

OCTOBER 2024

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# Ajinomoto: Machine Learning for Process Monitoring & Predictive Maintenance

Using AVEVA PI System & SAMGUARD

Michael Ross, Chemical Process Engineer

Meg Lashier, Senior Production Coordinator

Eat Well, Live Well.



# Machine Learning for Process Monitoring and Predictive Maintenance with SAM GUARD

Ajinomoto Health & Nutrition North America, Inc.



# Today's Agenda

Who are we?

Who is Ajinomoto?

Problem: We are firefighters

Solution: What is SAMGUARD?

Example 1: Reduced flow to dryers

Example 2: Abnormal scrubber pH

Example 3: Conductivity spikes in seal water

Summary and what is next?

Q&A

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The logo consists of the stylized letters 'Aij' in a red, cursive font.

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# Who are we?

- B.S. Chemical Engineering Iowa State University 2018
- Process Engineer at Ajinomoto Health and Nutrition North America
- Process optimization and improvement with a major focus on analytics and our data/instrumentation infrastructure
- PI System Admin and company-wide subject matter expert

Michael Ross



Meg Lashier



- B.S. Chemical Engineering Iowa State University 2022
- Senior Production Coordinator at Ajinomoto Health and Nutrition North America
- Previously Process Automation Engineer on Automation and Digital Transformation team
- Early adopter of SAM GUARD software

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# Who is Ajinomoto?



**123 plants** produce Ajinomoto Co. products throughout Europe, Africa, Asia, Latin America and North America.



**More than 1,700 R&D workers** are part of The Ajinomoto Group.



**#1 company worldwide** in dried savory ingredients.



**About 34,000** people work for The Ajinomoto Group worldwide.



**1909**

Ajinomoto Co. is headquartered in Tokyo, Japan and is publicly traded on the Tokyo Stock Exchange.



**141** countries and regions sell Ajinomoto Co. products.

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**Aj**  
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# Who is Ajinomoto?



Our story began more than one hundred years ago in Japan, when Dr. Ikeda discovered umami.

Umami is one of the five basic tastes (with sweet, salty, sour, and bitter).



Ajinomoto Co. opened their first North American office in 1917.



Ajinomoto Co.'s first product was monosodium glutamate (the world's first umami seasoning) in 1909.



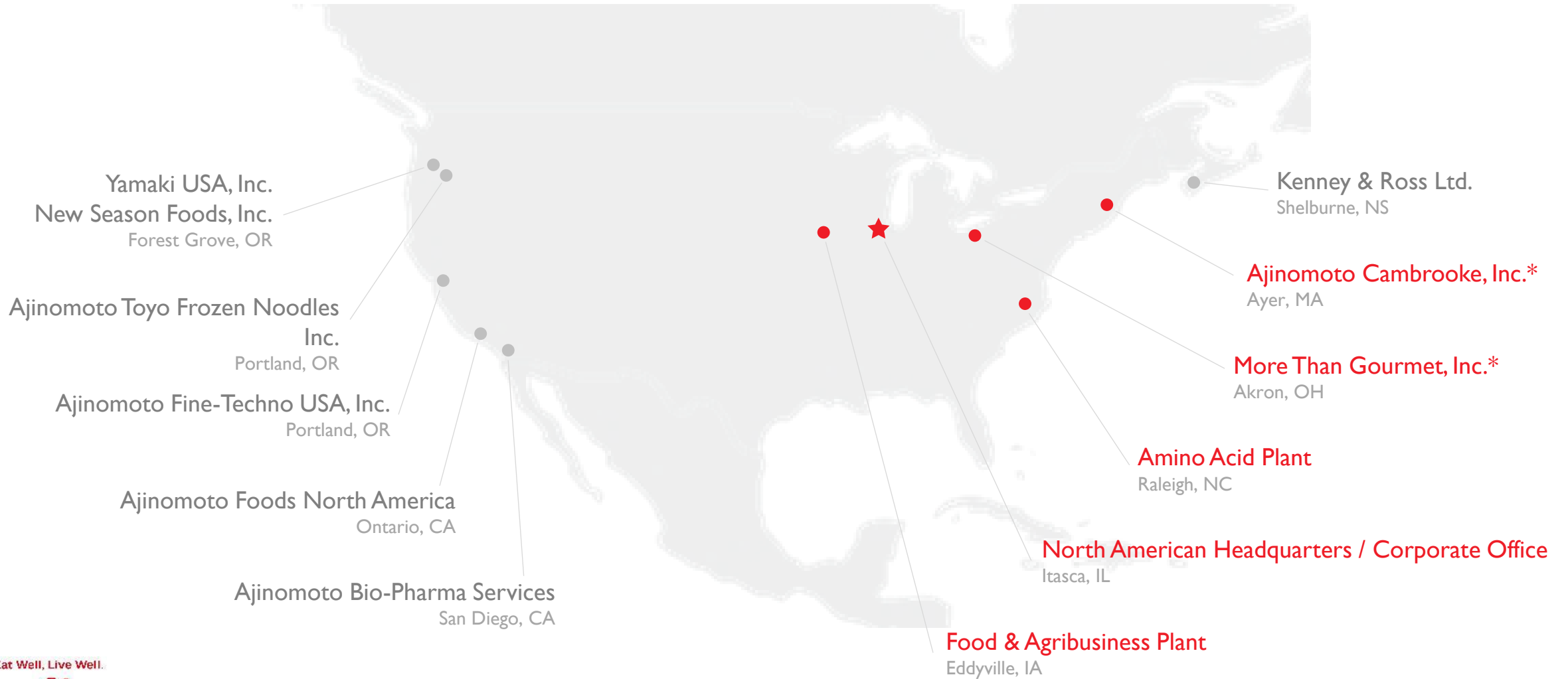
Today, Ajinomoto Co. is a global food and amino acid manufacturer that helps people around the world eat well and live well every day.

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# Ajinomoto Health & Nutrition North America, Inc.



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- Ajinomoto Health & Nutrition
- ★ Headquarters
- \* Subsidiary of Ajinomoto Health & Nutrition
- North American Affiliate

# Problem: We are firefighters (pompiers)

- Fire = problem occurring suddenly and needing immediate attention
- In the past, many times, systems have run to failure. Causing a “fire”
- Some time-based maintenance
- Many DCS alarms and automatic controls on systems
- When failure occurs, unplanned and urgent maintenance must be done. Inherently more dangerous

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# Problem: We are firefighters

- Looking back at PI data, some failures were easily avoidable if signs were noticed
- How do we notice them? Hire 20 more engineers? Set up more alarms for operators?
- NO! There must be a better way
- We want to stop being reactive and start being proactive

Reactive:  
Firefighters



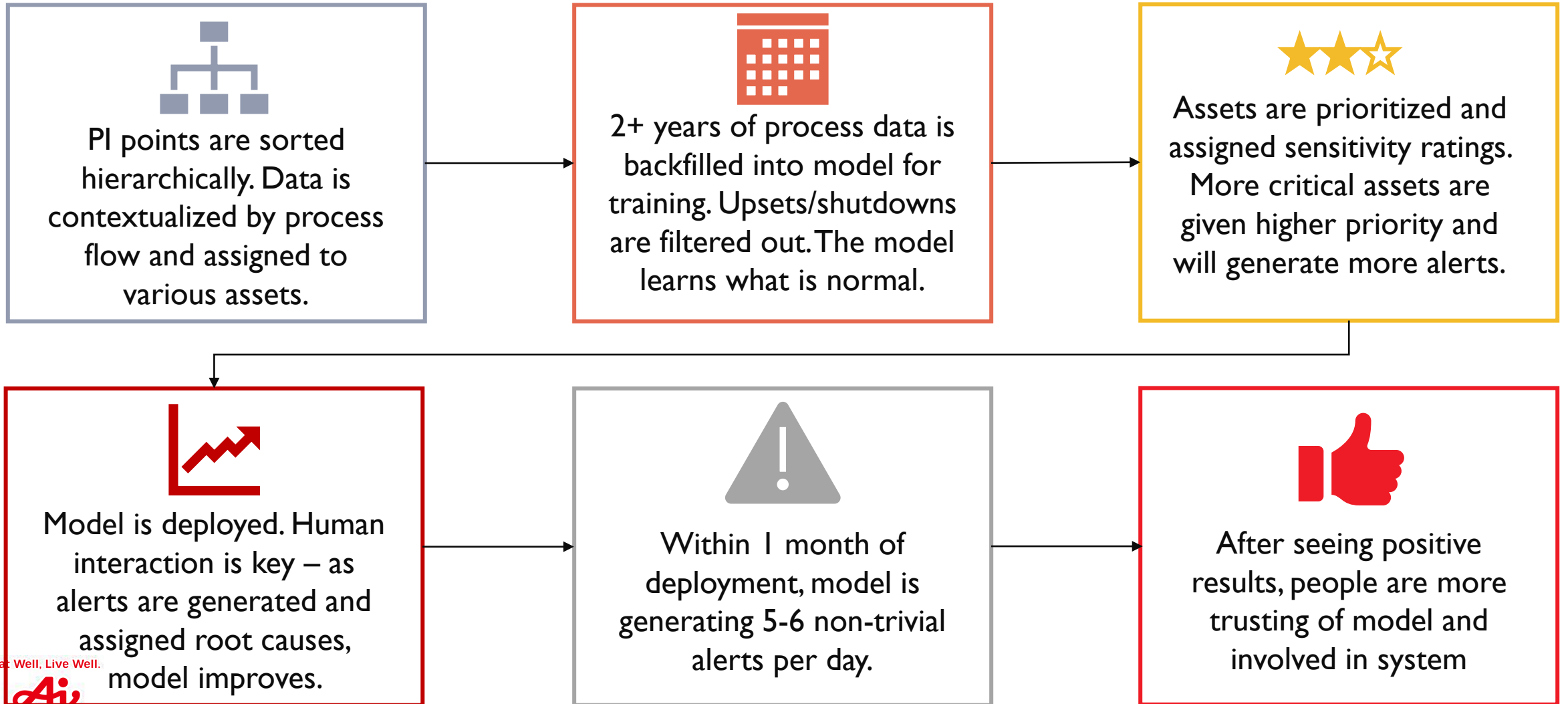
Proactive:  
Fire prevention

## Solution: PI Data "Watchdog"

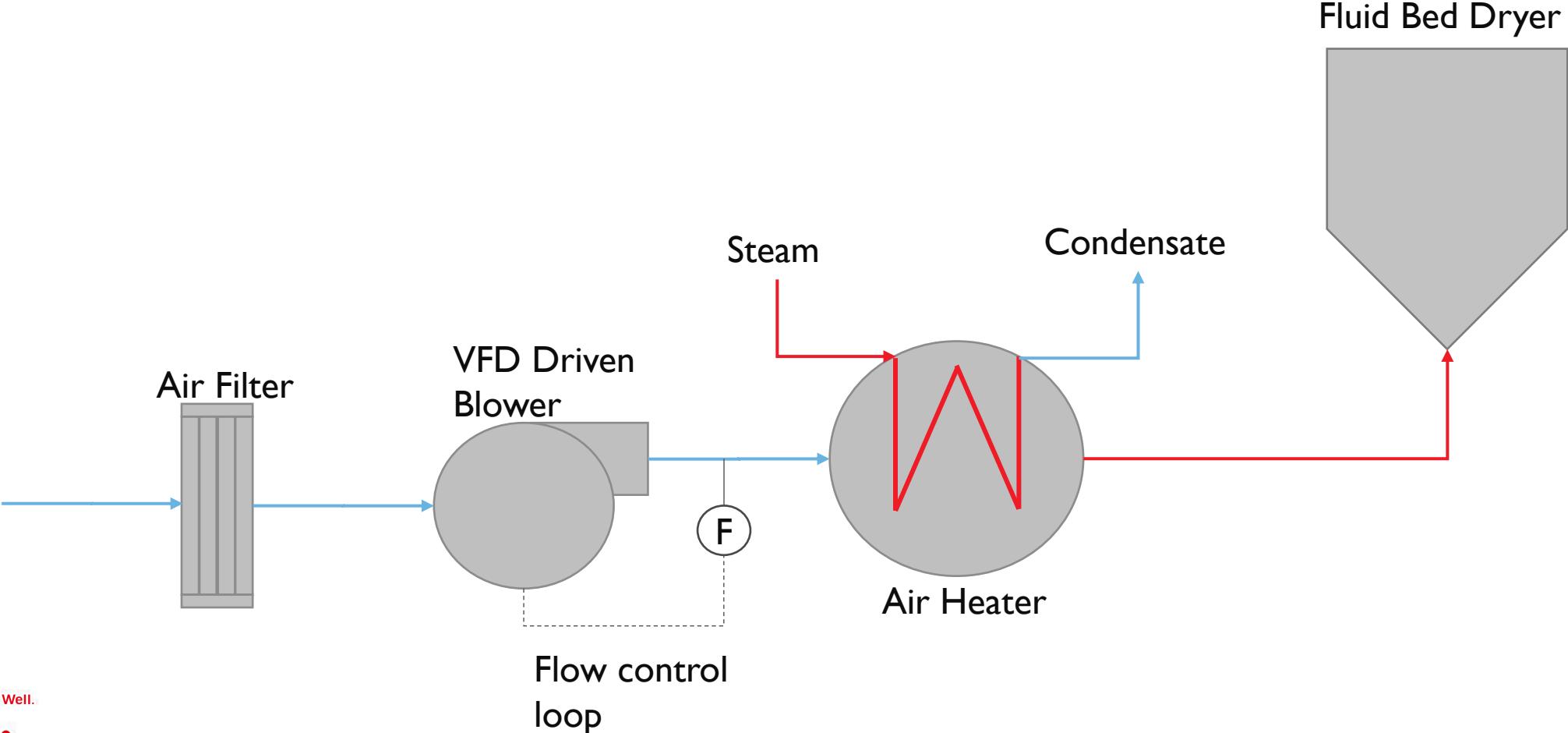
- Machine Learning solution to be the watchful eye over AVEVA PI data
- Team is notified of potential process upsets before they happen
- Decisions to alter course and schedule maintenance prevent serious issues and unplanned downtime
- PI historian and good data collection are the backbone – 3<sup>rd</sup> party software solution connects, contextualizes, and monitors data for anomalies



# Modeling Process



# Example 1: Fluidized bed dryer diagram

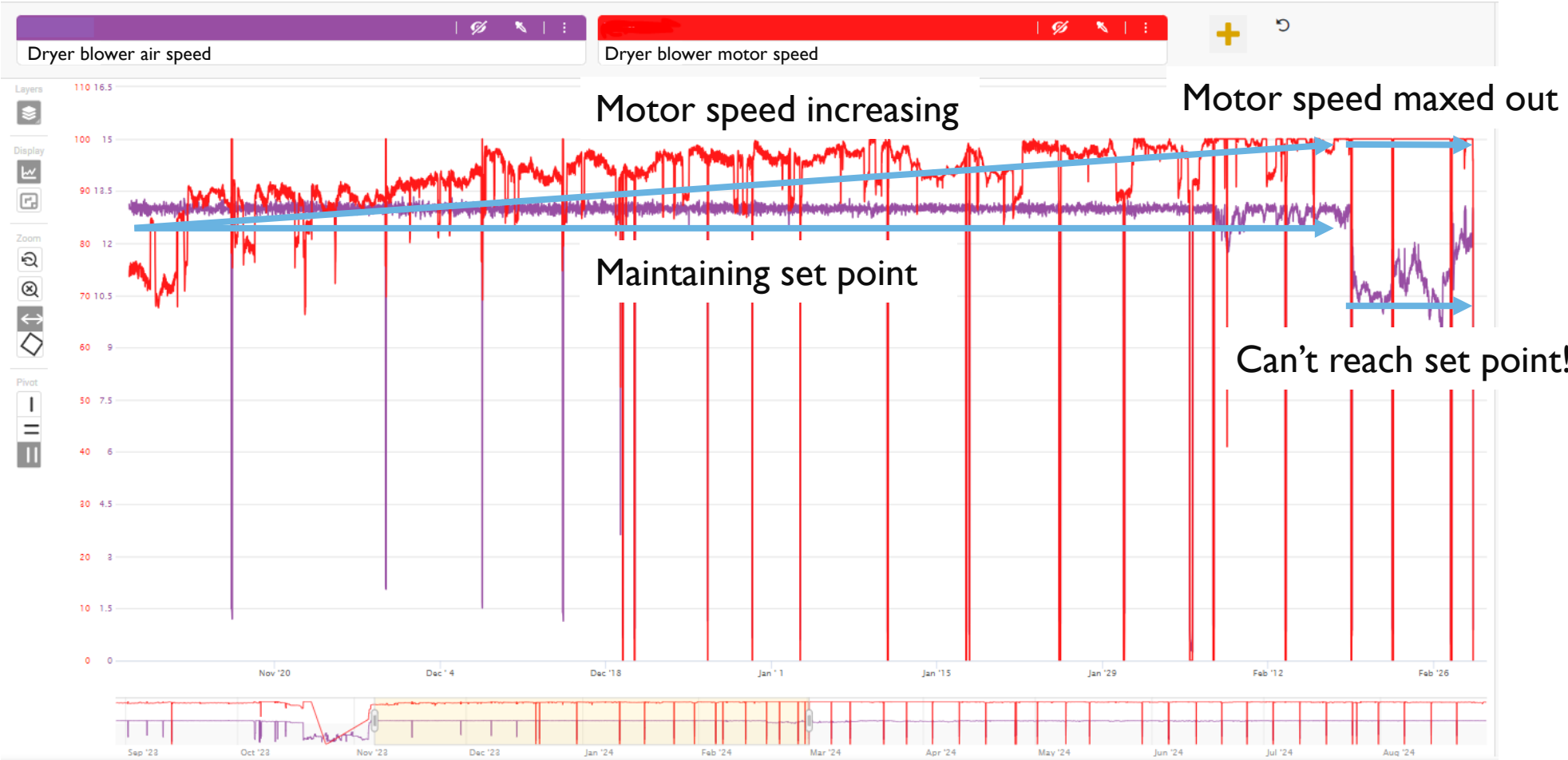


# Example 1: Dryer air flow rate issues

Closed investigation #2632

February 19, 2024 - 07:05

Equipment: Dryer air heater



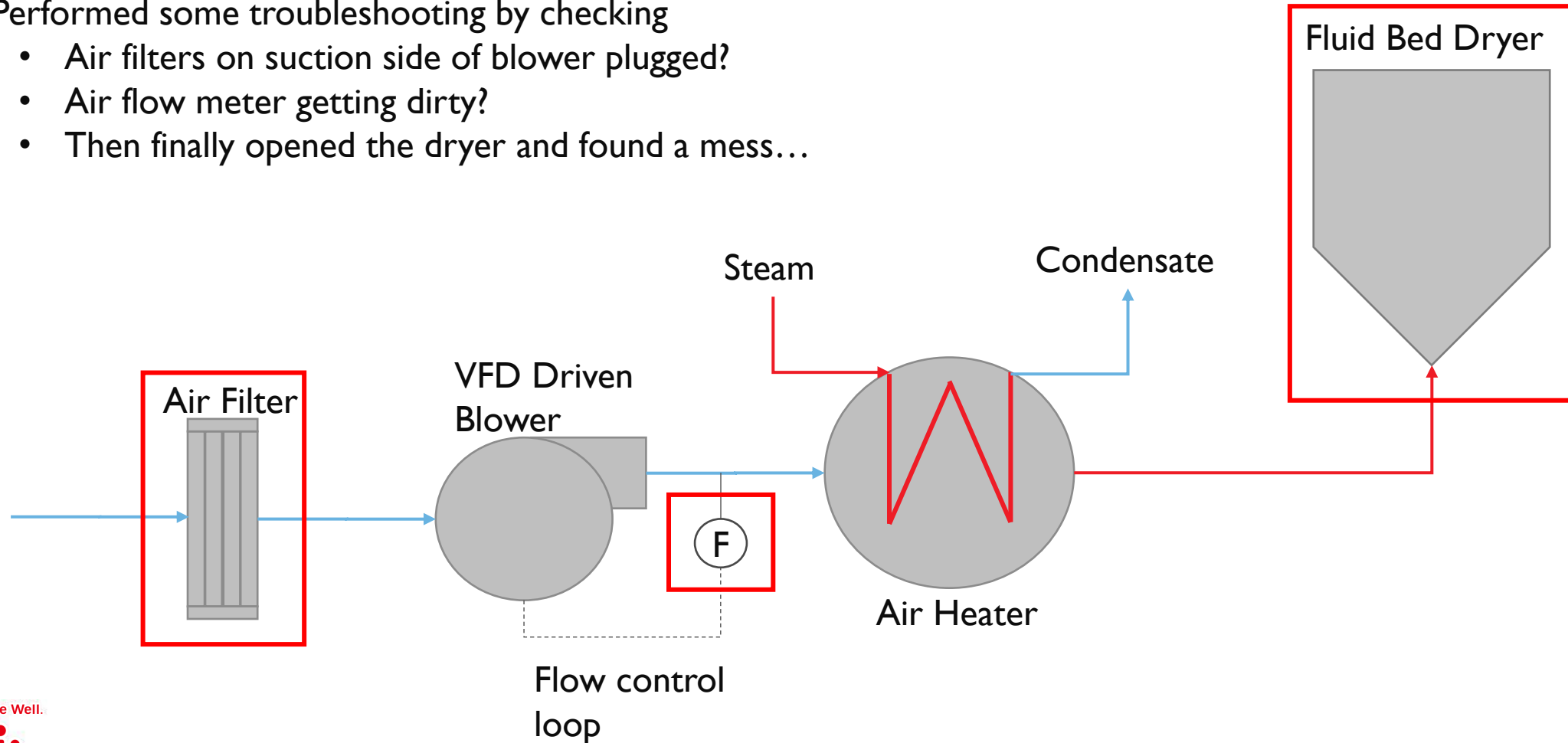
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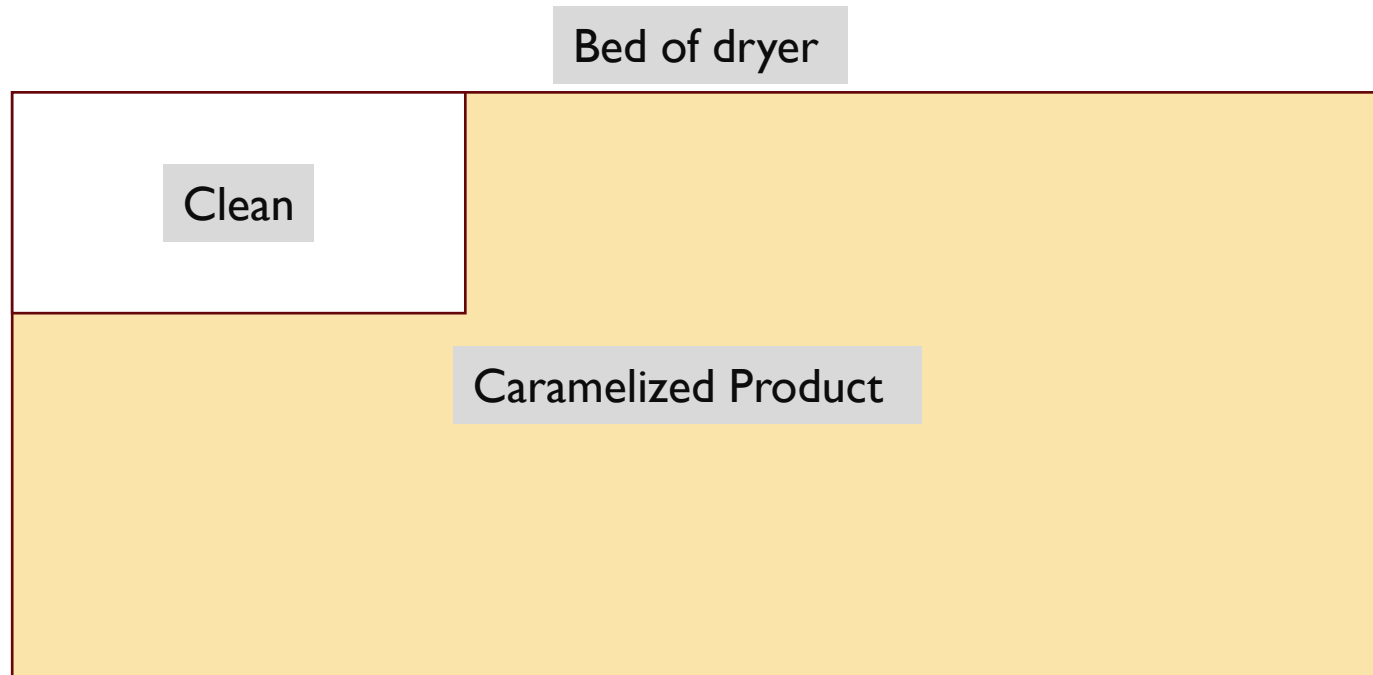
# Example 1: Dryer troubleshooting

- Performed some troubleshooting by checking
  - Air filters on suction side of blower plugged?
  - Air flow meter getting dirty?
  - Then finally opened the dryer and found a mess...



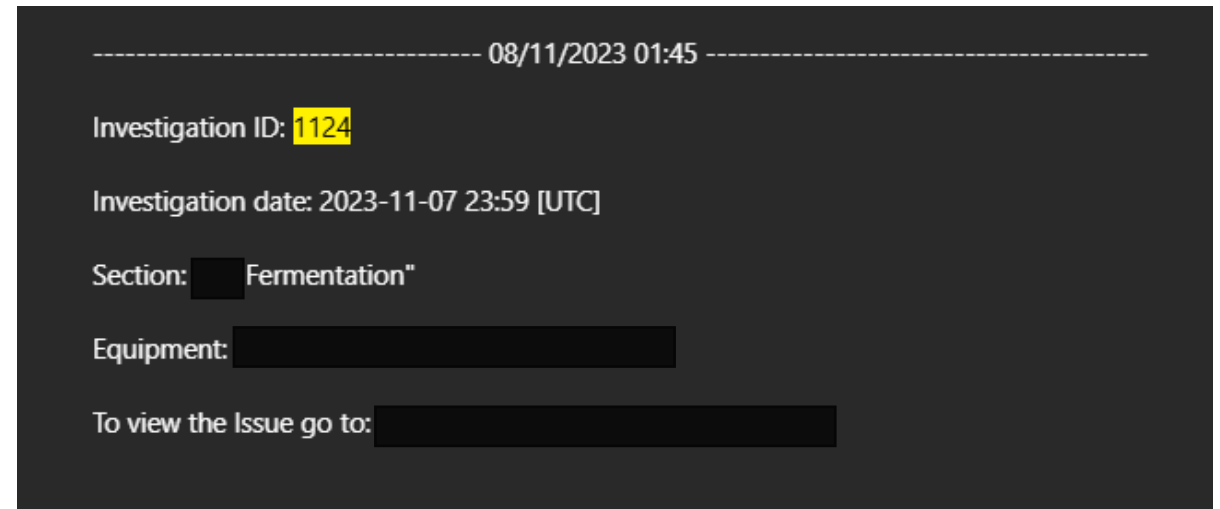
# Example 1: Dryer air flow rate issues

- Root cause was that the dryer bed was 80% covered in this caramelized product
- Opened the dryer during a planned wash day which avoided the unplanned downtime and potential loss of production or a larger upset



## Example 2: Automated Sequence Error

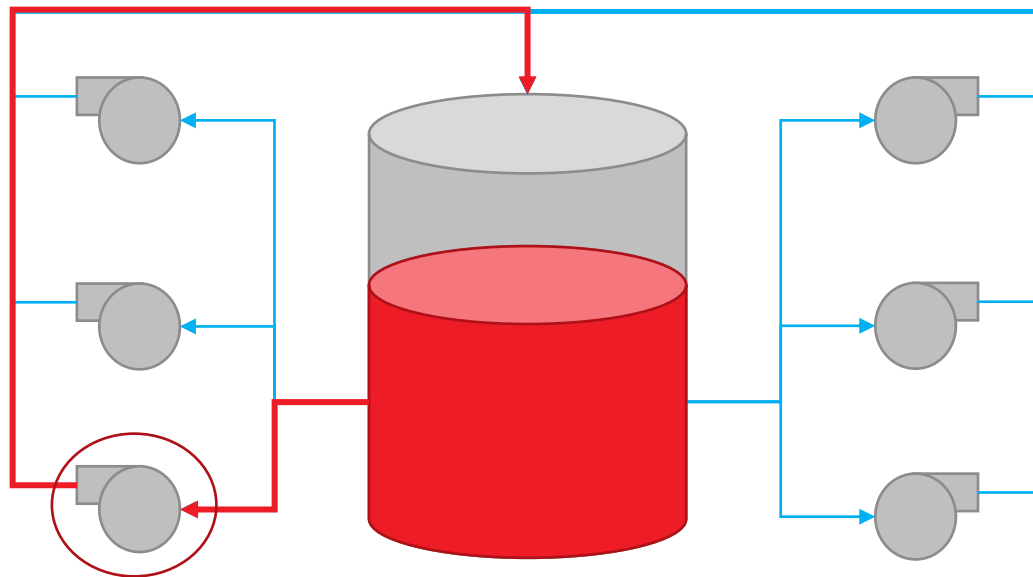
- Alert – abnormal pH and pump pressure on ammonia scrubber
- After extended plant shutdown, sequence had failed to start up
- Model caught the failure before operators did, preventing any potential environmental emissions
- Corrective actions taken to prevent issue from happening again





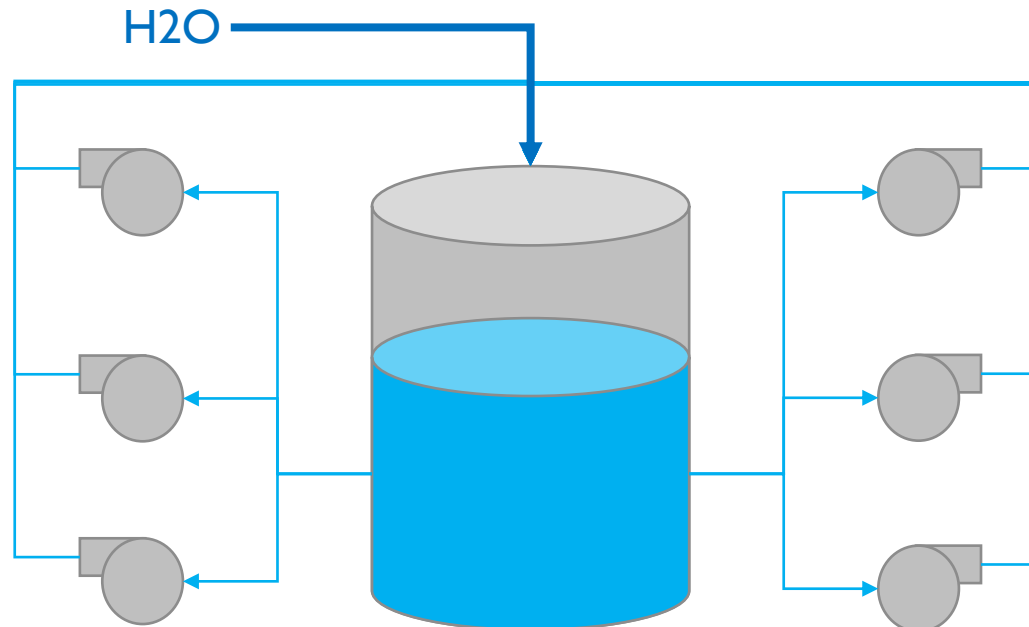
## Example 3: Seal Water Leaks

- Isolated system supplies water to all mechanical seals in plant
  - Water is recycled back to seal water tank
- Model sent an alert for conductivity spikes, as well as pH changes and level dropping in tank
- Root cause analysis led to quick action to fix a pump seal leaking into system
- Prompt response time allowed for minimal dilution of product and contamination to seal water system



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# Benefits Summary



INCREASED  
PRODUCTIVITY



10-15 HOURS/MONTH  
AVOIDED UNPLANNED  
DOWNTIME



ROI OF 5 MONTHS



SAFER WORK PRACTICES  
BY PLANNING  
MAINTENANCE



LEARNING ABOUT OUR  
OWN PROCESS



PEACE OF MIND

# Going forward, what is next?

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Continue to use the model

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Update model as the process evolves

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Expand to new areas of the plant as they become more consistent and have enough data

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Potential expansion to other Ajinomoto facilities as they start up their own PI systems

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Thank you very much! Merci beaucoup!

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Any questions? Des questions?

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# Questions?

Please wait for the microphone.  
State your name and company.



# Please remember to...

Navigate to this session in the mobile app to complete the survey.



# Thank you!