A WELL-OILED MACHINE: USING OPERATIONAL DATA TO MITIGATE PERFORMANCE LOSS

Cargill's Global Edible Oil Solutions (GEOS) division fills bottles of olive, vegetable, and other oils for delivery. From raw material management to filling, capping, and then sending the bottles to the warehouse, the multi-step process is complex. Given the volume of the production line, it's imperative that the process runs smoothly every step of the way. Unfortunately, the line was experiencing microstops, or production breaks under one minute, at various points in the process, costing up to 40 hours per month of productivity. Unable to determine root cause, Cargill turned to the PI System to analyze and contextualize operational data and take corrective action.

THE FOUR BUCKETS

As one of the top contributors to production loss, the microstops were concerning. Identifying the underlying reason was critical, but after visually inspecting the line and settings, the team found no anomalies. Line data in the PI System showed production breaks were occurring, but since all performance loss data was located in one large bucket, it was difficult to explore further. To understand how often the breaks were happening and isolate the issue, the company needed to take a more granular approach.

Using PLC information from the filling machine, process engineers created cycle-time tags within the PI System to break the filling process down into four new data collection buckets. Within these buckets, they analyzed upstream information: raw materials, lag time between fillings, actual fill time and any incidents, such as capping, preventing the container from being sent downstream. As tags accumulated data, information was analyzed in PI ProcessBook and production times emerged. Immediately, engineers could see fill time was often twice as long as it should be, but the information lacked one critical element: context to understand why.

DELIVERING CONTEXT THROUGH AF AND EVENT FRAMES

Next, the team pulled the tags and cycle times into Asset Framework (AF), the contextualization layer of the PI Server, to organize information hierarchically by asset, location, and more. By defining other attributes within AF templates, such as

CHALLENGE

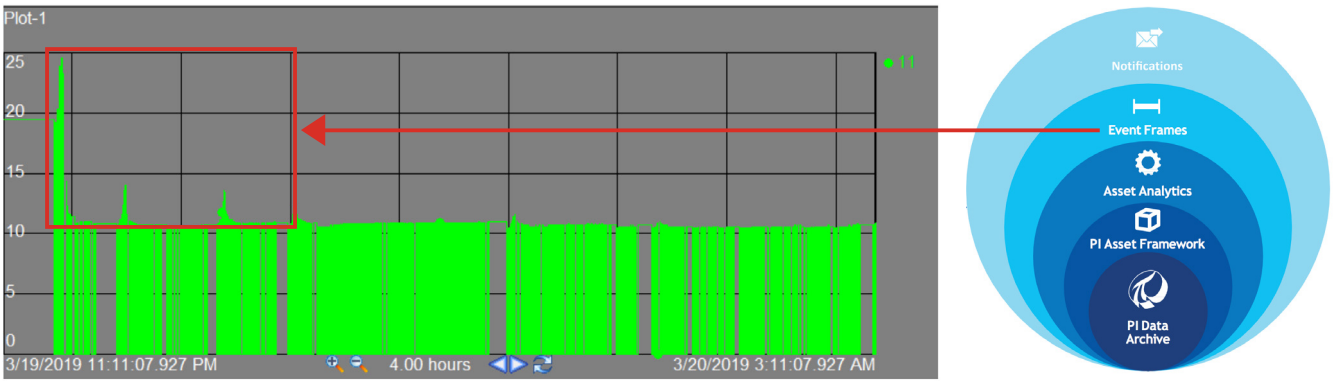
The production line was losing 40 hours a month in productivity due to microstops.

SOLUTION

Optimize the performance of its oil filling plant by tracking events in the PI System.

BENEFIT

The loss was reduced from 20-40 hours per month to just eight.



Cycle 1 Length (Fill Time) **PI Server**

By capturing process events data, the PI System allowed Cargill to optimize performance of its oil filling plant.

temperature, tank level, and pump status, they were able to view line data in an organized manner.

Using the PI System's Event Frames feature to capture, compare, and analyze important process events, the team defined maximum cycle times for the four production data buckets. If a cycle exceeded the maximum allotted time, the PI System captured both the event and associated process parameters. From there, all of the information was pushed into PI DataLink so engineers could analyze tags and events directly in Excel. Immediately, it was clear that two of the data buckets were driving performance loss events.

FILL LEVELS AND DATA FLOW

In digging deeper, the team found variations occurred during filling as well as sending a full container downstream — and they could now see how often events were occurring. Based on this information, they could infer the downstream issue was the capper dropping caps, and a solution was just a maintenance request away. However, they still needed to understand what was triggering the filling issue.

By visualizing information in the PI System, they could see data in a relational way. Data revealed inconsistencies in the fill cycle time: production breaks correlated with the height of the oil in the source tank. As the tank depleted, it was losing head pressure on the pump, extending filling times. Once the set point hit, the tank refilled and cycle times moved back into range.

While tank level data was previously available and easy to view, it was the context around these levels that highlighted how other factors were impacting the process. Overall, the project took just six-to-eight hours to setup, and the team asked engineers for just one hour of time per week for six-to-eight weeks. In that time, they identified the reason behind the breaks, took action, and reduced production loss from 40 hours down to just eight hours per month. Not only that, mitigating production loss during the week allowed them to reduce overtime shifts over the weekend.

Given the success of the project, more engineers are now receiving site level training to understand the value of the PI System and use insights for other processes, such as changeovers, or on other production lines. Through training, they can take brand new PI System users and teach them how to visualize and analyze information in just two hours. With such an adoptable solution, Cargill can now easily replicate the value of the PI System across many of its facilities.

For more information about Cargill and the PI System, watch the full presentation here.

> Once we had information in the PI System, we went from... 20, 30, 40 hours of performance loss per month down to eight — so we saw a huge improvement."
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> *— Lauren Vahle, Process Optimization Engineer, Cargill*

Vahle, Lauren; Varner-Pierson, Monica. "Driving Pack Line Productivity with Event Frames"
<https://www.osisoft.com/Presentations/Small-effort-with-a--big-Payoff---Using-PI-Event-Frames-to-drive-Pack-Line-productivity--Cargillx/>