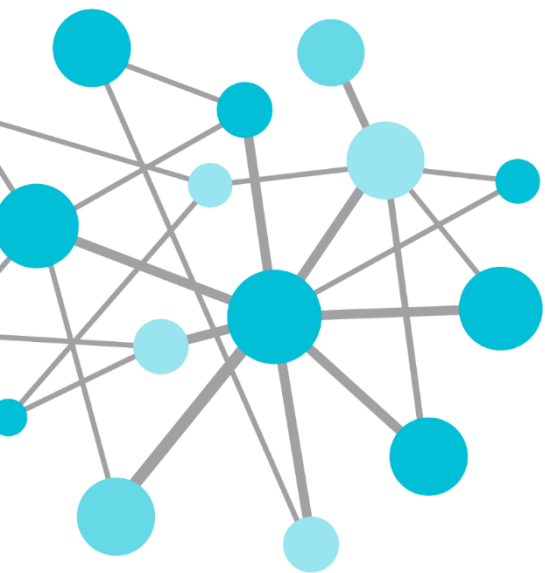




Rapid Insights with Data Analytics – Tate & Lyle Case Study



Presented by Mark Massey, Tate & Lyle

Gopal GopalKrishnan, P.E., OSIsoft

Tate & Lyle overview

- Founded in the UK in the mid 19th century, the Tate and Lyle businesses merged to form Tate & Lyle in 1921
- Headquarters in London and listed on London Stock Exchange:
 - constituent of FTSE 250
 - market capitalisation of £3.7 billion⁽¹⁾
- Business built on Core Values of Safety, Respect and Integrity
- Operations including production facilities and laboratories in more than 30 countries
- Over 4,500 employees worldwide
- Sales of £3.2 billion⁽²⁾ and adjusted profit before tax of £322 million⁽²⁾⁽³⁾
- Over 70% of sales into food and beverage market
- Customers include many of the world's largest food and beverage manufacturers, and industrial and pharmaceutical businesses.

⁽¹⁾ At 11 June 2014

⁽²⁾ For financial year ended 31 March 2014

⁽³⁾ Excluding exceptional items and amortisation of acquired intangible assets and net retirement benefit interest



Tate & Lyle's locations

- SFI Production Facility
- SFI Regional Sales office
- BI Sites
- Global Shared Services

1) US BI Sites:

- Coles, IL
- Cowden, IL
- Dayton, OH
- Decatur, IL
- 1) Duluth, MN
- Findlay, IL
- Fowler, IN
- Francesville, IN
- Heyworth, IL
- Lafayette, IN
- Loudon, TN
- Mattoon, IL
- Parnell, IL
- Pittwood, IL
- Wapella, IL
- Watseka, IL
- Wilmington, DE

1. Chicago, IL Commercial and food innovation centre
2. Mexico City, Mexico Applications lab
3. Sao Paulo, Brazil Regional sales office / lab
4. Buenos Aires, Argentina Applications lab
5. Lille, France Innovation centre
6. Moscow, Russia Regional sales office / Food systems
7. Shanghai, China Regional sales office / Lab
8. Melbourne, AU Applications lab

1. Sycamore, IL Food systems
2. Van Buren, AR Speciality starch
3. McIntosh, AL Sucralose
4. Sagamore, IN Speciality starch
5. Houlton, ME Speciality starch
6. Mold, UK Food Systems
7. Koog, NL Speciality Starch
8. Lubeck, Germany Food Systems / Innovation centre
9. Noto, Ossono, Bergamo, Italy Food systems/Applications lab
10. Singapore Sucralose / Applications lab
11. Brisbane, AU Food Systems
12. Johannesburg, SA Food Systems
13. Kimstad, Sweden SFI ,Tate & Lyle Oat Ingredients
14. Suqian, China Food Systems, Jiangsu Province, China
- Xuzhou, China Food Systems applications lab

2. Almex, Mexico
3. Casablanca, Morocco
4. Boleraz, Slovakia
5. Hungrana Hungary
6. Razgrad, Bulgaria
7. Adana, Turkey
- 1) Lodz, Poland
- 1 Head office / SFI Headquarters

Tate & Lyle's ingredients portfolio

Speciality Food Ingredients

Sales £983m⁽¹⁾ Adjusted Operating Profit £213m⁽¹⁾⁽²⁾

Starch-based Speciality Ingredients

- Speciality starches
- Speciality sweeteners
- Speciality fibres



High-Intensity Sweeteners

- SPLENDA® Sucralose
- PUREFRUIT™ monk fruit extract
- TASTEVA® Stevia Sweetener



Food Systems

- Dairy stabilizer systems
- “Bespoke” blending



Bulk Ingredients

Sales £2,164m⁽¹⁾ Adjusted Operating Profit £172m⁽¹⁾⁽²⁾

US Sweeteners

- Corn syrups
- Dextrose
- Glucose



EU Sweeteners

- Corn syrups
- Dextrose
- Glucose



Industrial and other

- Starches for paper and paperboard
- Acidulants/fermentation/bio-based products and ethanol
- Corn co-products incl. animal feed



⁽¹⁾ For financial year ended 31 March 2014, ⁽²⁾ Excluding exceptional items and amortisation of acquired intangible assets

Tate & Lyle serves major customers worldwide



PI System at Tate & Lyle

- Tate & Lyle standardized on PI in 2000
- The PI system consists of 19 historian servers at 16 sites
 - Each site has a local PI administrator but with little central oversight
 - 486,00 licensed tags
 - 57 interfaces
 - Centralized PI server in Decatur
 - Centralized PI server in Europe
- All servers running pre-PI2010
- Primary tools in use are PI ProcessBook and PI DataLink
- Operations heavily relies on PI as a decision driver

How can we move from being data consumers to information innovators?

PI System Sandbox

PI Server – Site 1



PI Server – Site 2



PI System – Sandbox for Experiments

<http://vCampus.osisoft.com>

Win 2008 R2 or Win 2012 (80GB disk and 16GB RAM)

Office Excel 64 bit - 2010 or 2013
PowerPivot or PowerView

PI Server (vCampus license is OK)

SQL 2012 (SQL Express is OK)

AF 2014 R2 (Server and Client)

EFGen

PI SMT

PI Builder

PI OLEDB Enterprise

PI DataLink 2014

PI ProcessBook 2014

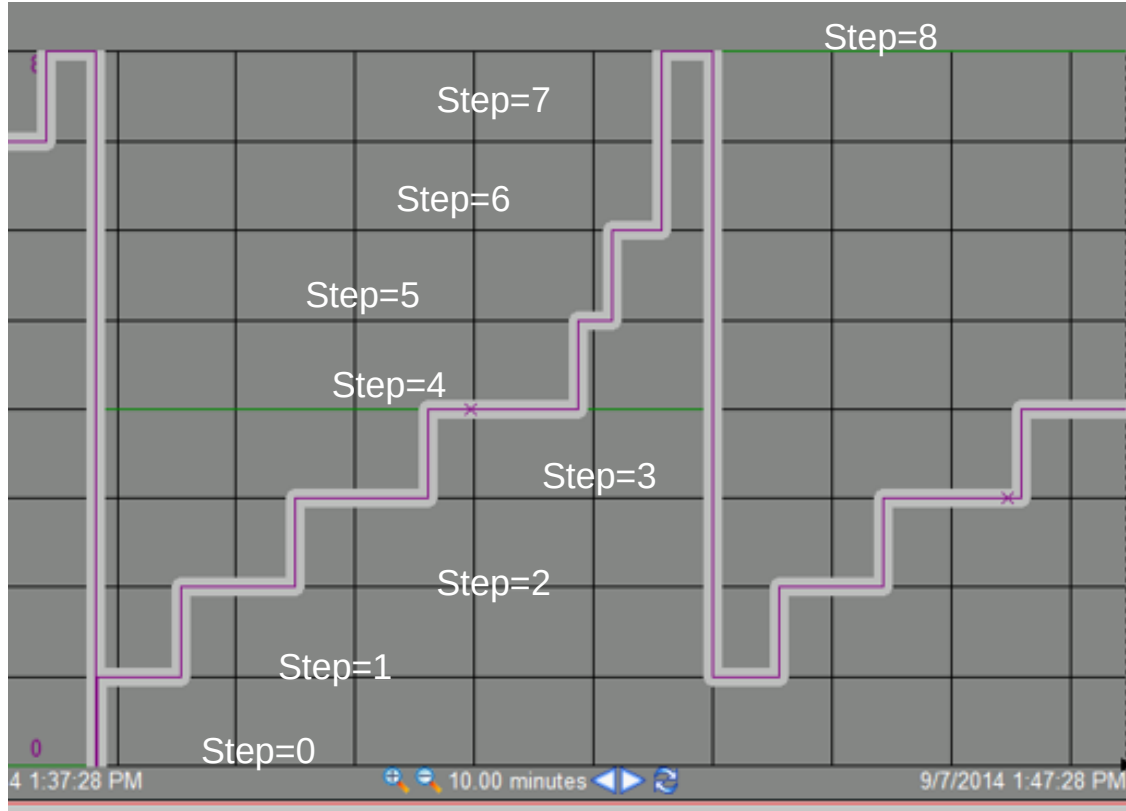
PI Coresight 2014

Rapid Insights

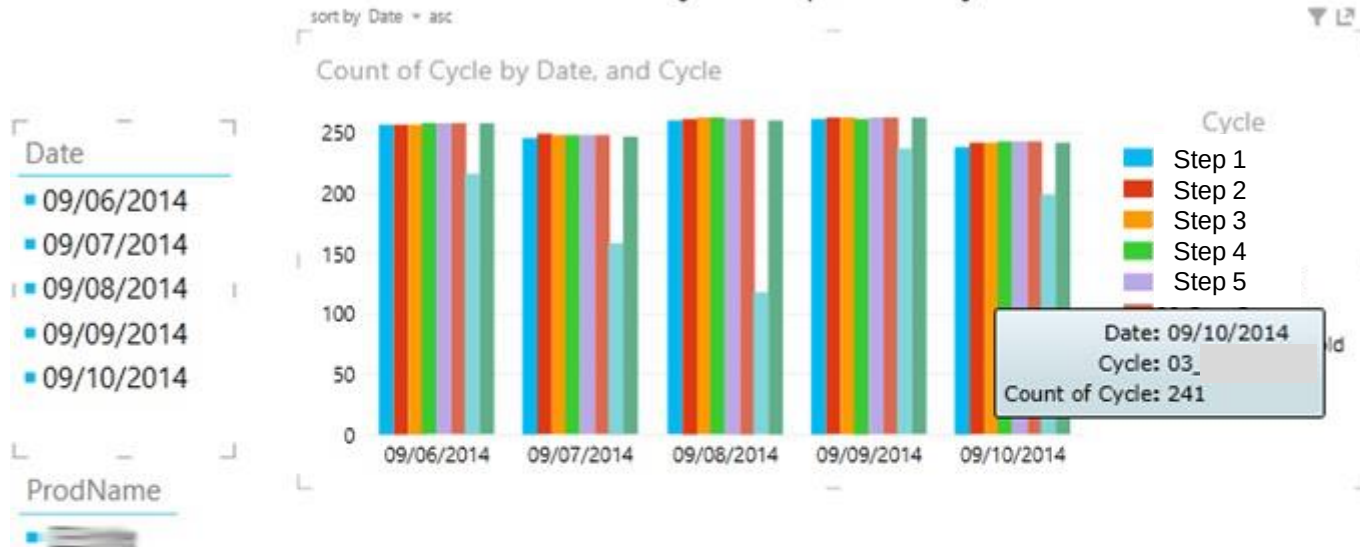
- Where is the process spending time?
- How can I monitor key metrics?
- Where are the downtimes? What is the OEE?
- How can I track energy?
- How can I improve throughput?
-
- Show me – by product, by process cycle, by day...
- Can the new tools bring any insight into my process?

And, we need all this in 2 weeks...

Batch Operation



Cycles per Day



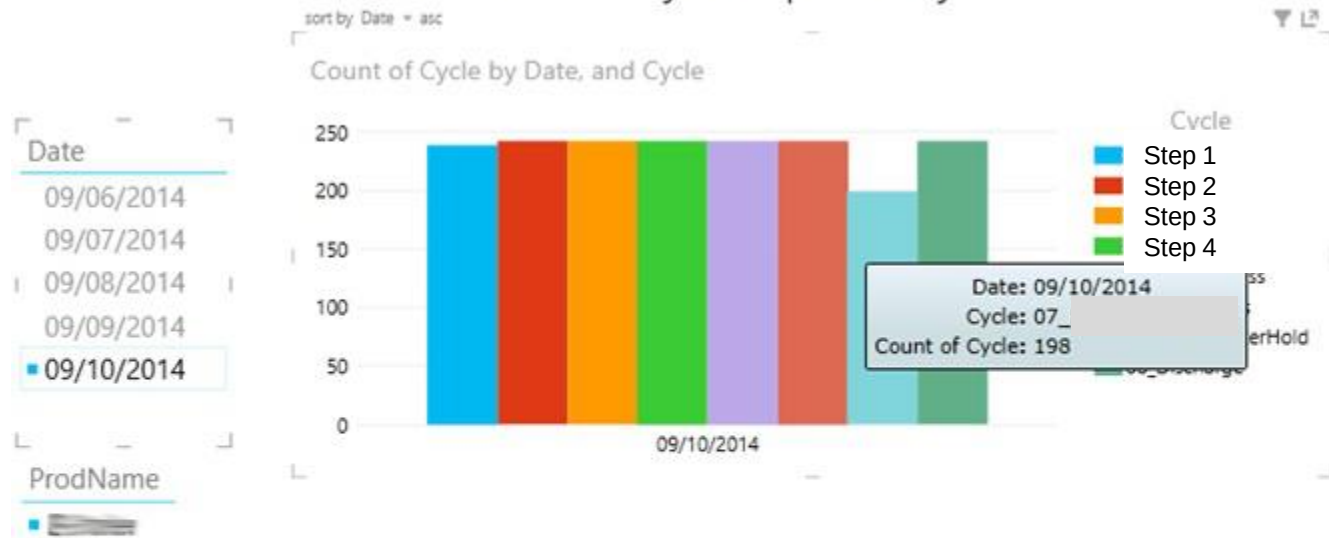
Date Production

09/06/2014	519
09/07/2014	566
09/08/2014	521
09/09/2014	527
09/10/2014	537

Date Downtime_Hours

09/06/2014	1.42
09/07/2014	2.33
09/08/2014	1.83
09/09/2014	1.75
09/10/2014	3.00

Cycles per Day



Date	Production
09/06/2014	519
09/07/2014	566
09/08/2014	521
09/09/2014	527
09/10/2014	537

Date	Downtime_Hours
09/06/2014	1.42
09/07/2014	2.33
09/08/2014	1.83
09/09/2014	1.75
09/10/2014	3.00

Cycles - Duration Statistics

Date

09/06/2014

09/07/2014

09/08/2014

09/09/2014

09/10/2014

Hour

01

02

03

04

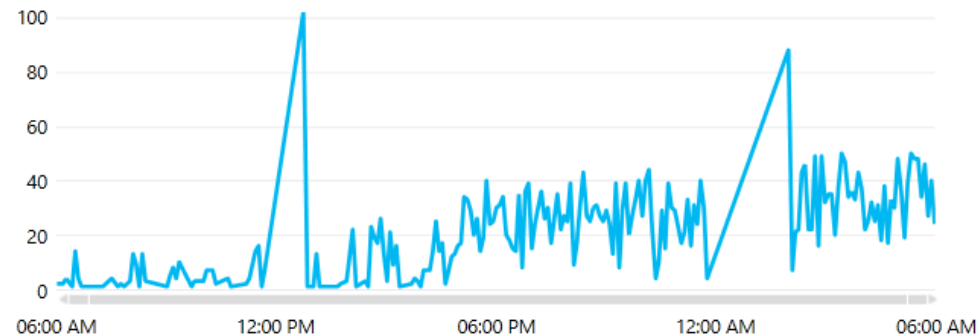
05

06

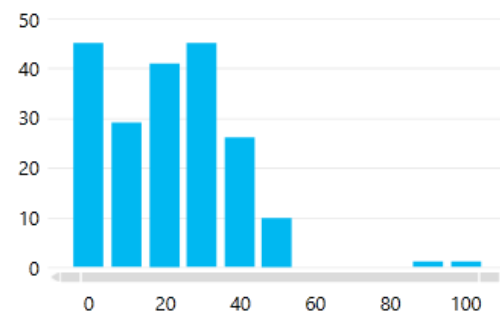
07

08

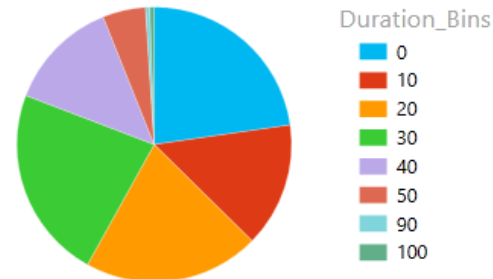
Duration_Seconds by StartTime



Count of Duration_Seconds by Duration_Bins



Count of Duration_Seconds by Duration_Bins



Cycle

Step 1

Step 2

Step 3

Step 4

Step 5

Step 6

Step 7

Step 8

Cycles - Duration in Each Step

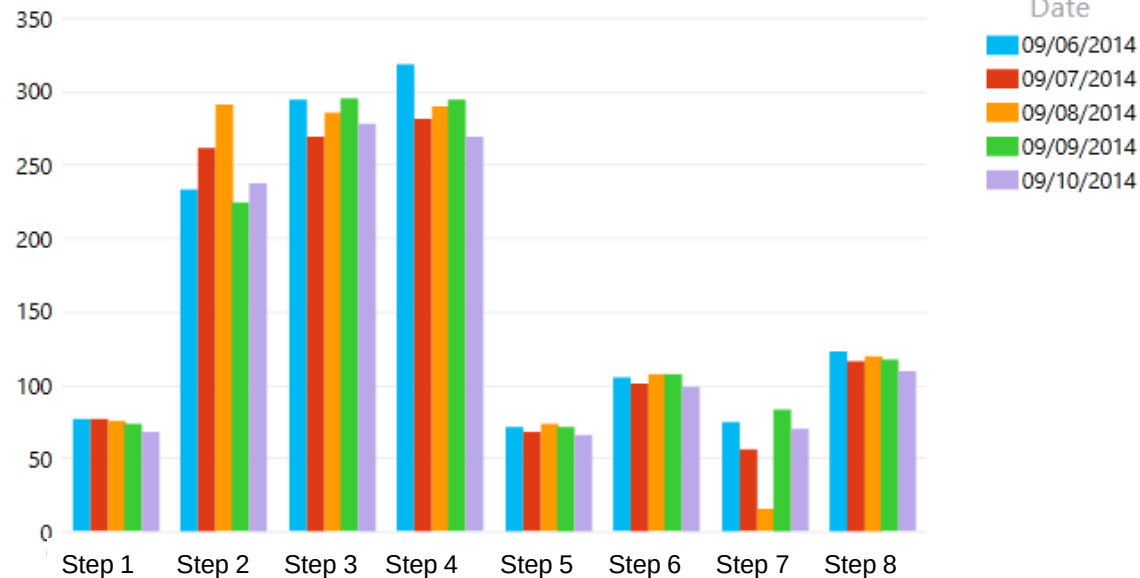
Date

- 09/06/2014
- 09/07/2014
- 09/08/2014
- 09/09/2014
- 09/10/2014

Cycle

- Step 1
- Step 2
- Step 3
- Step 4
- Step 5
- Step 6
- Step 7
- Step 8

Duration_Minutes by Cycle, and Date



Date

- 09/06/2014
- 09/07/2014
- 09/08/2014
- 09/09/2014
- 09/10/2014

Cycles - Duration in Each Step

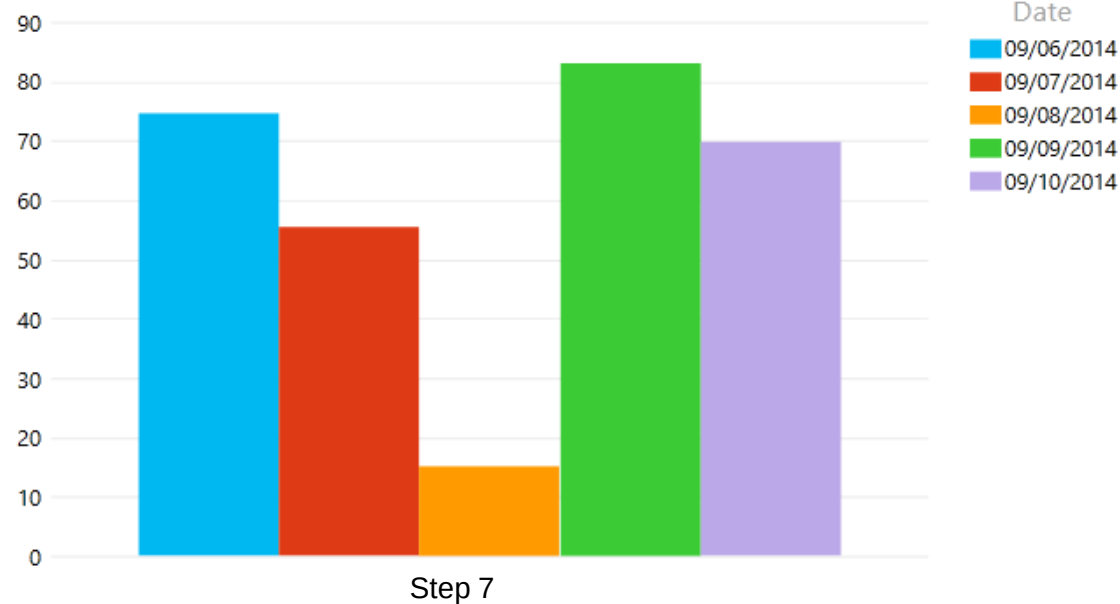
Date

- 09/06/2014
- 09/07/2014
- 09/08/2014
- 09/09/2014
- 09/10/2014

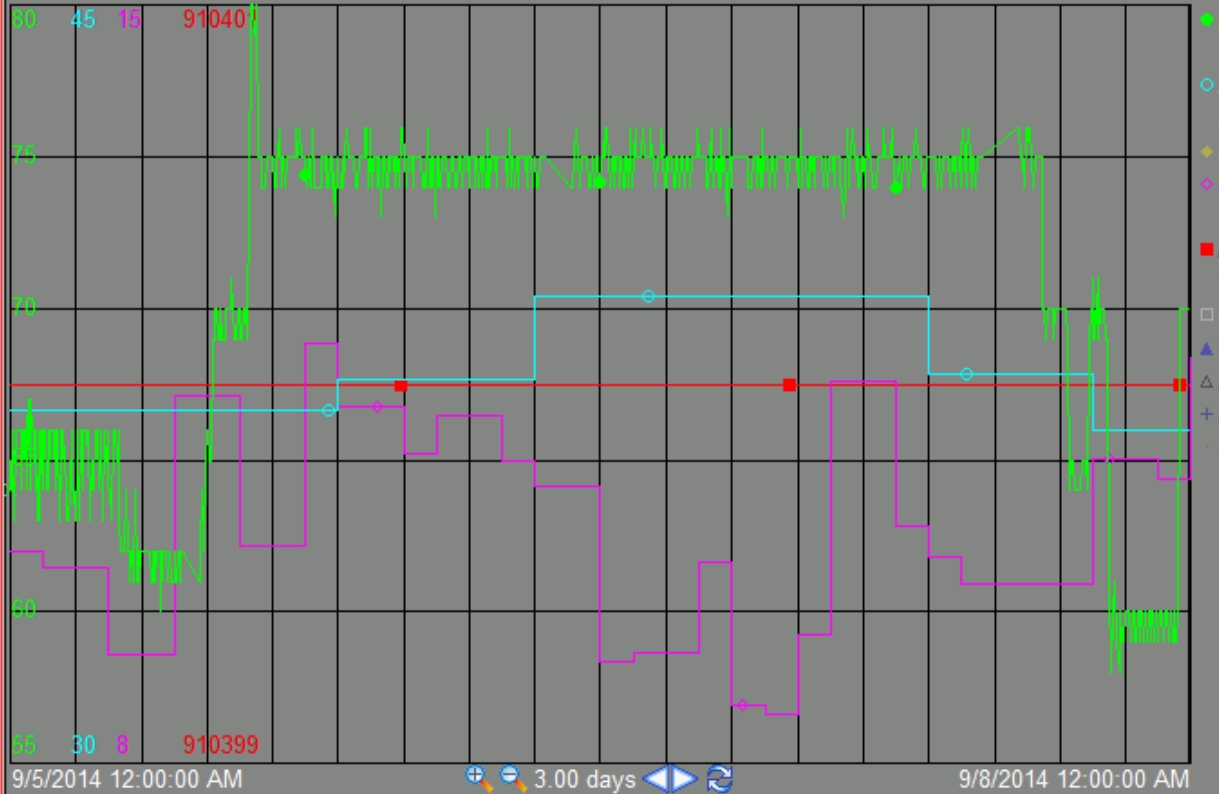
Cycle

- Step 1
- Step 2
- Step 3
- Step 4
- Step 5
- Step 6
- Step 7
- Step 8

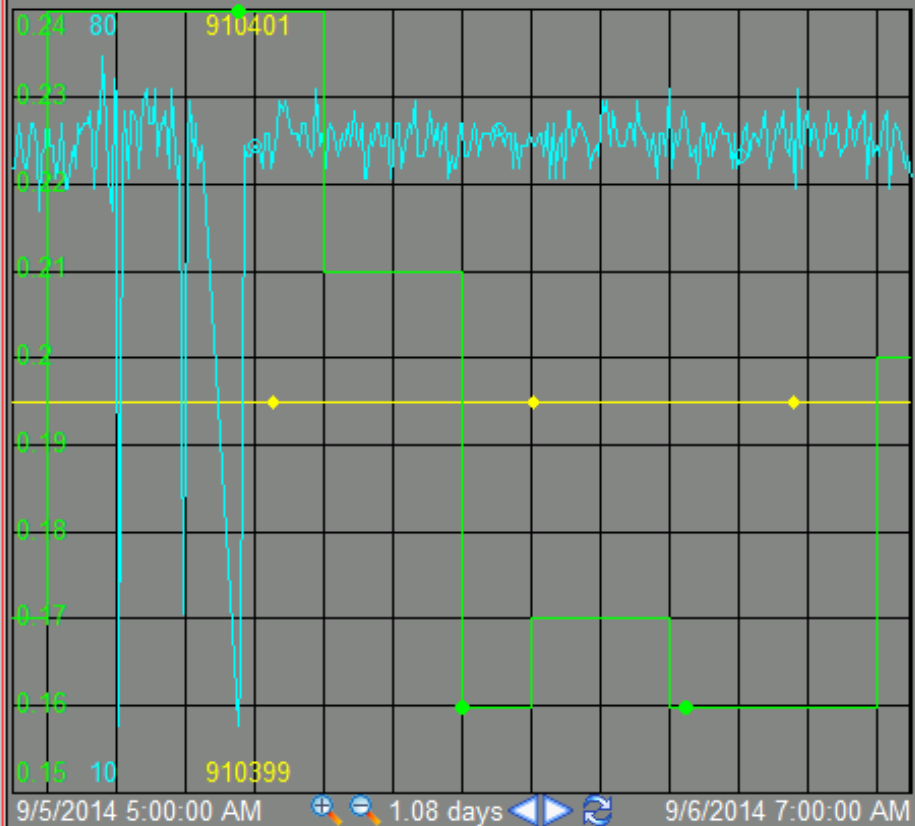
Duration_Minutes by Cycle, and Date



Plot-0

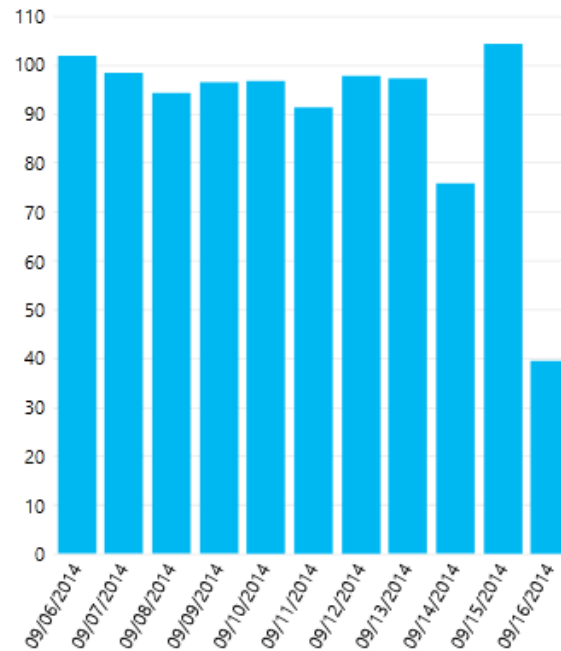


Plot-0



Daily OEE (Target=23 Hours)

OEE by Date



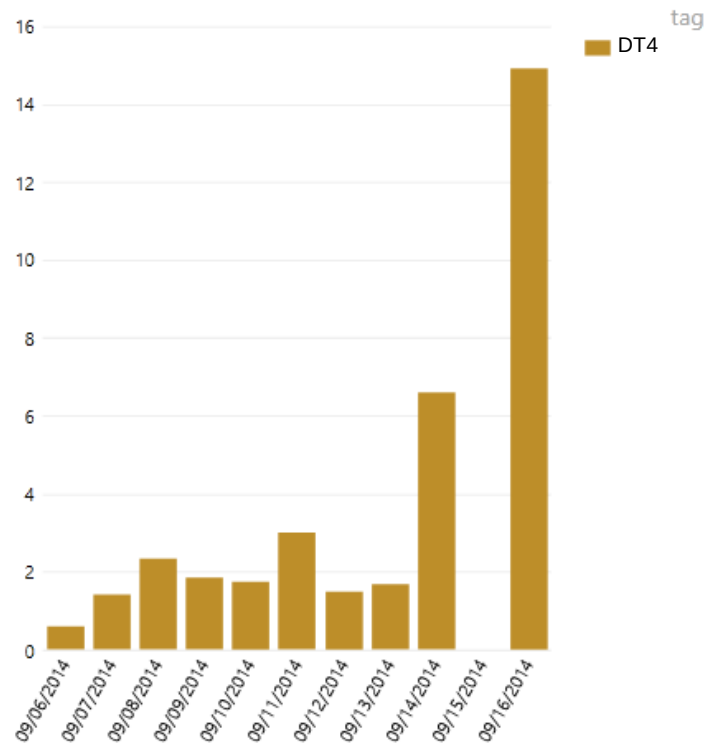
Item
DT1
DT2
DT3
DT4

Date

- 09/06/2014
- 09/07/2014
- 09/08/2014
- 09/09/2014
- 09/10/2014
- 09/11/2014
- 09/12/2014
- 09/13/2014
- 09/14/2014
- 09/15/2014
- 09/16/2014

Downtime Hours (6am to 6am)

Downtime_Hrs by Date, and tag

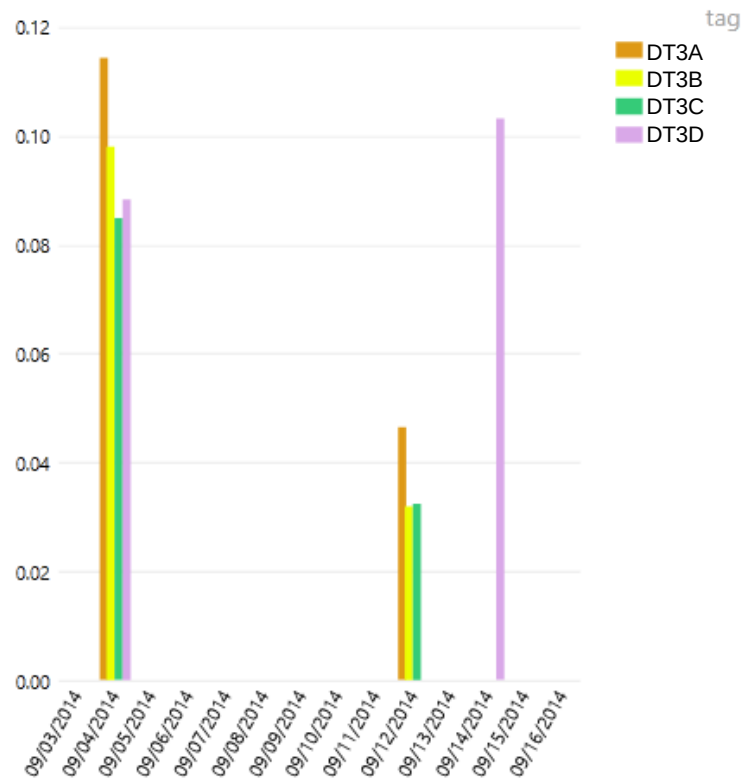


Downtime Hours (6am to 6am)

Item
DT1
DT2
DT3
DT4

Date
09/03/2014
09/04/2014
09/05/2014
09/06/2014
09/07/2014
09/08/2014
09/09/2014
09/10/2014
09/11/2014
09/12/2014
09/13/2014
09/14/2014
09/15/2014
09/16/2014

Downtime_Hrs by Date, and tag



From: DoNotReply@OSIssoft_PINotif.com [mailto:DoNotReply@OSIssoft_PINotif.com]

Sent: Thursday, September 25, 2014 7:00 AM

To: [REDACTED]
Subject: Production KPIs] generated a new notification event.

Name: Daily Production KPIs

Trigger Time: 9/25/2014 6:00:00 AM Central Daylight Time (GMT-05:00:00)

Unit: Batch Operation

In the Last 24 hours:

Cycles = 259 count

Downtime = 2.583333 h

Feed 1 = 43062.45 US gal

Feed 2 = 20236.69 US gal

From: DoNotReply@PINotif.com [mailto:DoNotReply@PINotif.com]

Sent: Thursday, September 25, 2014 8:00 AM

To: [REDACTED]

Subject: [REDACTED] Maintenance] generated a new notification event.

Name: Daily Maintenance

Trigger Time: 9/25/2014 7:00:00 AM Central Daylight Time (GMT-05:00:00)

Target: Batch Operation

Batch Downtime (6 am to 6 am):

B1 : 0 min

B2 : 0 min

B3 : 73.38995 min

DT 24hr (6 am to 6 am):

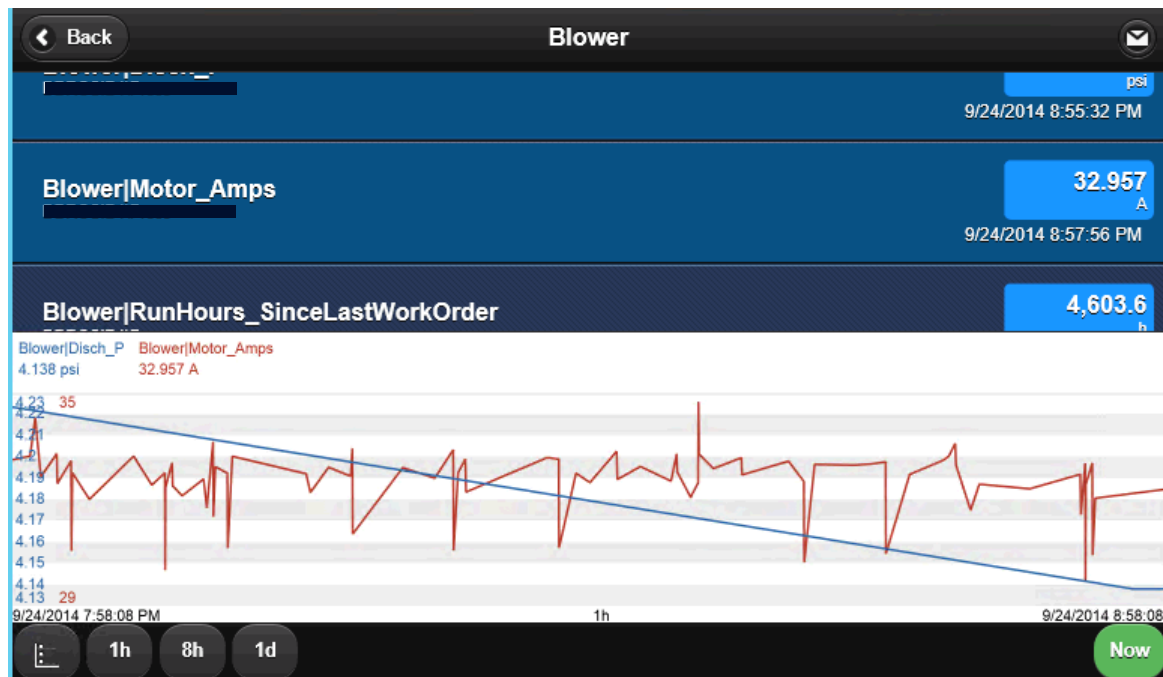
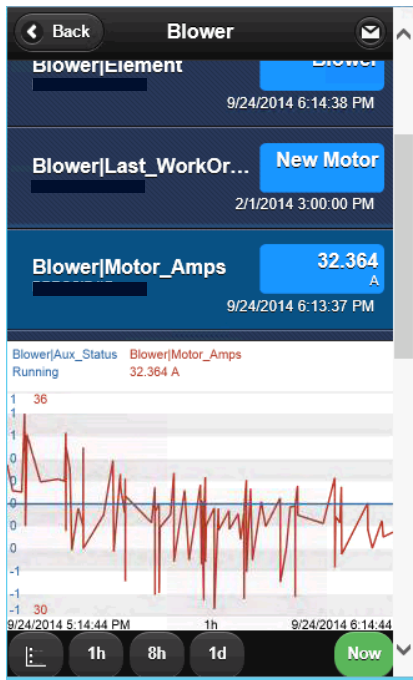
DT3A : 0 min

DT3B : 0 min

Blower

Blower Run Hours Since Last WO : 4627.563 Hours

Blower Number of Starts since Last WO : 87 Count





Batch Operation

Blower

CIP ON
(last 6 am to 6 am)

Downtime
(last 6 am to 6 am)

DT3A : 0 min

DT3B : 0 min

DT1 : 0 min

DT2 : 0 min

DT3 : 73.39 min

DT4 : 0 min

RunHours (6am to 6am) 24 h

Starts Count (since last WO) 87 count

RunHours (since last WO) 4627.56 h

Cycles (Last 24 hr):

258 count

9/24/2014 7:17:41 AM

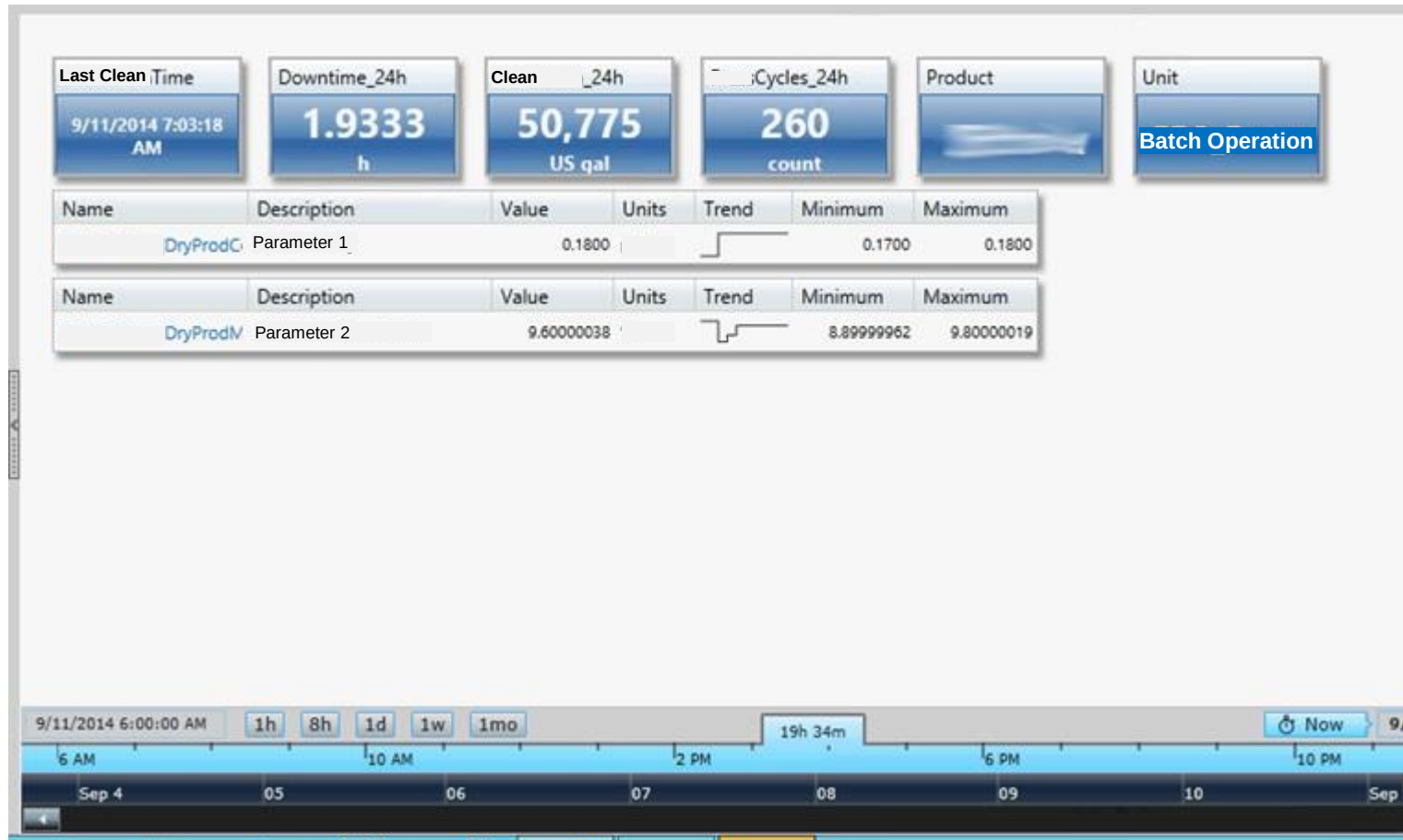


1d



Now

9/25/2014 7:17:41 AM



Event Frames

Search ALL for today

- Step 5
- Step 6
- Step 7
- Step 8
- Event **20140924000133**
- Step 1
- Step 2
- Step 3
- Step 4
- Step 5
- Step 6
- Step 7
- Step 8
- Event 20140924000626
- Step 1
- Step 2
- Step 3
- Step 4
- Step 5
- Step 6
- Step 7
- Step 8
- Event _20140924001138

Elements

Event Frames

Event _20140924000133

General Child Event Frames Referenced Elements Attributes

Filter

☒		Name	[00:04:54.018...	Duration	Start Time	End Time	Di
☒		Step 1		0:00:31.98	9/24/2014 12:01:52.8...	9/24/2014 12:02:24.87 AM	
☒		Step 2		0:00:42.011	9/24/2014 12:02:24.8...	9/24/2014 12:03:06.881 AM	
☒		Step 3		0:01:04.023	9/24/2014 12:03:06.8...	9/24/2014 12:04:10.904 AM	
☒		Step 4		0:01:19.991	9/24/2014 12:04:10.9...	9/24/2014 12:05:30.895 AM	
☒		Step 5		0:00:18.03	9/24/2014 12:05:30.8...	9/24/2014 12:05:48.925 AM	
☒		Step 6		0:00:24.968	9/24/2014 12:05:48.9...	9/24/2014 12:06:13.893 AM	
☒		Step 7		0:00:06	9/24/2014 12:06:13.8...	9/24/2014 12:06:19.893 AM	
☒		Step 8		0:00:27.015	9/24/2014 12:06:19.8...	9/24/2014 12:06:46.908 AM	

Elements

Elements

Batch Operation

Element Searches

Elements

Event Frames

Library

Unit of Measure

Analyses

Batch Operation

General

Child Elements

Attributes

Ports

Analyses

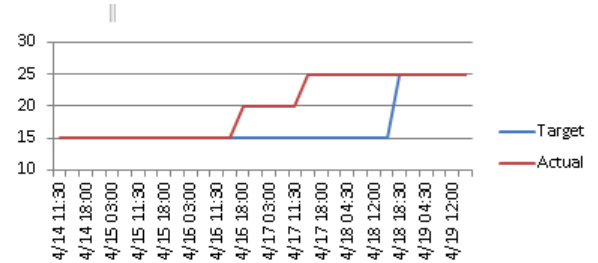
Version

Filter

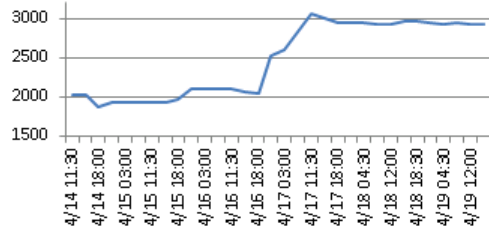
Name	Value	Time Stamp
Category: <None>		
Category: Cat 3		
Category: Cat 2		
Category: Downtime		
↳ ⚡ ↳_Downtime_Calc	1	9/12/2014 1:50:00 PM
↳ ↳_Downtime_Last24h	0.1084947 h	9/12/2014 1:51:30.5...
↳ ↳_Downtime_ManualEntry	0 h	9/12/2014 5:00:00 AM
↳ ↳_Downtime_ManualEntry_Last24h	1.5 h	9/12/2014 1:51:30.5...
↳ ↳_CleaningTime	0.1084947 h	9/12/2014 1:51:30.5...
↳ ↳_RunTime_SinceLastClean	0.05 h	1/1/1970 12:00:00 AM
↳ ⚡ ↳_LastBleachTime	9/12/2014 1:41:47 PM	9/12/2014 1:41:47.8...
Category: EFGen		
Category: Cycle		
Category: Lab Data		
Category: Process Data		
Category: Product		

Product ABC – pH,

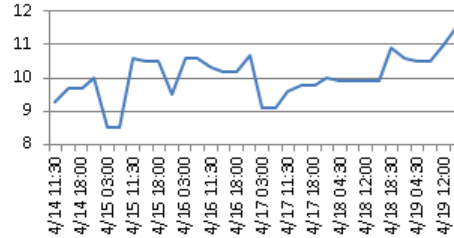
Month	Day	Parameter 1	Parameter 2	Parameter 3	Target	Actual
4	14 15 16 17 18 19	0.14 0.16 0.18 0.20	6.0 6.5 7.0 7.5	10 11 8 9	15 25	15 20 25



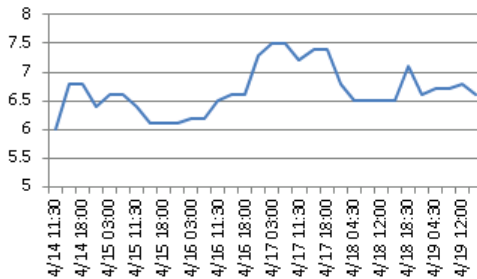
Parameter 4



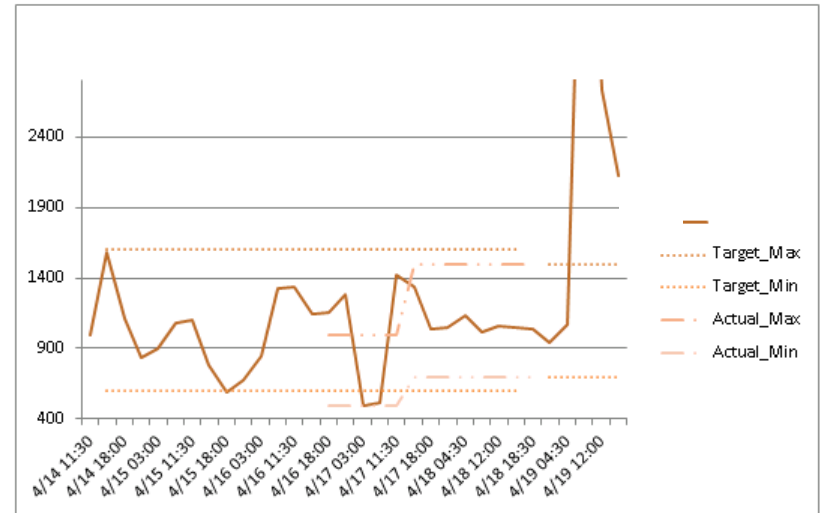
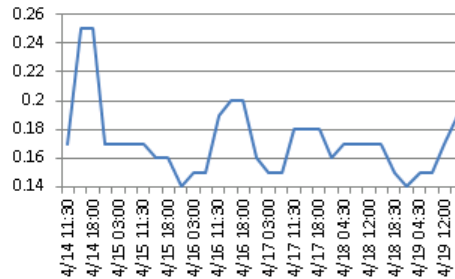
Parameter 3



Parameter 2



Parameter 1



New Tools Used

- PI System Explorer
 - Created new databases for plants
- Asset Framework
 - Created Templates
 - Created Analysis
 - Created a new UOM
 - Create lookup table
- Event Frame Generator
- Event Frames
 - Create new EF Template and replicated to 3 additional units
- Notifications
 - Added Contacts
- Coresight

Project Results

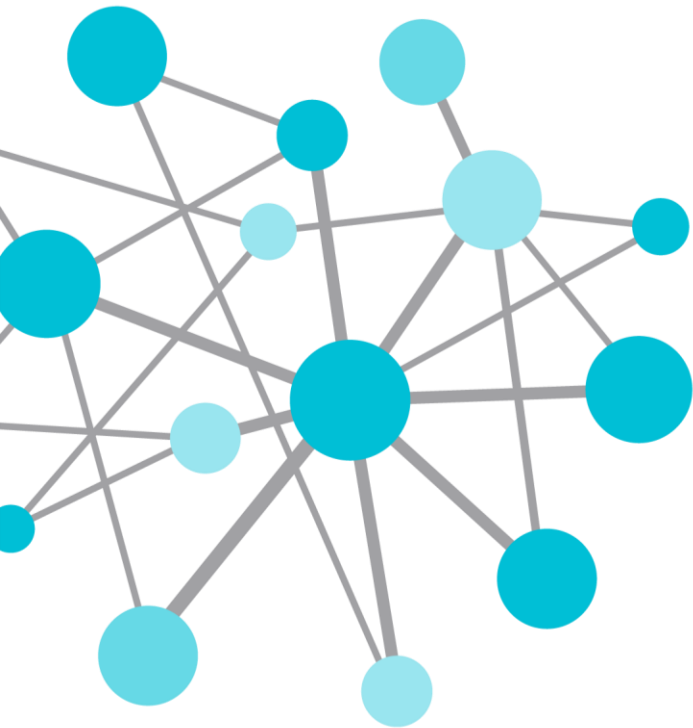
- Within 2 weeks of presenting the data to operations, production has increased by 7%, and we have not even addressed step 2 and step 3 analysis yet!
- We were able to calculate the additional energy needed for the production increase and verify the any constraint.
- Downtime is automatically calculated
- Critical KPI's are received daily
- The increase was achieved with no additional equipment.
- Calculated revenue increase between \$300,000 and \$500,000 annually
 - We have 15 of these units across the company!
- Since completing this project
 - We have attached our development server to other PI servers to give the local admins a hands on lab to work with
 - Created daily and monthly inventory notifications to critical buyers
 - Created a Tank template to calculation levels, using raw and scaled values – used at multiple sites
 - Applied the batch template to 3 additional operations for analysis, in less than 3 days.
- With these results in hand, we have quantifiable proof to share with critical stakeholders in the organization.

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Solution Architect
OSIsoft, LLC.



THANK
YOU

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