PI Historian enables Enterprise Optimization

PI Historian enables sustaining enterprise-wide Process Optimization for Cargill



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Today's Speakers





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- Chris Christie, PhD
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- Bob Rice, PhD
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Agenda

- Opportunity
 - Intro to Cargill and their PI Infrastructure
 - Intro to why PID performance matters
 - Review industry wide statistics (loops in manual)
- Challenge
 - Adoption of Technology
 - Deployment Strategy
- Solution
 - Review PlantESP
 - Metrics, Hierarchy, Reporting, Root Cause
- Results
 - What are the benefits that Cargill saw



Cargill Snapshot

With more than 150,000 employees



located in 67 countries





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across nearly



is singular: to be the global

our purpose

the global leader in nourishing people

Integrated supply chains & key business segments:







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Oilseed Crush & Refining

90+

Manufacturing plants (with PI Data Historian)









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State of Regulatory Control





Analysis of over 100 Manufacturing Plants..... Over 17 Years Later

Loops Operating in the Correct Mode

- Mostly in Automatic
- Sometimes in Automatic
- Rarely in Automatic

Loops that Display Oscillation

- No Oscillation
- Slight Oscillation
- Large Oscillation

Average Error as Percent of PV Range

- Low Error (<1% of PV Range)</p>
- Medium Error
- Large Error (>5% of PV Range)

Loops that Display Stiction

Stiction Detected
 No Stiction











Benefits from Process Optimization short-lived



- Many loops run in Manual
- Good improvement in control loop uptime after each visit but not sustained long term
- Local team does not have sufficient visibility to underperforming loops



Challenges

- Lose 30-40% of gains from new control strategies
- Multiple control systems across fleet
- Limited Control SME resources for all sites
- Focus only on critical areas rather than the whole plant
- Authentication needed to connect to individual PI servers



Opportunity: Enterprise Agreement with OSI

- Existing Enterprise Agreement provides:
 - Ready PI Server infrastructure at all plants
 - Unlimited PI tag creation capability
 - Consistent and software-independent data silo
 - Short-term deployment at scale
 - Layer of security as tools access PI rather than PLC layer



Search for tool with these Core Requirements

- Leverage Enterprise Agreement
 - Connectivity to PI
 - Ability to Read/Write to PI
- Central Server capability
- Availability of Cargill-defined standard loop metrics
- Reporting Capability for multiple user types



What is PlantESP?



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PlantESP – Configuration from AF or Excel





PlantESP - KPIs

- Used to highlight trends and current conditions
- Each metric has an importance
- Overall Loop Health is an average of loop metrics based on their relative importance value
- Unit Health is an average of loops based on their relative Overall Loop Health value





PlantESP – Data Visualization

Detailed Loop Performance

Area Performance Overview





PlantESP – Root Cause Analysis

Locate Shared Oscillation Frequencies

Identify Correlation Between Loops





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Solution Architecture



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Deployment Strategy

- Implement Standard Control Strategies as part of Productivity Improvement program
- Use PlantESP to monitor performance of control loops that are integral to the Productivity Improvement program
- Incorporate PlantESP metrics and reports into daily and weekly plant production meetings
- Provide troubleshooting guide to be used along with ESP reports
- Relevant PlantESP Metrics reported up the chain of command
 - Local plant → Central/Global Operations Leadership



Enables Sustaining Improvement in Control performance



Sustained Loop Closure → GREATER THAN 95%



Exposes areas of weaknesses: Conditioner Operations - Bean Temperature

- High AAE on Temp (993% increase)
- Steam valve half open after startup causing low temp and high residual fat for ~ 6hrs
- Issue resolved overnight but ESP alerted Supervisor (in the AM).
- This would normally have gone
 unnoticed!!
 - New Area Operators
 - · Supervisor provided training
 - Opportunity to put measures in place to avoid recurrence





Benefits to Cargill from using PlantESP

- Increased focus on Control Loop Performance
- Sustain value realized from improved control strategies
- Better utilization of local and central control resources
- Basic use of PlantESP keeps loops closed and properly tuned
- Mature teams use advanced features of tool for troubleshooting



PI Infrastructure enables faster deployment at scale



- Deployed at more than 60 sites across 4 regions
- 2x faster in Y2
- 3x faster in Y3



Recap



Opportunity

PID Controllers not running in automatic cost money, sustained optimization requires monitoring



Challenge

Deploying to multiple sites across the globe needs to leverage PI System scalability and flexibility



Solution

PlantESP can be implemented quickly across multiple sites to track metrics specific to PID Controller Performance.



Results

Cargill saw sustained improvements to controllers in automatic and improved process control.



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