Maple Leaf Foods: Increasing yield and optimizing operations from gate to plate

Maple Leaf Foods - mapleleaffoods.com
Industry - Manufacturing-consumer products

Challenges

- Wanted additional productivity improvements using IoT and AI technologies at its heritage site

- Looking for new ways to drive operational excellence on the production floor

- Wanted to consistently reduce waste and increase yield in bologna production

Solution

- Used AVEVA™ Manufacturing Execution System with advanced AI models from Braincube to find the ideal operating conditions for Maple Leaf Foods' bologna product

Results

- Increased gross profit by 10-12% through waste reduction and improved yield of bologna production

- Leveraged existing AVEVA MES/SCADA systems, layering in more advanced data analysis for near-real-time awareness and response on the production floor

- Delivered ROI in three months

AV=VA

Maple Leaf Foods, Canada's largest prepared meats and poultry producer, prides itself on being "the most sustainable protein company on earth." As a leader in sustainability, the company continuously seeks new ways to optimize operations across the supply chain—as senior solutions architect Andy Thorne likes to say, "from gate to plate." Most recently, Maple Leaf Foods' focused on its heritage plant, where it produces bologna and over 800 million hot dogs a year. The company wanted to ensure product consistency while improving yield and reducing waste on the production floor. That's why Maple Leaf Foods partnered with Cygnus Consulting, an AVEVA System Integrator. Using AVEVA solutions along with AI-powered analytics from Braincube, the company found ideal operating conditions to produce a "golden batch" every production run.

"In the MES, not only do we get all the process data from the plant, like temperatures and cook cycles, but we get all the context of what's in MES, so that when we send up to the AI system, we can contextualize the process data with manufacturing information in the production orders and the SKUs, so all that production information is already pre-packaged for us."

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Blair Hembruff
President, Cygnus Consulting

Leveraging what's already there

When Maple Leaf Foods originally conceived this optimization project, the idea was to use IoT technology —implementing new IoT sensors and data collection with advanced data analysis—to make production improvements. "We initially thought we would put all these IoT sensors in and mesh them together and send the data to the cloud for AI analysis," said Blair Hembroff, president of Cygnus Consulting.

But Andrew Thorne, reminded him, Maple Leaf Foods already had a full end-to-end MES from AVEVA in place, providing contextualized process data. Did they really need a full IoT implementation?

So instead of throwing time and money at brand-new IoT systems, the team focused on leveraging what was already there. Their existing MES already gave them process data from the plant—temperatures, cook cycles—as well as context such as manufacturing information of production orders and the SKUs— which they could then send to Braincube for deeper analysis using digital twin models of the plant's assets. It was also important to the team to get buy-in from the shopfloor, so they involved end users early in the process through UX/UI workshops, listening to and acting on input from operators.

In addition to leveraging what they already had, the Maple Leaf team wanted to measure their success in a meaningful way. So they focused on eight specific use cases to reduce waste at each stage, from log length to slicing to pickling. The end goal was to make a consistent product, cooked exactly the right amount to minimize yield loss from moisture, to send to slicing halls to slice the product with the exact right dimensions, for maximum yield.

Large screen monitors provide real-time actionable information to operators and supervisors

Finding the golden batch

To begin, the Maple Leaf Foods team monitored all logs for consistent length, width, and shape. Using their agnostic AVEVA MES, they measured the log dimensions, sending that contextualized data to Braincube's digital twin models and using the ideal parameters found from that deeper analysis to alert operators when adjustments needed to be made. The AI and machine learning used in the models become more precise the more data they are fed, so that eventually operators end up with the golden batch, the ideal log, every time.

After the logs are portioned out, they go to the batch house to be cooked. It's important to make sure they're cooked completely—but overcooking can result in yield loss from low moisture.
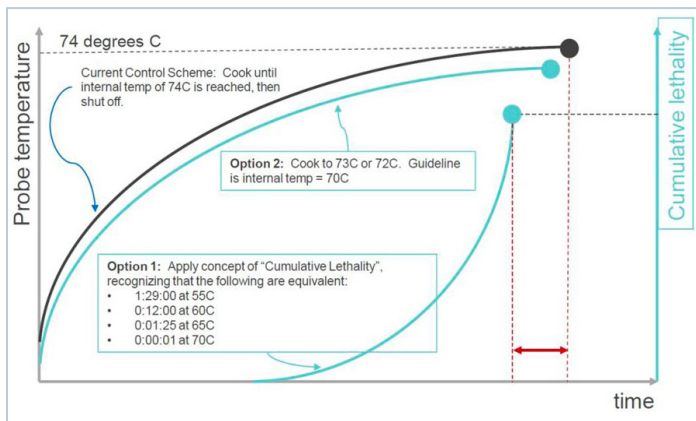
Using data from temperature probes and feeding that data back up to the digital twin, the team was able to find optimal "cumulative lethality," the precise oven temperature that wouldn't undercook or overcook the product.

With a limited number of operators loading multiple ovens, and with products that have different batch house rules, there's a danger that logs stay in the oven too long and overcook. By using temperature probes and oven data from the MES and feeding that data back up to the digital twin, the team was able to find optimal temperature profiles and optimized oven schedules for each SKU.

The biggest area of improvement the team saw was in the slicing of the product—after the logs get cooked, they're sent to the slicers, which are complicated machines. Through close monitoring and adjusting the parameters of these machines, the team was able to find the optimal settings for slicers that increased yield by reducing end loss. Color-coded dashboards on the shopfloor showed operators slicer yields in real time so they knew exactly when the machines were showing deviations and needed to be adjusted. Braincube's models would suggest a .05mm change, and operators would see the effect of that .05mm change immediately. And as each machine wears, this feedback allows them to prolong the life of their equipment.

Real-time dashboards for analysis of process and product variance

Adjusting recipes to get the optimal product and increasing profit 10-12%

Previously, operators would put recipes in and just run the machines. Now, they're adjusting recipes weekly to get the optimal product every time. At each stage of the process, the benefits have accrued—the improvement in the size of the log limits waste; when the logs are put into the ovens, they're coming out consistently optimally cooked — and Maple Leaf Foods is saving money on power by turning the ovens off early; the slicers are turning out maximum yield and minimum waste.

In just three months, Maple Leaf Foods saw a return on investment and a 10-12% increase in minimum gross profit. By leveraging its existing infrastructure and focusing on identifying and measuring each use case, Maple Leaf Foods was able to see precise gains, saving time and money.

Watch the presentation

Citation:

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