Bridging the Gap

Administration and Manufacturing in the Baking Industry

Administration and Manufacturing

- All too often, a "*left hand not knowing what the right hand is doing*" situation takes place between the administrative and manufacturing sides of a business in the Baking industry.
- How can we bridge the gap?
- What technologies could help?

What is IIoT?

Figure 1 – Courtesy Patti Engineering

- Industrial Internet of Things
- Industry term for a network of devices that are inter-connected.
- Data from these devices can be used to gain valuable insights and lead to better business decisions.

How can IIoT systems help?

- Metrics and Insights
  - The use of IIoT is focused on delivering metrics, insights, and opportunity back to the data owner.
  - OEE (Overall Equipment Effectiveness)
  - AI/Machine Learning

OEE

- OEE is a metric comprised of 3 KPI's (Key Performance Indicators)
- Can be used to tell us how equipment is performing.
- Can be used to create a baseline that can be referenced to determine effectiveness of process changes.

Key Performance Indicators

Figure 2 – Courtesy OEE Foundation

- IIoT allows us to gather these various quality, performance, and availability metrics from various sensors.
- Applying an OEE calculation to every piece of equipment will help to determine bottlenecks.

AI and Machine Learning

- Artificial Intelligence and machine learning can help us analyze vast amounts of data.
- Helps to eliminate the difficulty and reduce the time required to generate useful inferences.
- Apply an algorithm to our data to produce a result set that helps us pinpoint anomalies, produce trends, and visualize processes.

The Machine Learning Process

Step 1	Step 2	Step 3	Step 4	Step 5
Gathering data from various sources	Cleaning data to have homogeneity	Model Building Selecting the right ML algorithm	Gaining insights from the model's results	Data Visualization- Transforming results into visuals graphs

Figure 3 – Courtesy FullStackFeed

Preventative/Proactive Dashboards

- Turn data into actionable events.
- Without action, we don't have a use for gathering the data.
- There are many ways to use this data, we have outlined two common use cases below.
  - SMS/Email alerts
  - Proactive Parts Orders

SMS/Email Alerts

- Be alerted BEFORE a filter became clogged and caused downtime
- Run-to-failure scenario's where parts break down are 100% preventable through proper maintenance of your system.
- Using the correct sensors and data analysis, we can determine when and if a part will fail.
- Example of using data and making it actionable.
  - In our filter example, we can gather feedback from pressure sensors, or other sensor types to determine whether a filter is working efficiently. A maintenance technician could be alerted when something goes out of tolerance.

Pro-active Parts Ordering

- Another great way to make the data we are gathering actionable is to mesh it with data from other systems.
- Automatically order replacement filters for you when it was time.
- Be alerted after the runtime period had been exceeded for a belt or other common wear part.
- Using the data gathered from your system in conjunction with your past order history, IIoT applications can be used to optimize your system.
- Likewise, it can be a great tool for OEM's to raise a flag if a customer is ordering too many replacement parts for a particular area.

How do I get Started with IIoT?

- If you do not have experience in the world of IIoT, big data, and how it can work for you, it can be a daunting task.
- Typically there are two ways to approach a project like this if you do not have in house expertise in this area.
 - OEM Partnership
  - 3rd Party Consultants

OEM Partnership

- OEM's know their equipment and how it operates very well.
- Can enable gathering OEE metrics at a sensor level.
- Eventually, develop plant level OEE calculations that will drive your business decisions in the future.

3rd Party

- Give customers a simplistic view at plant or machine level metrics
- Can provide high level tools to gather metrics from a lower level system or line to provide to a MES system.
- The downside of 3rd-party IIoT tools is the ability to integrate effectively with OEM's ERP platforms or other data sources for a holistic, predictive, and preventative view of plant operations.
- The graphic below represents a typical automation layer hierarchy with IIoT taking the place of typical complicated SCADA setups.

ERP
MES
IIoT
PLC
I/O
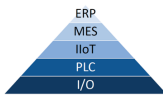
Recap

- How can we bridge the gap between administration and manufacturing?
  - Through data collection and actionable insights
- What technologies could help?
  - IIoT - including preventative/proactive dashboards

Questions