

Using the PI Integrator for MS Azure to Operationalize Predictive Analytics

Kevin Geneva, Field Service Engineer

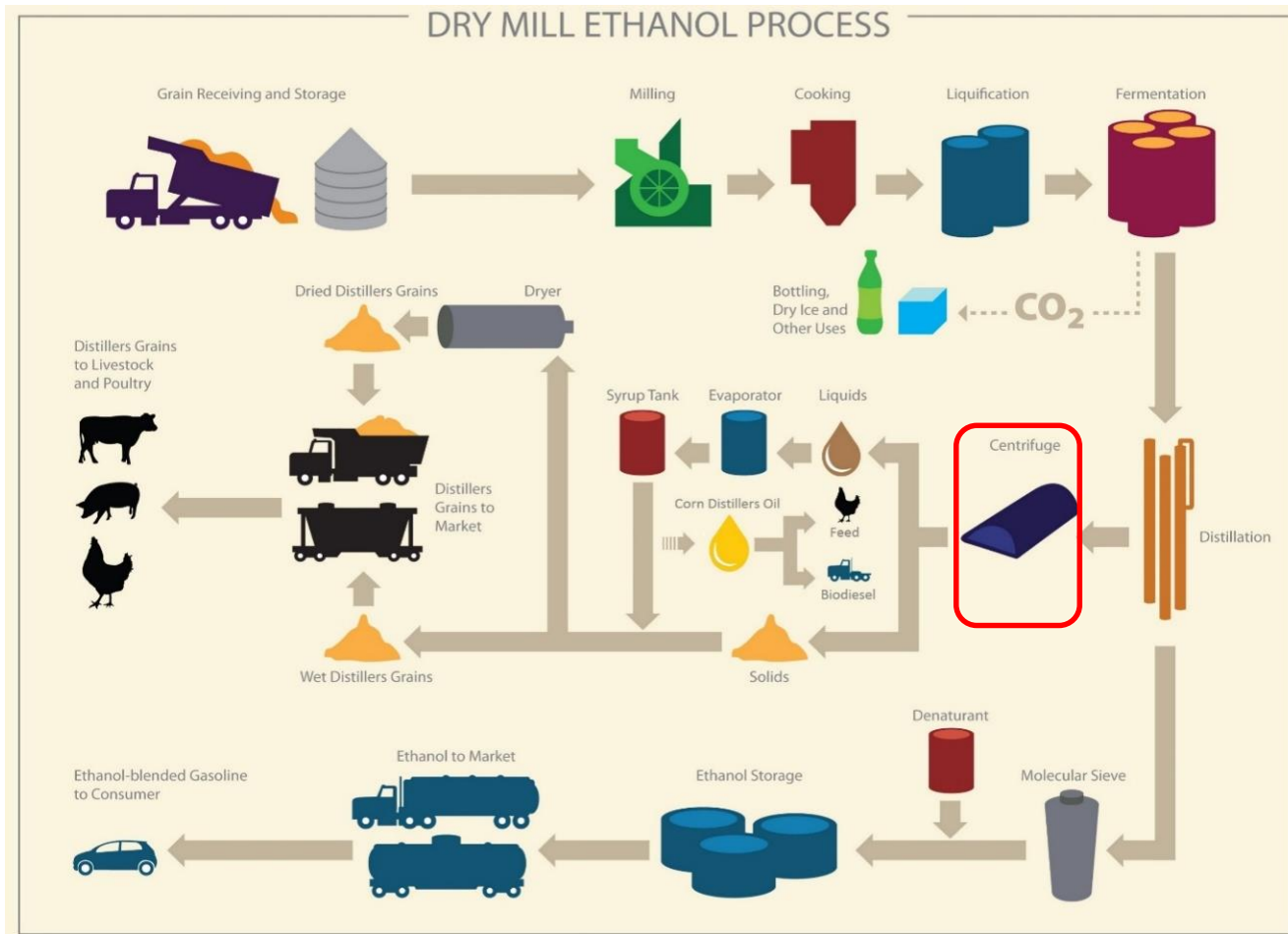
Sept 22, 2016



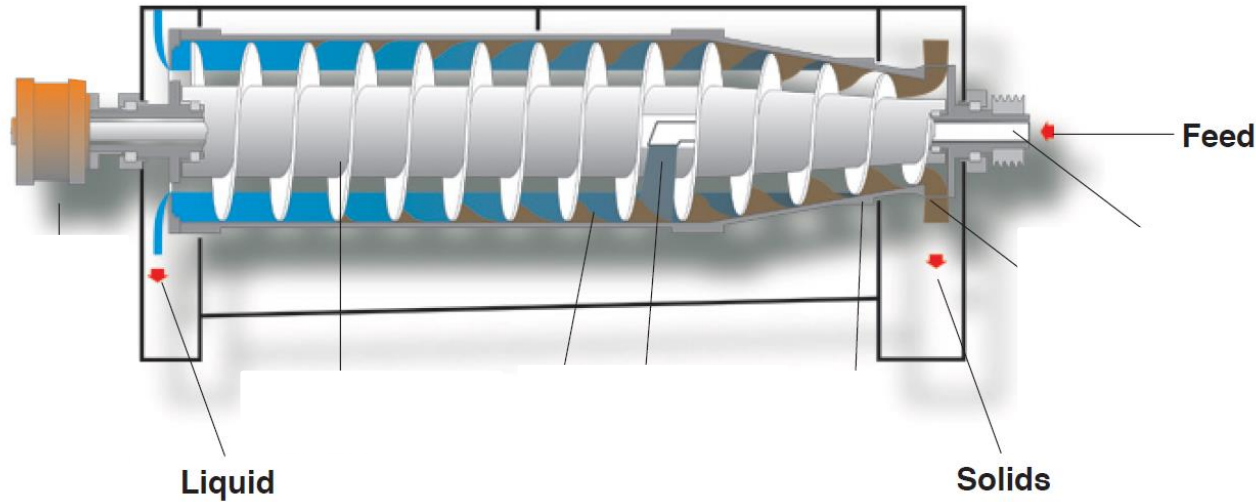
Global food processing company

- More than 270 plants worldwide
- Over 100 years old
- Grains and Seeds are processed for use in
 - Food and beverage
 - Industrial uses
 - Nutraceutical
 - Animal Feed

DRY MILL ETHANOL PROCESS



Centrifuge/Decanter Operation



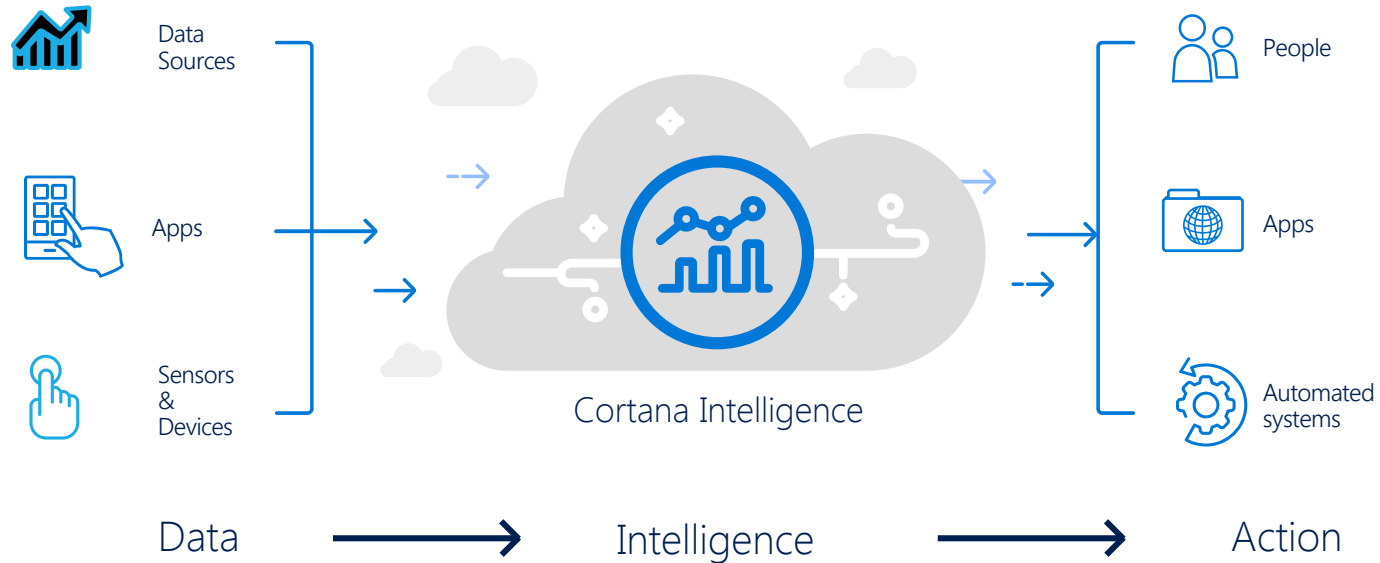
Quick Facts

- 2 Plants
- 28 Machines
- 6 Month Average Life
- \$50,000 per Rebuild

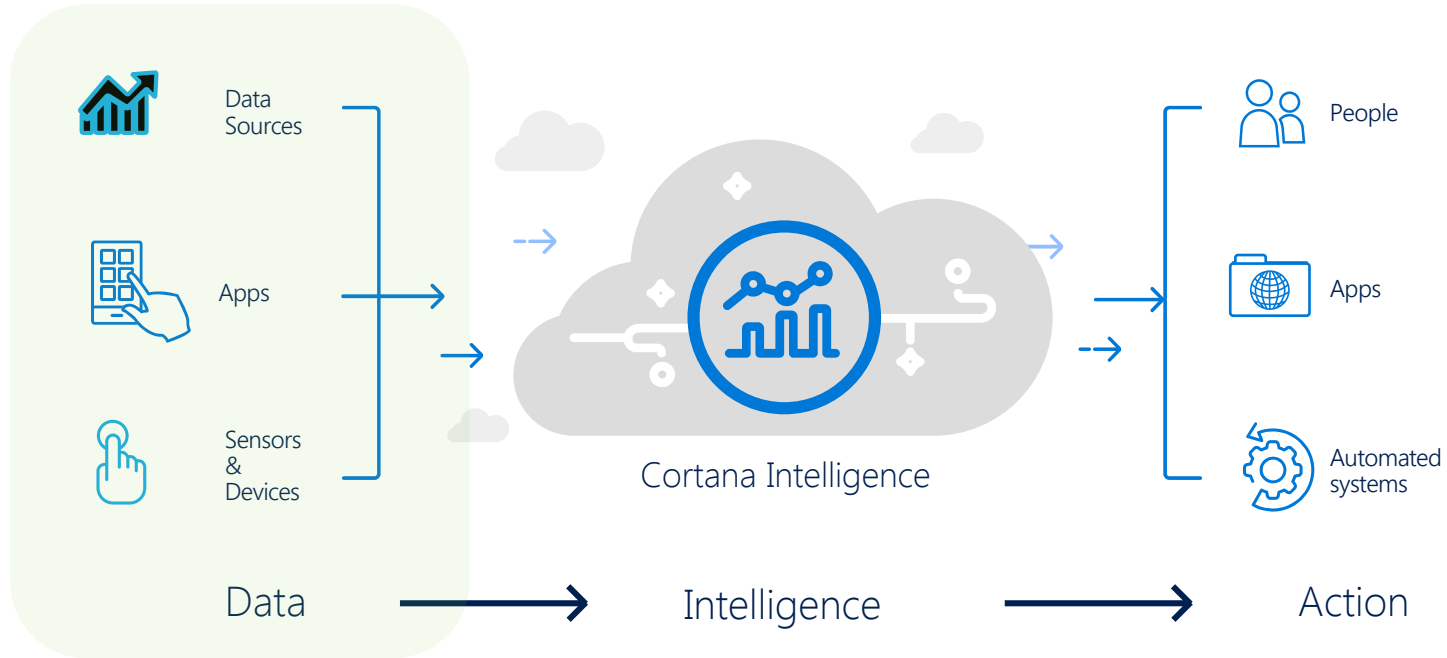
Variables

- 25 Feed Related
- 25 Per Decanter Related to Operational/Machine Behavior

Analysis Model



Preparing the Data



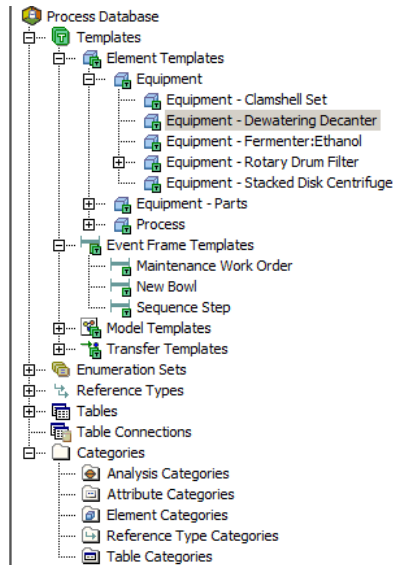
PI Asset Framework

One version of the truth

- 2 Plants
- 28 Machines

Preparation work

- Template Design
- Deployment

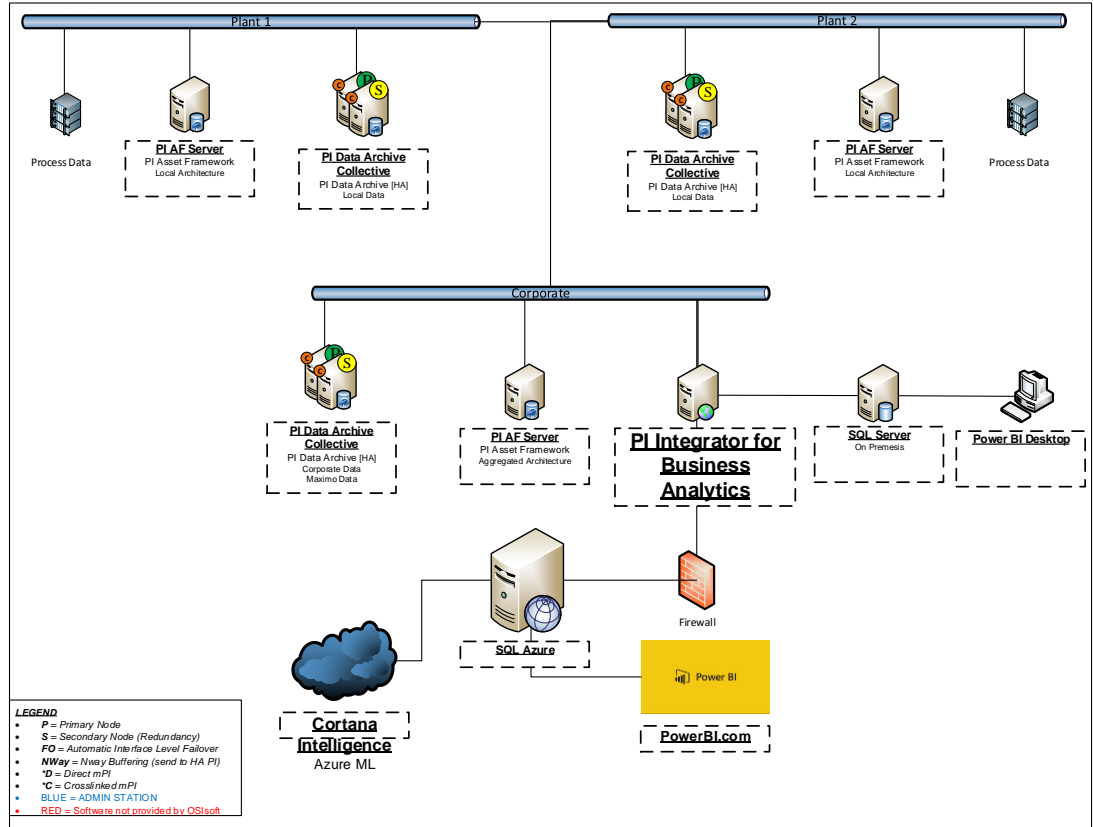


Filter
Template: Equipment
Change Control
Location Code
Maintenance Work Order
Manufacturer
PI Server
Template: Equipment - Dewatering Decanter
Bearing Temperature - Front
Bearing Temperature - Rear
Bowl Serial Number
Change Control
Control Mode
Differential Speed
Feed Flow
Sequence Step
Speed - Bowl
Speed - Pinion
Torque
Vibration - Front Bowl
Vibration - Front Overall
Vibration - Front Overall Minus Bowl
Vibration - Rear Bowl
Vibration - Rear Overall
Vibration - Rear Overall Minus Bowl

System Architecture

Archive data remained on source

Aggregated on central PI AF



PI Integrator for Microsoft Azure

Process Database - PI System Explorer (Administrator)

File Search View Go Tools Help

Database Query Date Back Check In Refr

Elements

Asset Framework (AF)

4000 - Alcohol (Dry Grind)

Name	Run Status	Type	Run Mode	Start Time	End Time	Last Run Time
Data	Not Yet Published	Asset	Once	*-8h	*	Never
TestDecanter	Not Yet Published	Asset	Once	*-1y	*	Never
DecanterFirstTest	Stopped	Asset	Once	*-8h	*	3/30/16 1:28 PM
Decanter Data	Stopped	Asset	Once	9/17/15 12:00 AM	3/17/16 12:00 AM	4/1/16 10:07 AM
Decanter Data Structure	Not Yet Published	Asset	Once	*-8h	*	Never
sequence step test	Not Yet Published	Asset	Once	*-8h	*	Never

PI Integrator for Business Analytics

Overview Log Security

Run Status: Not Yet Published

View Name: Decanter Data Structure

PI AF Database: Process Database

Publish Target:

View Type: Asset

Run Mode: Once

Last Run Time: Never

Your Start Time is: *-8h

Your End Time is: *

Your Time Interval gets an interpolated measurement every: 1 minutes

Search Shape

Asset Shape

- 4000 - Alcohol (Dry Grind)
- 4020 - Fermentation
- Beerwell
- Lab: Acetic Acid Concentration
- Lab: Ammonia Concentration
- Lab: DPI Concentration
- Lab: DP2 Concentration
- Lab: DP3 Concentration
- Lab: DP3+ Concentration
- Lab: Ethanol Concentration
- Lab: Glycerol Concentration



PI Integrator for Microsoft Azure

Decanter Data v2 NAIX949886

Select Data > Modify View > Publish Next

Source Assets

Server:

Database:

Assets

- 4019 - Propagation
- 4020 - Fermentation
- 4030 - Distillation
 - 4038 - Carbon Dioxide (CO2) Stripper
 - 4040 - Carbon Dioxide (CO2) Recovery
- 4050 - Dehydration
- 4058 - Oil Centrifuges
- 4059 - Dewatering
 - Centrate
 - Decanter 1
 - Decanter 01A**
 - Decanter 01B
 - Decanter 01C
 - Discharge Conveyor
 - Decanter 2
 - Decanter 3

Attributes

Select All

- Bearing Temperature - Front
- Bearing Temperature - Rear
- Bowl Serial Number
- Control Mode
- Differential Speed
- Feed Flow
- Maintenance Work Order

Search Shape

Asset Shape

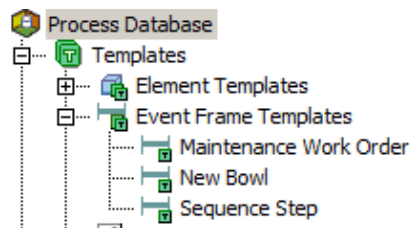
- Equipment - Dewatering Decanter
 - Bearing Temperature - Front
 - Bearing Temperature - Rear
 - Bowl Serial Number
 - Control Mode
 - Differential Speed
 - Feed Flow
- Maintenance Work Order
 - Type
 - Description
 - Labor Cost
 - Material Cost
 - Service Cost
- Manufacturer
- Sequence Step
- Speed - Bowl
- Speed - Pinion
- Torque
- Vibration - Front Bowl
- Vibration - Front Overall
- Vibration - Front Overall Minus Bowl**
- Vibration - Rear Bowl
- Vibration - Rear Overall
- Vibration - Rear Overall Minus Bowl

Matches

Found 28 Matches

- Decanter 01A
- Decanter 01A
- Decanter 01B
- Decanter 01B
- Decanter 01C
- Decanter 01C
- Decanter 01D
- Decanter 02A
- Decanter 02A
- Decanter 02B
- Decanter 02B
- Decanter 02C
- Decanter 02C
- Decanter 03A
- Decanter 03A
- Decanter 03B
- Decanter 03B
- Decanter 03C
- Decanter 03C
- Decanter 03C
- Decanter 03D
- Decanter 03D
- Decanter 04A
- Decanter 04A
- Decanter 04B
- Decanter 04B
- Decanter 04C
- Decanter 04C
- Decanter 04D

PI Event Frames



Template: Maintenance Work Order	
	Decanter
	Decanter.Bowl Serial Number
	Location Code
	Maintenance Work Order
	Maintenance Work Order Description
	Maintenance Work Order Type

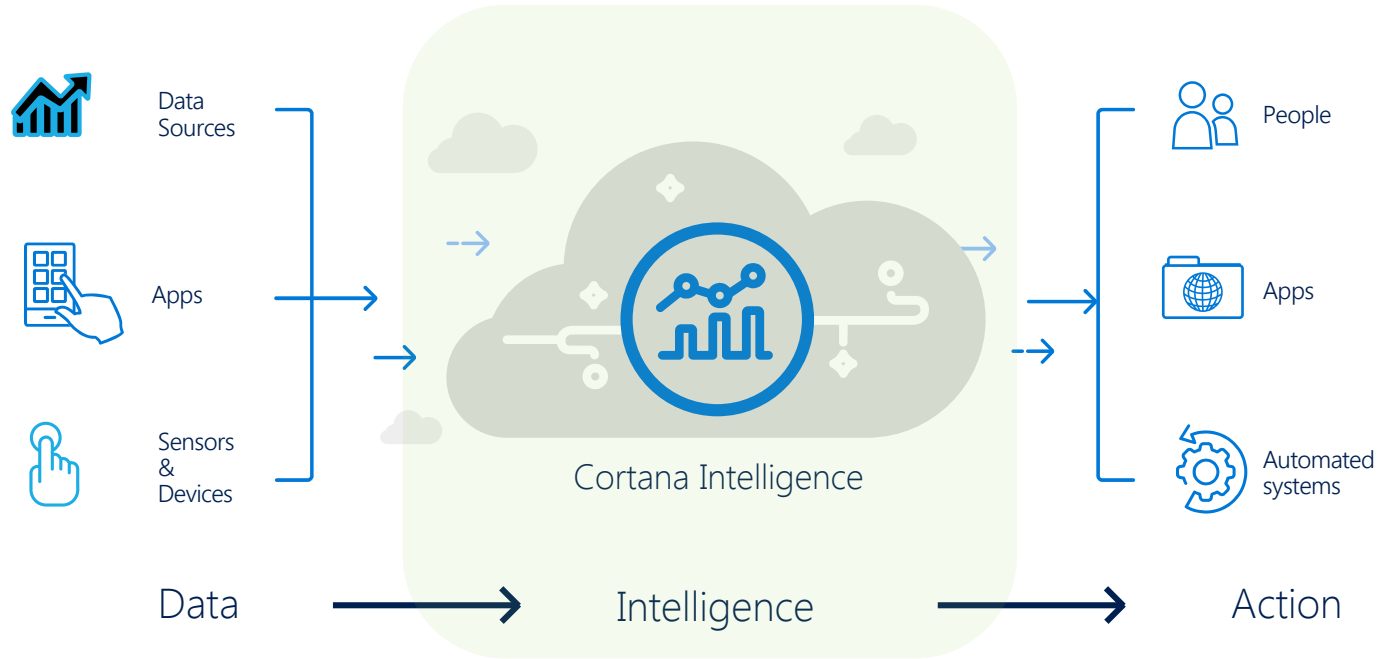
Template: Sequence Step	
	Beerwell.Lab: Acetic Acid Concentration Avg
	Beerwell.Lab: Acetic Acid Concentration Stdev
	Beerwell.Lab: DP1 Concentration Avg
	Beerwell.Lab: DP1 Concentration Stdev
	Beerwell.Lab: DP2 Concentration Avg
	Beerwell.Lab: DP2 Concentration Stdev
	Beerwell.Lab: DP3+ Concentration Avg
	Beerwell.Lab: DP3+ Concentration Stdev
	Beerwell.Lab: DP3 Concentration Avg
	Beerwell.Lab: DP3 Concentration Stdev
	Beerwell.Lab: Ethanol Concentration Avg
	Beerwell.Lab: Ethanol Concentration Stdev
	Beerwell.Lab: Glycerol Concentration Avg
	Beerwell.Lab: Glycerol Concentration Stdev
	Beerwell.Lab: Lactic Acid Concentration Avg
	Beerwell.Lab: Lactic Acid Concentration Stdev
	Beerwell.Lab: pH Avg
	Beerwell.Lab: pH Stdev
	Beerwell.Lab: Total Sugar Concentration Avg
	Beerwell.Lab: Total Sugar Concentration Stdev
	Decanter.Bearing Temperature - Front Avg
	Decanter.Bearing Temperature - Front Stdev
	Decanter.Bearing Temperature - Rear Avg
	Decanter.Bearing Temperature - Rear Stdev
	Decanter.Bowl Serial Number

Template: New Bowl	
	Beerwell.Lab: Acetic Acid Concentration Avg
	Beerwell.Lab: Acetic Acid Concentration Stdev
	Beerwell.Lab: DP1 Concentration Avg
	Beerwell.Lab: DP1 Concentration Stdev
	Beerwell.Lab: DP2 Concentration Avg
	Beerwell.Lab: DP2 Concentration Stdev
	Beerwell.Lab: DP3+ Concentration Avg
	Beerwell.Lab: DP3+ Concentration Stdev
	Beerwell.Lab: DP3 Concentration Avg
	Beerwell.Lab: DP3 Concentration Stdev
	Beerwell.Lab: Ethanol Concentration Avg
	Beerwell.Lab: Ethanol Concentration Stdev
	Beerwell.Lab: Glycerol Concentration Avg
	Beerwell.Lab: Glycerol Concentration Stdev
	Beerwell.Lab: Lactic Acid Concentration Avg
	Beerwell.Lab: Lactic Acid Concentration Stdev
	Beerwell.Lab: pH Avg
	Beerwell.Lab: pH Stdev
	Beerwell.Lab: Total Sugar Concentration Avg
	Beerwell.Lab: Total Sugar Concentration Stdev
	Decanter.Bowl Serial Number
	Decanter.Maintenance Work Order Count
	Decanter.Feed.Lab: Dry Solids Concentration Avg
	Decanter.Feed.Lab: Dry Solids Concentration Stdev

PI Event Frames

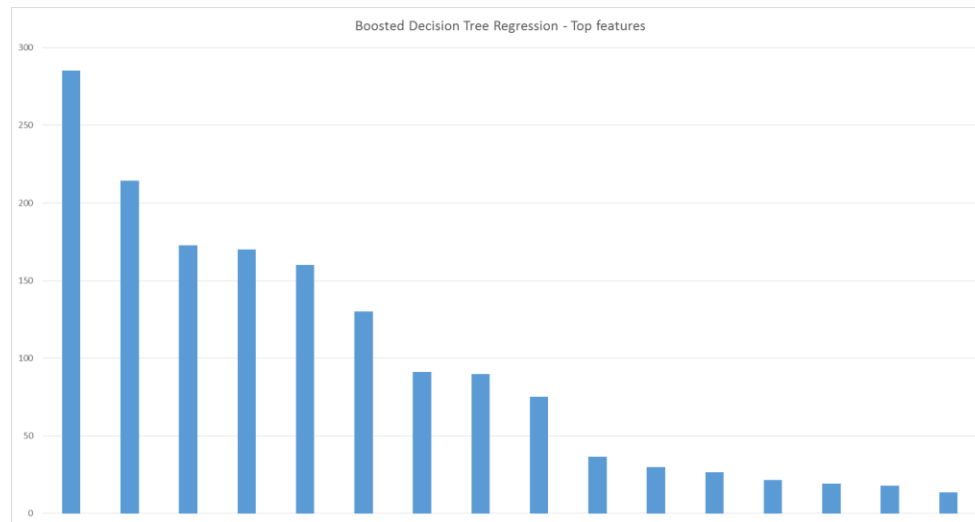


Data Analysis

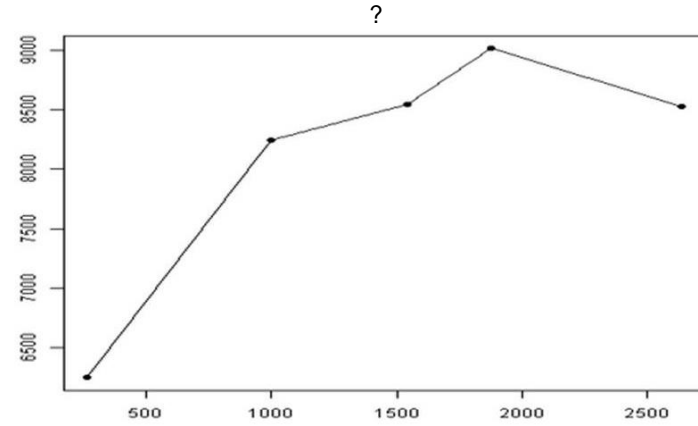
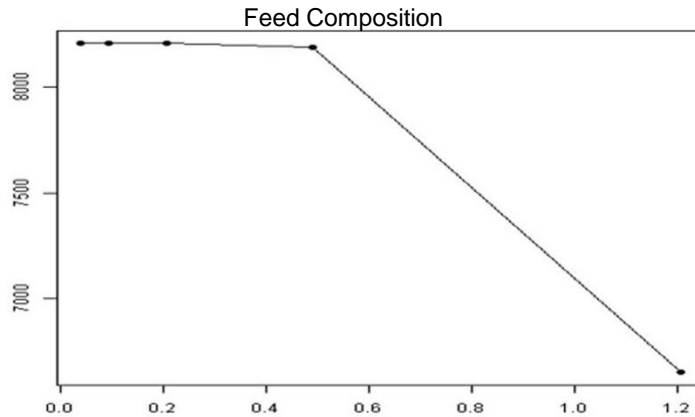
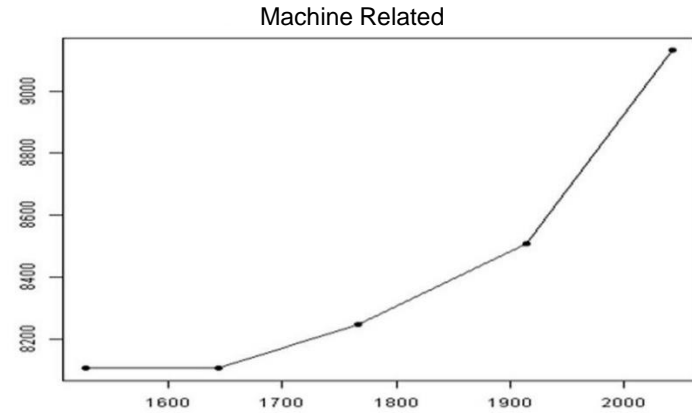
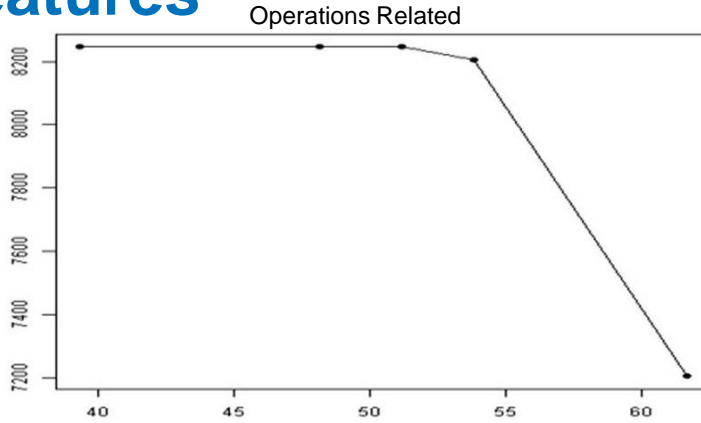


Top Features

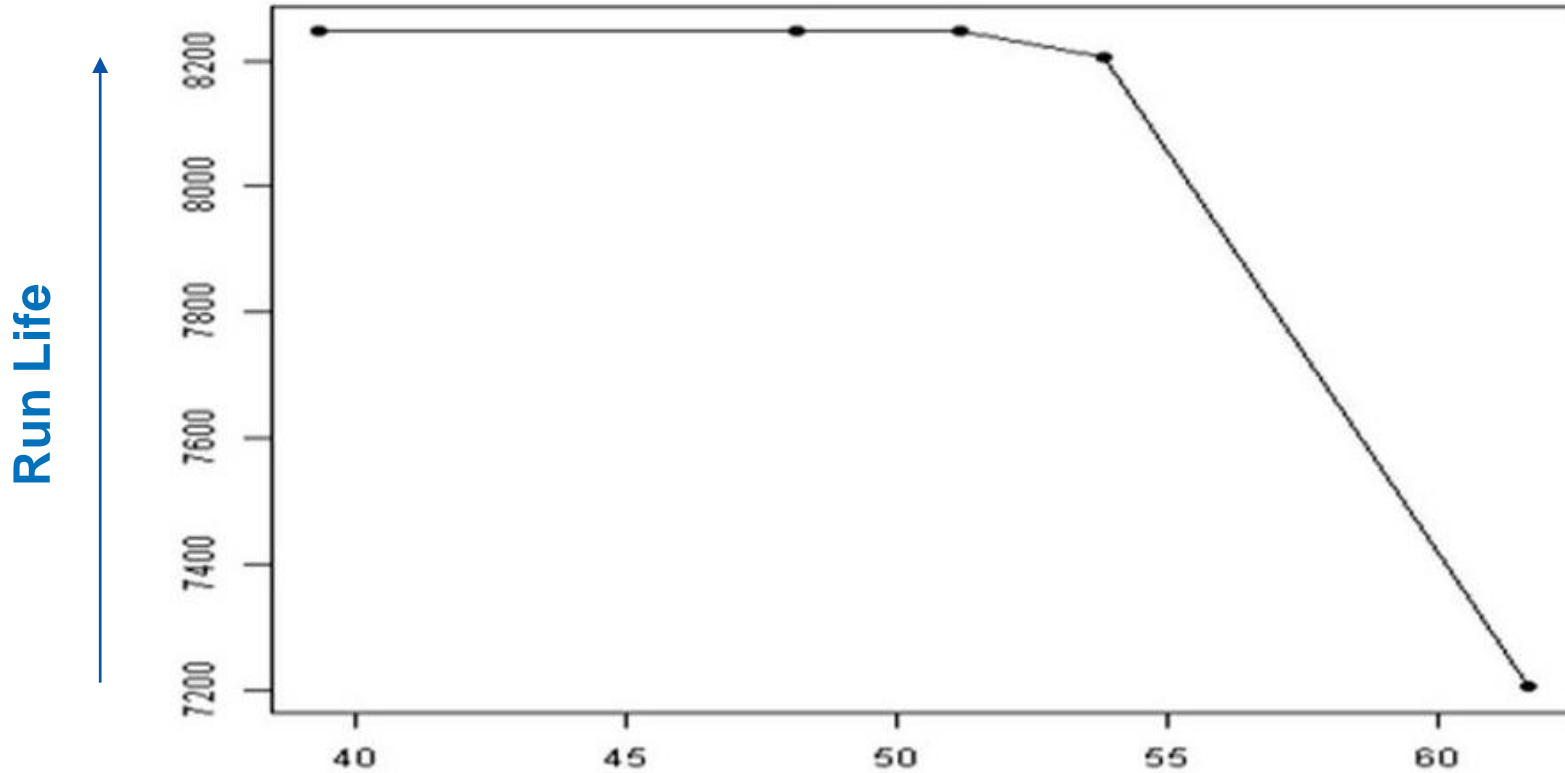
Boosted Decision Tree Regression - Top features	
Variable 1	285.105583
Variable 2	214.418511
Variable 3	172.824017
Variable 4	169.973469
Variable 5	159.950095
Variable 6	130.138557
Variable 7	91.258758
Variable 8	89.65731
Variable 9	75.05133
Variable 10	36.644271
Variable 11	29.905867
Variable 12	26.395968
Variable 13	21.45298
Variable 14	19.099895
Variable 15	18.041149
Variable 16	13.537764



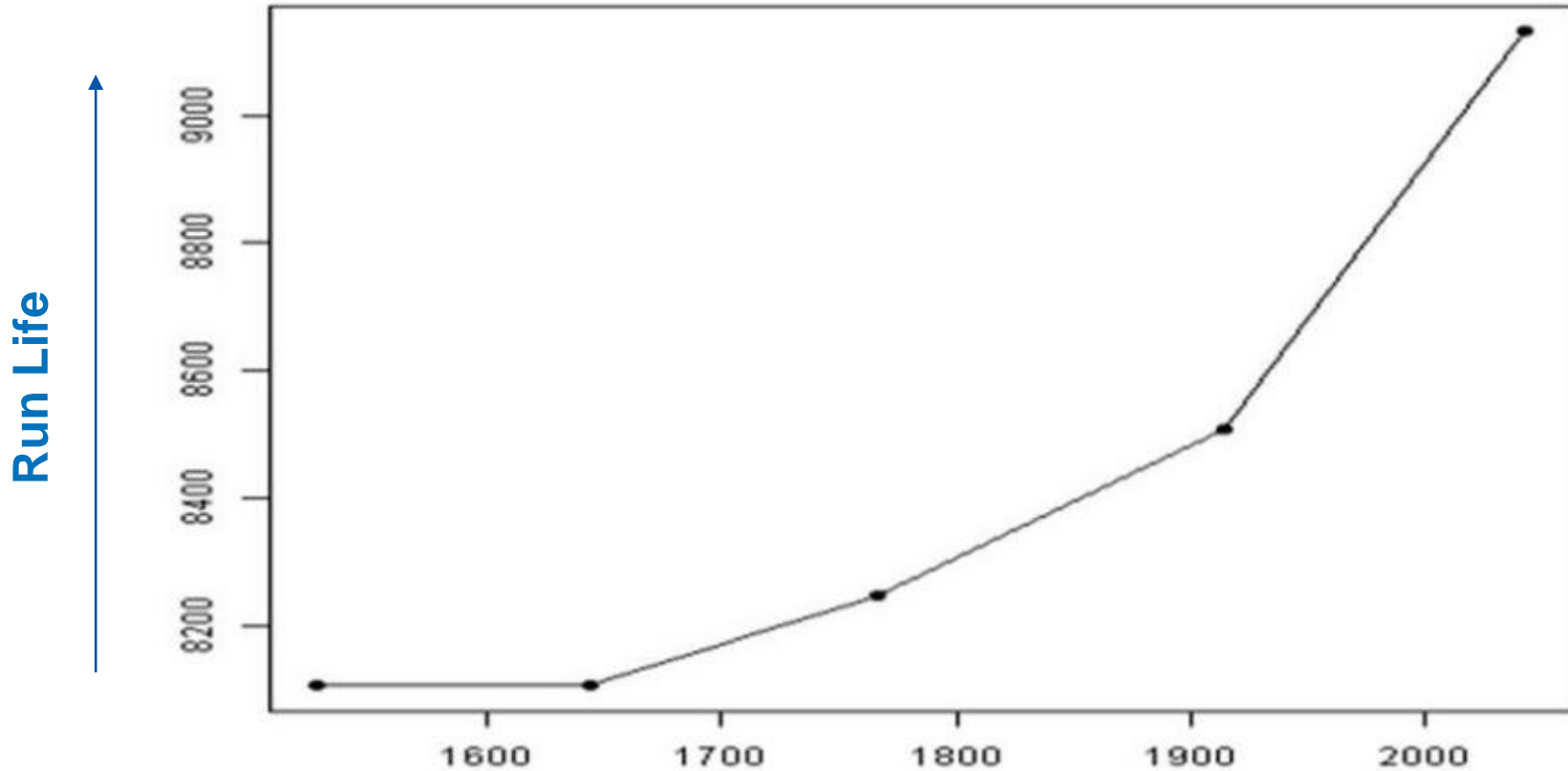
Top Features



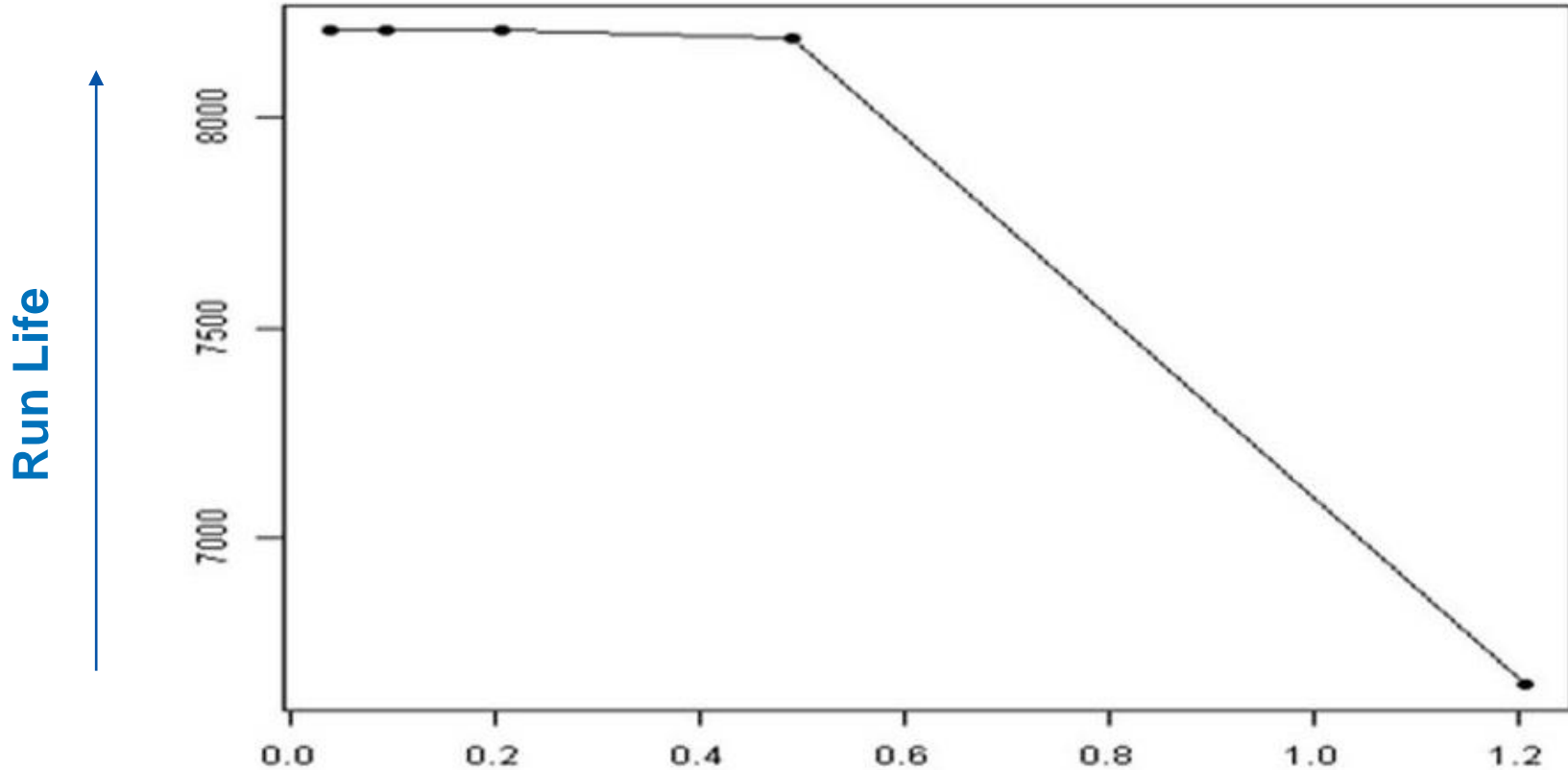
Operations Related



Machine Related

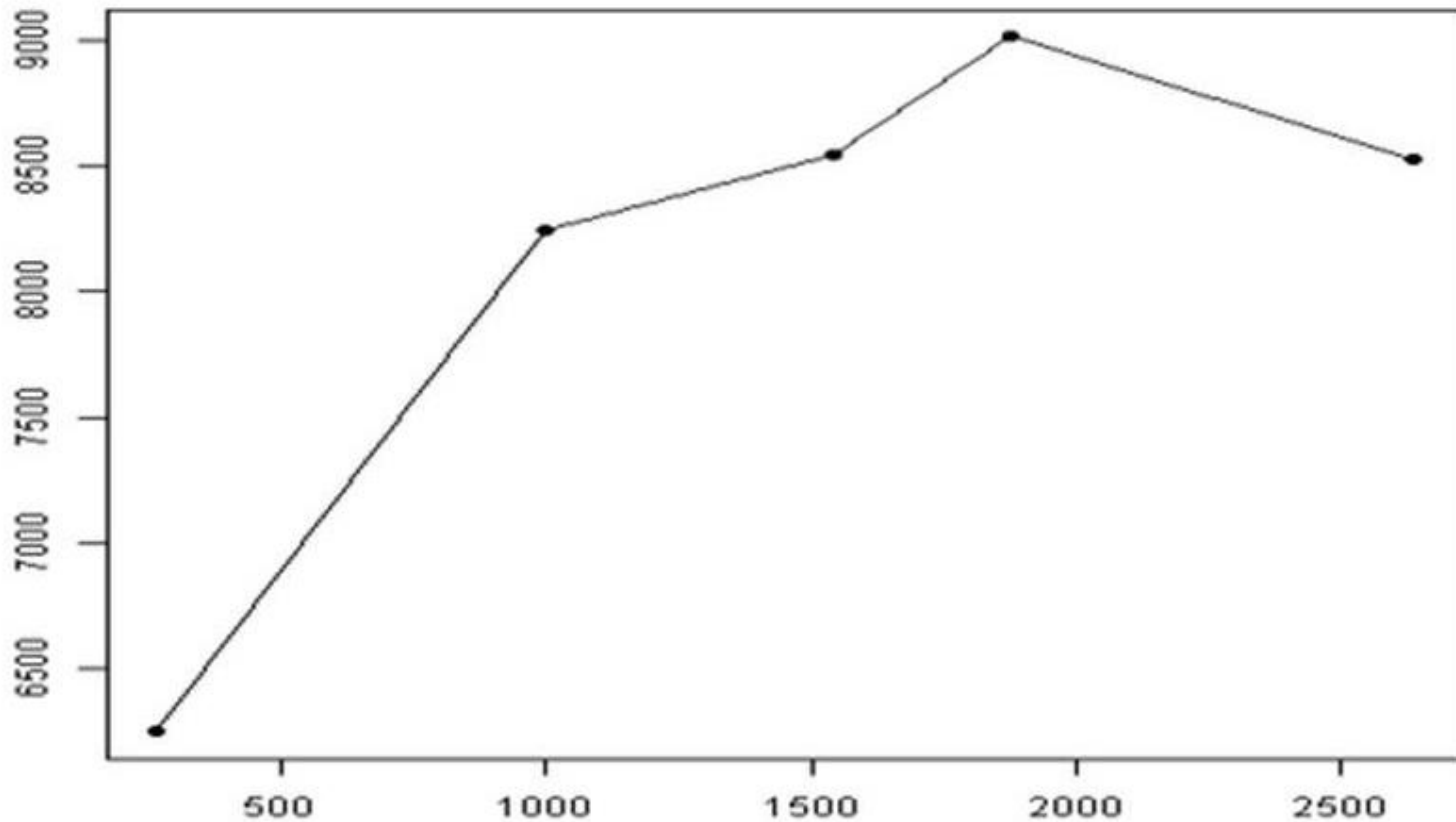


Feed Composition

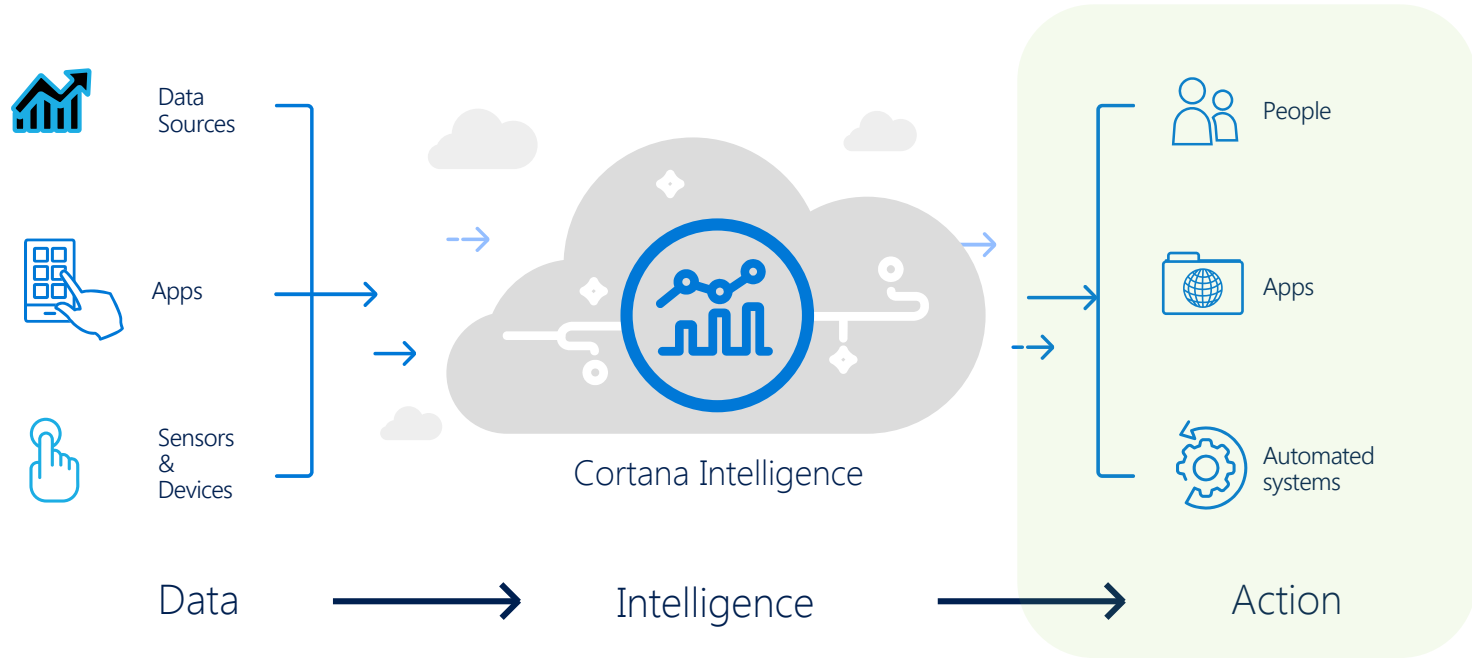


???

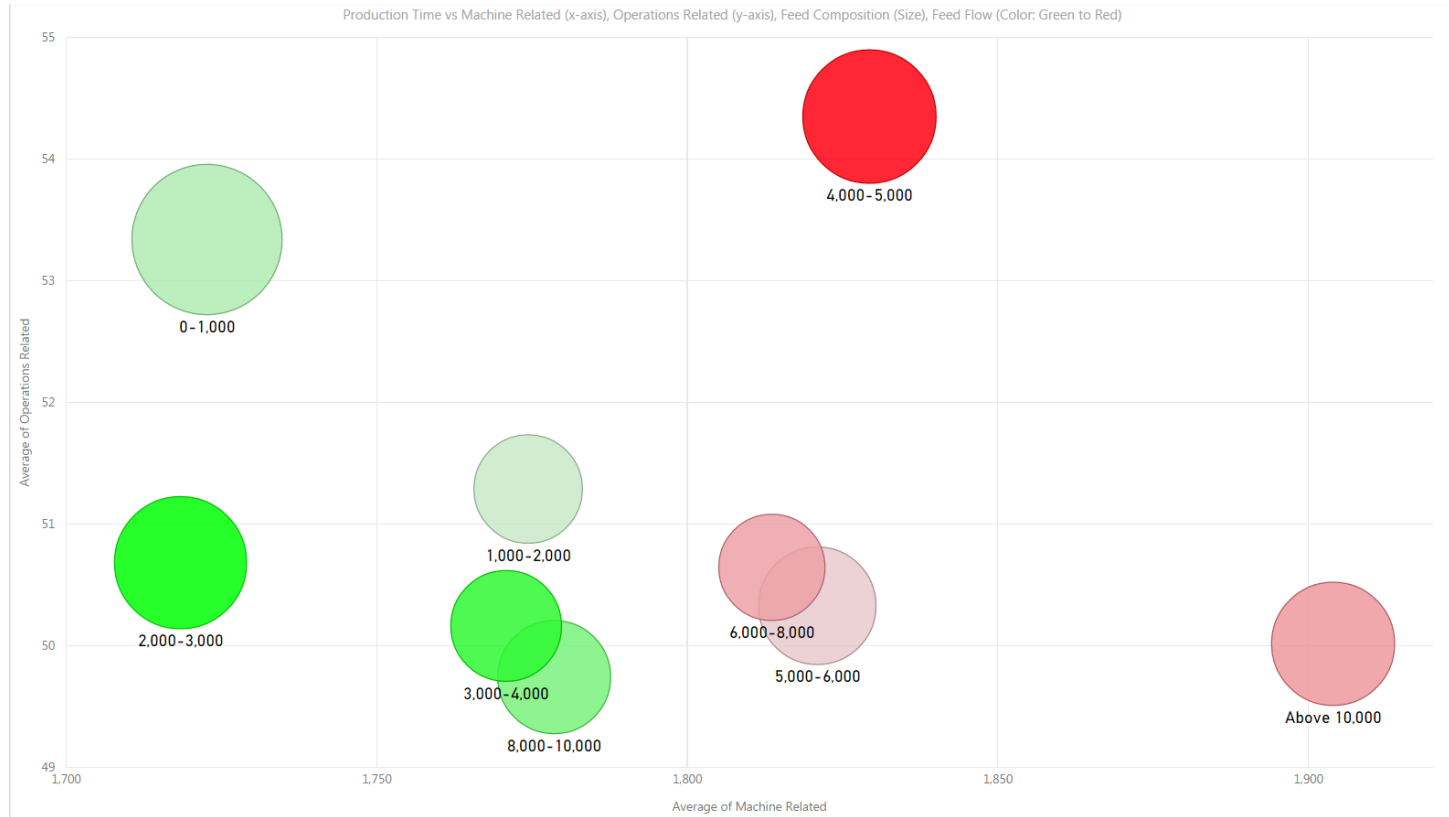
Run Life



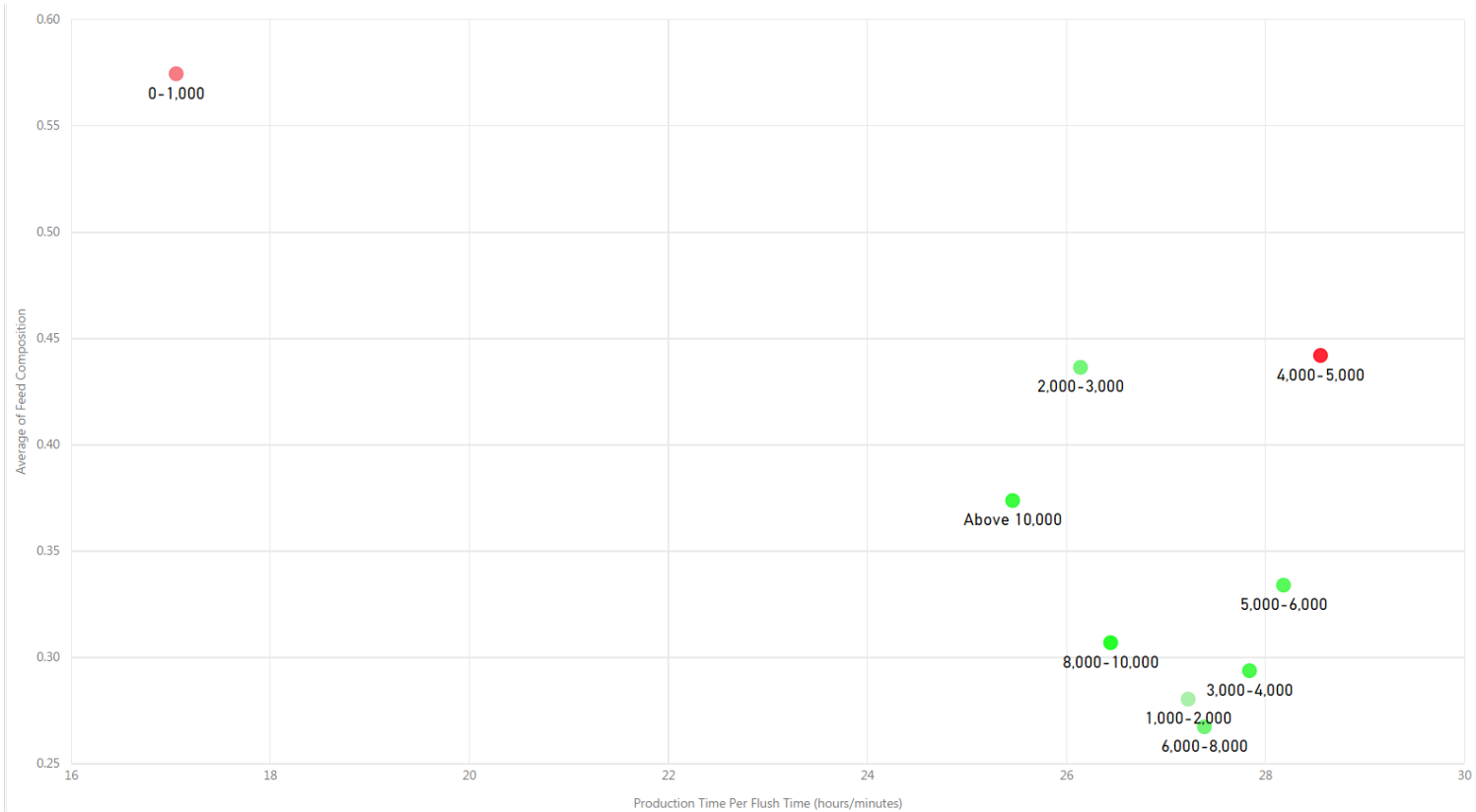
Results Analysis



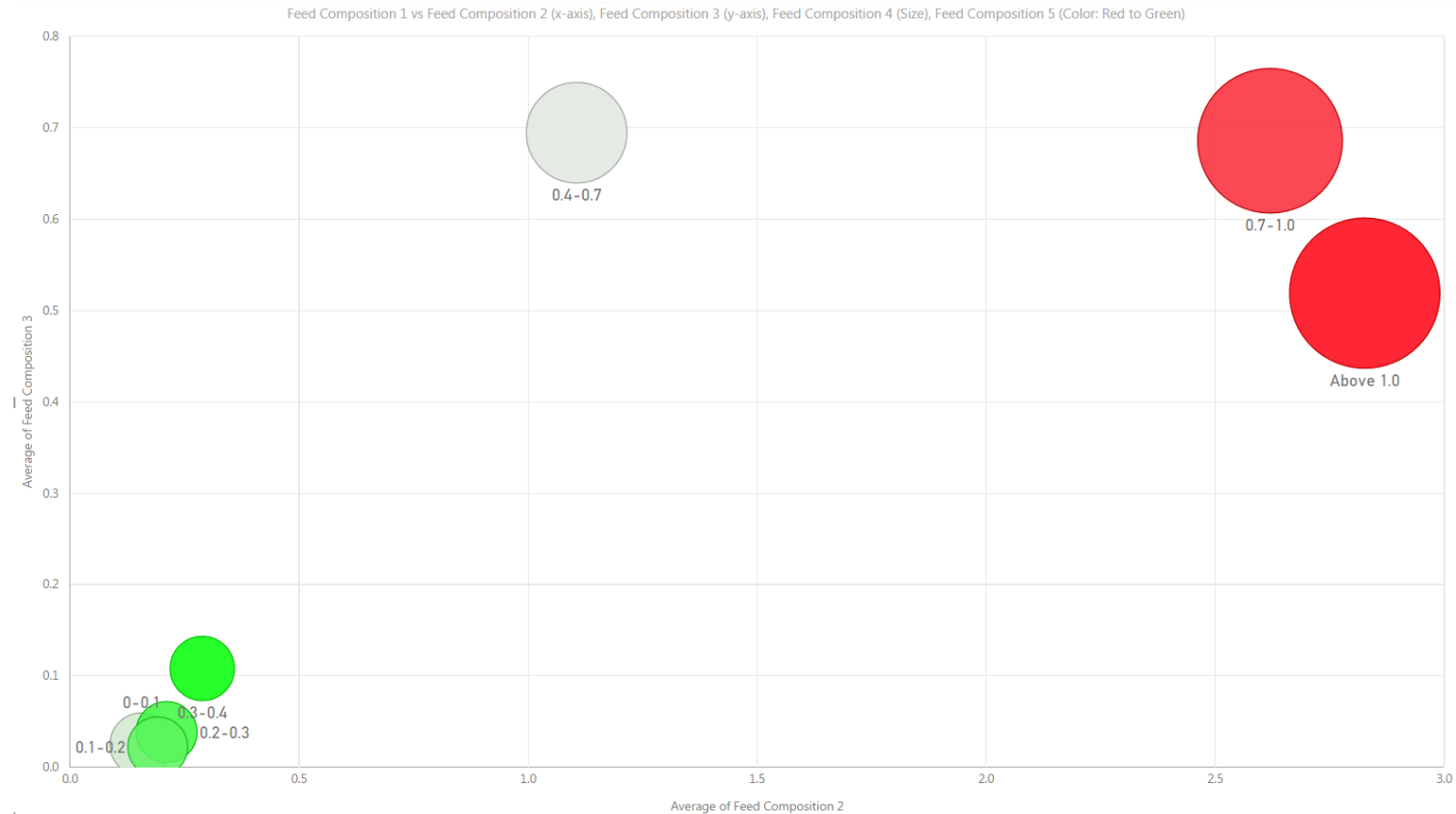
Results Analysis



Results Analysis



Results Analysis



Contact Information

Kevin Geneva

kgeneva@osisoft.com

Field Service Engineer

OSIsoft, LLC



osisoft.

REGIONAL SEMINARS 2016

Questions

Please wait for the
microphone before asking
your questions



State your
name & company

Please don't forget to...

Complete the Survey
for this session



The **Power of Data**

DECISION READY IN REAL-TIME

Evaluation Form (Seminar Location - Date)

Name: _____ Company: _____

Email: _____

Quality and content of the presentations

	Poor	Good	Excellent	N/A
Welcome	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The Journey To Real-Time Operational Intelligence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The Power of Connection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tank Level Management System	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using the PI System to Aid in Troubleshooting Operational Aspects of Oil and Gas Well Drilling and Completion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unleash your Infrastructure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information on the Spot	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wrap-up/Seminar Conclusion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Quality and organization of the seminar

Choice of date	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Time allowed for lunch/breaks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Choice of presentations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Break and time allowed for the presentation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



OSIsoft.

REGIONAL SEMINARS 2016

© Copyright 2016 OSIsoft, LLC

25

감사합니다

谢谢

Danke

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado



OSIsoft.

REGIONAL SEMINARS 2016

© Copyright 2016 OSIsoft, LLC