

At Kellogg, Savings are in the Air!

Michael ThomasPresented byControls EngineerKellogg Company, Lancaster PA



OSIsoft. USERS CONFERENCE 2014

(e) @OSIsoftUC | #UC2014

© Copyright 2014 OSIsoft, LLC.

Kellogg Company

- Kellogg Company History
 - 1894, W.K. Kellogg and Dr. John Harvey Kellogg discover flaked cereal
- (Illustration courtesy of Kellogg Company Timeline)
- 1906, Kellogg Company started in Battle Creek, MI as the "Battle Creek Toasted Corn Flake Company"
- 1907, Original Bartlett Street plant burns down
- Today, Production facilities in 18 countries with product distributed to more that 180 countries
- Other product include Kashi, Keebler and Pringles

Kellogg Company Lancaster, PA



- Kellogg Company, Lancaster History
 - 1976, Kellogg's builds state of the art manufacturing facility in Lancaster, PA
 - Products include:



Kellogg Company Lancaster, PA



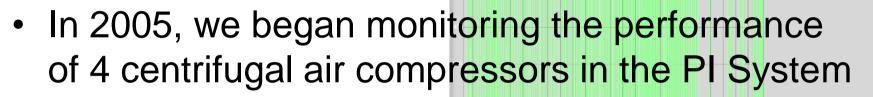
- Kellogg, Lancaster Plant PI System
 - Single PI Server
 - Single Interface Node
 - Current tag count: ~10,500 tags
 - PI System:
 - PI Server, PI ProcessBook, PI DataLink, PI Asset Framework, PI Interface for RSLinx, PI SQC

Michael Thomas, Controls Engineer

- Electrical Controls Engineer, 23 years
- 17 years at the Kellogg Company
- PI System administrator, 15 years
- vCampus member
- Aspiring self-proclaimed "Rock Star"



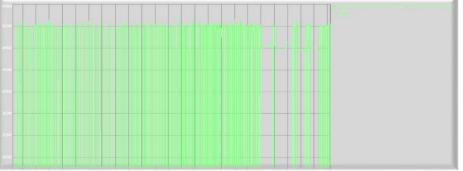
Project History



- Inefficient performance suspected, degree was unknown
- After reviewing historical data and performing some crude calculations, it appeared to be well over 1M kWh/year of waste

Project History

- We began implementing internal strategies to minimize wasteful compressed air consumption
- Although our conservation efforts proved valuable, it did not return the results that we knew were available



OSIsoft. USERS CONFERENCE 2014

Project History

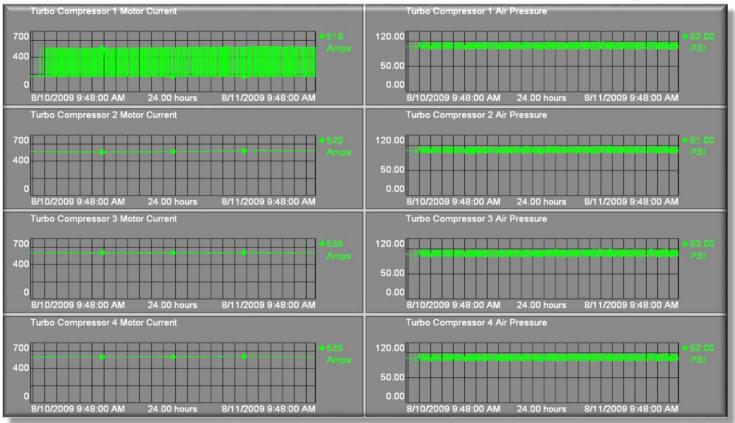


- The data drove us to start looking for better compressor control technologies
- In 2009 we were introduced to "Case Engineering, Inc." through our local service company, Cummins-Wagner Co., Inc, specializing in air compressor controls

TUMMINS-WAGNER

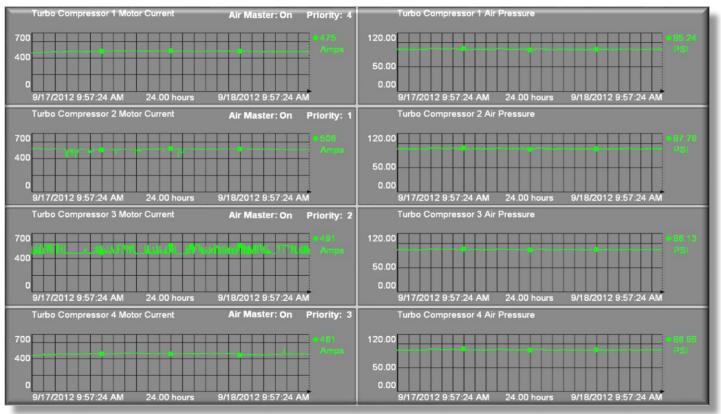
 A new control system was implemented in early 2010 and the savings was immediate

Compressor Performance Pre-Upgrade...



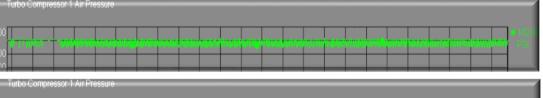
OSIsoft. USERS CONFERENCE 2014

Following the control upgrade...



OSIsoft. USERS CONFERENCE 2014





"...the story gets even better"

OSIsoft. USERS CONFERENCE 2014

Additional room for improvement...

| AIR COMPRESSOR OVERVIEW | AirMaster System Press | Outside Temp 73 | Outside Humidity 92 |
|--|--|---|--|
| Compressor 1 | Compressor 2 | Compressor 3 | Compressor 4 |
| Running Status On On Loaded Status On On On Local Air Press 85.50 PSI System Air Press 86.10 PSI Compressor Air Press 106.28 PSI | Running Status On ● Loaded Status On ● Local Air Press SP 90.00 PSI System Air Press 88.55 PSI Compressor Air Press 96.21 PSI | Running Status On ● Loaded Status On ● Local Air Press SP 88.50 System Air Press 86.72 PSI Compressor Air Press 103.44PSI | Running Status On Loaded Status On Local Air Press SP 87.00 PSI System Air Press 87.41 PSI Compressor Air Press 92.69 PSI |
| Air Master Enabled On Air Master Priority 4 Air Master Press SP 90 PSI Air Master Emerg Press Air Master Auto Rotation Off | Air Master Enabled On Air Master Priority 1 Air Master Press SP 90 PSI Air Master Emerg Press SP 78 PSI Air Master Auto Rotation Off | Air Master Enabled On Air Master Priority 2 Air Master Press SP 90 PSI Air Master Emerg Press SP 78 PSI Air Master Auto Rotation Off | Air Master Enabled On Air Master Priority 3 Air Master Press SP 90 PSI Air Master Emerg Press SP 78 PSI Air Master Auto Rotation Off |
| Loading Status: Loaded Controlling Status: Control To DTL Inlet Valve Position 59 % Bypass Valve Position 100 % | Loading Status: Loaded Controlling Status: Control To PSI Inlet Valve Position 100 % Bypass Valve Position 100 % | Loading Status: Loaded Controlling Status: Control To DTL Inlet Valve Position 28 % Bypass Valve Position 100 % | Loading Status: Loaded Controlling Status: Control To DTL Inlet Valve Position 30% Bypass Valve Position 100% |
| Oil Temp 116 °F | Oil Temp 115 °F | Oil Temp 122 °F | Oil Temp 120 °F |
| Oil Pressure, Before Filter 150 PSI | Oil Pressure, Before Filter 146 PSI | Oil Pressure, Before Filter 150 PSI | Oil Pressure, Before Filter 149 PSI |
| Oil Pressure, After Filter 146 PSI Oil Pressure, Filter Drop 3 PSI Bearing Oil Press 506 PSI | Oil Pressure, After Filter 140 PSI Oil Pressure, Filter Drop 5 PSI Bearing Oil Press 523 PSI | Oil Pressure, After Filter 142 PSI Oil Pressure, Filter Drop 8 PSI Bearing Oil Press 511 PSI | Oil Pressure, After Filter 140 PSI Oil Pressure, Filter Drop 9 PSI Bearing Oil Press 499 PSI |
| Stage 1 Air Temp 75 % Stage 2 Air Temp 112 % Stage 3 Air Temp 106 % Stage 1 Vibration 0.777 mils Stage 2 Vibration 0.464 mils Stage 3 Vibration 0.338 mils | Stage 1 Air Temp 72 °F Stage 2 Air Temp 109 °F Stage 3 Air Temp 97 °F Stage 1 Vibration 0.218 mils Stage 2 Vibration 0.356 mils Stage 3 Vibration 0.374 mils | Stage 1 Air Temp 75 °F Stage 2 Air Temp 104 °F Stage 3 Air Temp 102 °F Stage 1 Vibration 0.462 mils Stage 2 Vibration 0.241 mils Stage 3 Vibration 0.269 mils | Stage 1 Air Temp75%Stage 2 Air Temp400%Stage 3 Air Temp94%Stage 1 Vibration0.539 millsStage 2 Vibration0.490 millsStage 3 Vibration0.451 mills |
| Motor Current 476 Amps 700 0 Motor Power 356 KW | Motor Current 508 Amps 700 0 Motor Power 380 KW | Motor Current 465 Amps 700 0 Motor Power 350 KW | Motor Current 466 Amps |
| Run Hours 76373 | Run Hours 69941 | Run Hours 61204 | Run Hours 76018 |
| Loaded Hours 11513 | Loaded Hours 18510 | Loaded Hours 20055 | Loaded Hours 19259 |
| Warning Status Off O Tripped Status Off O | Warning Status Off O Tripped Status Off O | Warning Status Off 🧔 Tripped Status Off 🥥 | Warning Status Off O Tripped Status Off O |

OSIsoft. USERS CONFERENCE 2014

Additional room for improvement...

- The project success to this point was great but a closer look at the data showed there was room for improvement
- Compressor performance efficiency increased significantly on cold days but flow was restricted due to lack of output from our 500 HP motors

More room for improvement...

- In conjunction with Cummins-Wagner Co., Inc performance benefits of implementing 600 HP premium efficiency motors was evaluated, the potential was solid and the project moved forward
- This phase of the project was completed in early
 2011

PPL Customer incentive program...

- During the motor upgrade design, we were made aware of customer incentives being provided through our local electric provider.
- We met with representatives of PPL and a third party auditor hired to analyze the systems.



OSIsoft. USERS CONFERENCE 2014

PPL Customer incentive program...

- Auditors were shocked to say the least, they have never visited a company that had so much retrievable quality data.
- Based on amount of quality reliable data collected over the life of this project, PPL agreed to take into account all data including the Control System upgrade in 2010 resulting in a larger Customer Incentive Program payout of \$265k.

PPL Customer incentive program...

Left to Right:

Michael Thomas Kellogg Company Controls Engineer

Scott Reilly PPL Electric Utility Key Accounts Manager

Timothy Fritz Kellogg Company Senior Manager, Engineering



OSIsoft. USERS CONFERENCE 2014

At Kellogg, Savings are in the Air!

- "It was a great day to have the PI System"
- Michael Thomas Controls Engineer Lancaster, PA





Customer Business Challenge

- Corporate initiative to decrease carbon foot print.
- Site Goal: Conservation, optimization of resources, and cost control.

Solution

- Implemented Air Conservation program.
- Implemented Air compressor control technology upgrade.
- Leveraged the PPL customer incentive program.

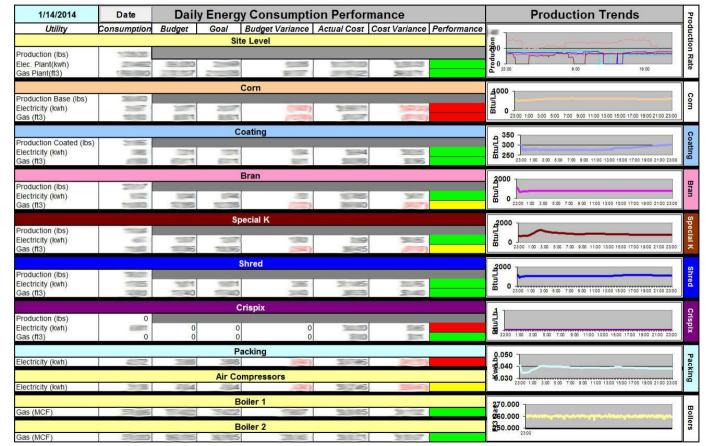
Customer Results / Benefits

 Final result was an energy reduction of over 2.5M kWh/year and a one time Customer Incentive payback of \$265k.

OSIsoft. USERS CONFERENCE 2014

Energy Performance Management

- Daily Real-Time
 Visibility into Energy
 Conversion
 Performance
- Energy Consumption Based on Actual Production Performance
- Simple KPI's for Rapid Line Supervisor Response Time
- Converted Units to Actual Cost Provides Recognizable Impact on Plant Bottom Line Costs

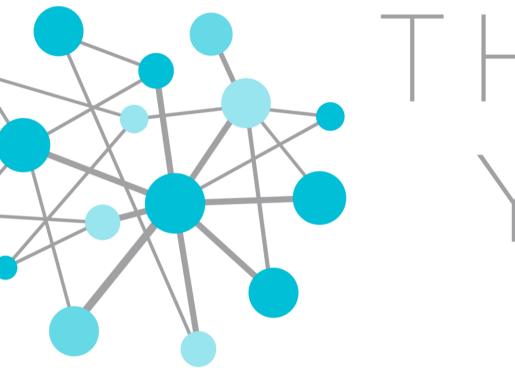


OSIsoft. USERS CONFERENCE 2014

Michael Thomas

- michael.thomas@kellogg.com
- Controls Engineer
- Kellogg Company

OSIsoft. USERS CONFERENCE 2014



- HANK You



OSIsoft. USERS CONFERENCE 2014

(e) @OSIsoftUC | #UC2014

© Copyright 2014 OSIsoft, LLC.