quality and public safety. The Valls plant's CCPs are tied to ovens, driers and temperature sensors, the conditions of which must be closely monitored to reduce product holds and potential recall events. Starting in 2015, the plant collected data from temperature sensors in the PI System and used

HIGHLIGHTS

64% and 73%
CCP incidents dropped by 64% and 73% fewer cases of product rejected

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67%
In-line stoppages reduced by 67%

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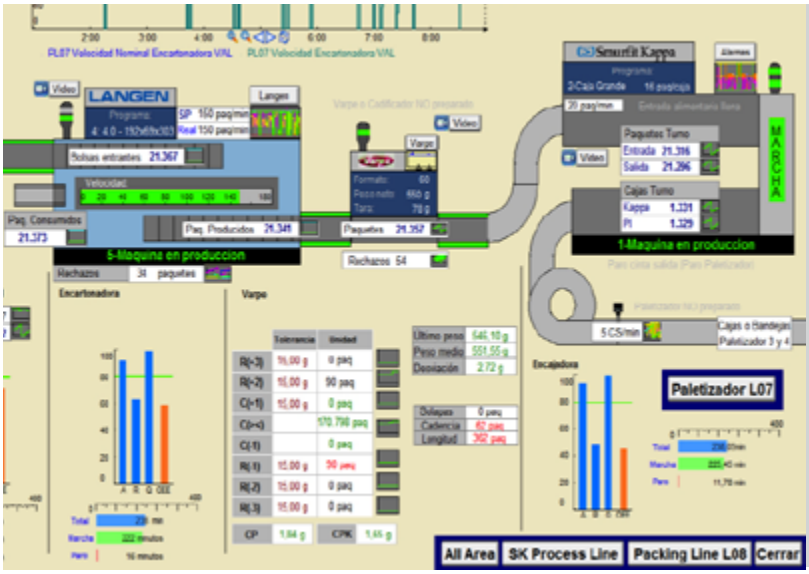
180%
Mean Time Between Failure (MTBF) increased by 180%



Using the PI System's Asset Framework, the Valls plant has created a digital twin of plant operations and increased OEE from 67% to 80%.

PI Notifications to alert different departments to changes in CCP conditions in real time. Richer, real-time analytics helped maintenance become more proactive while reducing variability in product yields.

The PI System has also helped keep conditions within the plant's equipment above critical limits of temperature and slashed product failures. Since 2015, when Valls first used the PI System's Asset Framework to put data in the context of their real-time operations, the number of CCP incidents has dropped 64 percent, and the number of cereal cases scrapped due to failures has been slashed by 73 percent. This contextualized data has helped plant operators create a virtuous cycle of analytics that is expected to further reduce the number of CCP events.

USE CASE #3 – USING A DIGITAL TWIN TO IMPROVE OEE

Meeting best-in-class standards of the Consumer Packaged Goods (CPG) industry was another goal that provided Kellogg with an opportunity to burnish its reputation as a corporate citizen and deliver ROI through cost reductions and more effective plant maintenance. The Valls plant in 2014 rated at 68 percent for overall equipment effectiveness (OEE), but it wanted to reach 80 percent – the benchmark for CPG best-in-class rating.

The plant's management needed to improve equipment mean time between failures (MTBF) rate and reduce the number of minor stops on the line to meet its OEE goal. Better root cause analysis could isolate bottlenecks and reduce stops and line efficiencies. To that end, the plant used Asset Framework to create, according to Angles, "digital twins of all equipment on the packing line." The Asset Framework brought machine metrics onto dashboards, which allow operators to control packing line efficiency in real time and spot maintenance alerts before problems arise. By 2018, Valls had hit the 80 percent OEE benchmark and extended its average MTBF by 180 percent (10 minutes to 28 minutes). Minor stops per hour had been cut by 67 percent.

These three use cases are just the beginning for the Valls plant. According to Angles, the PI System will enable the plant to launch advanced analytics and machine learning initiatives for predictive maintenance and control of product.

For more information about the Kellogg's Valls plant and the PI System, watch the full presentation here.

PI System Components:
PI Server™

- Data Archive
- Asset Framework
- Asset Analytics
- Notifications
- Event Frames

PI Interface for OPC DA
PI Interface for Modbus TCP/IP

"Now we spend less time looking for data and more time analyzing it." Emilio Angles, PC & IS Manager, Kellogg's Valls Manufacturing Plant."

— Emilio Angles,
PC&IS Manager at
Kellog Company

Angles, Emilio. "Use cases of OSIsoft PI System in the Consumer Goods Industry."
https://www.osisoft.com/Presentations/Use-cases-of-OSIsoft-PI-System-in-the-Consumer-Goods-Industry

CBKELLEN-101918