

# Capturing and Sharing Ethanol Plant Data using PI Asset Framework

Presented by **Mark Sather – Syngenta**  
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**Ron Nicholas – SafeNet Consulting**  
**Jason Prosser – Stone Technologies**

# Working Together as a Team



Plant Info & Preparation   Install Plant Interfaces   AF Model & Deployment   Tag Binding   Validation   Business Adoption

- Syngenta and Enogen
- The Consultative Development & Deployment Process
- Illustrative Examples
- Continued Evolution – Future Vision

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# Developing a 21<sup>st</sup> Century Business with the PI System and the Cloud

*“Enogen® is bio-tech corn developed to maximize ethanol yield and throughput in dry grind ethanol plants.”*

*The Enogen program needed a 21<sup>st</sup> century technology to enable us to develop a scalable, highly customer focused 21<sup>st</sup> century solution.*

*PI AF, PI Coresight, PI Processbook, PI DataLink and PI Cloud Connect coupled with our consultant based development and deployment has met our needs and expectations.”*

Mark Sather, PMP, Syngenta® Enogen® Project Lead



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## Business Challenge

- New business model serving a geographically and process dispersed, tight margin, customer base
- Need to show benefits and services to customers and our internal teams
- Need a scalable, adaptive, cost effective, solution
- Need to capture batch and events with metadata for reporting, visualization, & analytics

## Solution

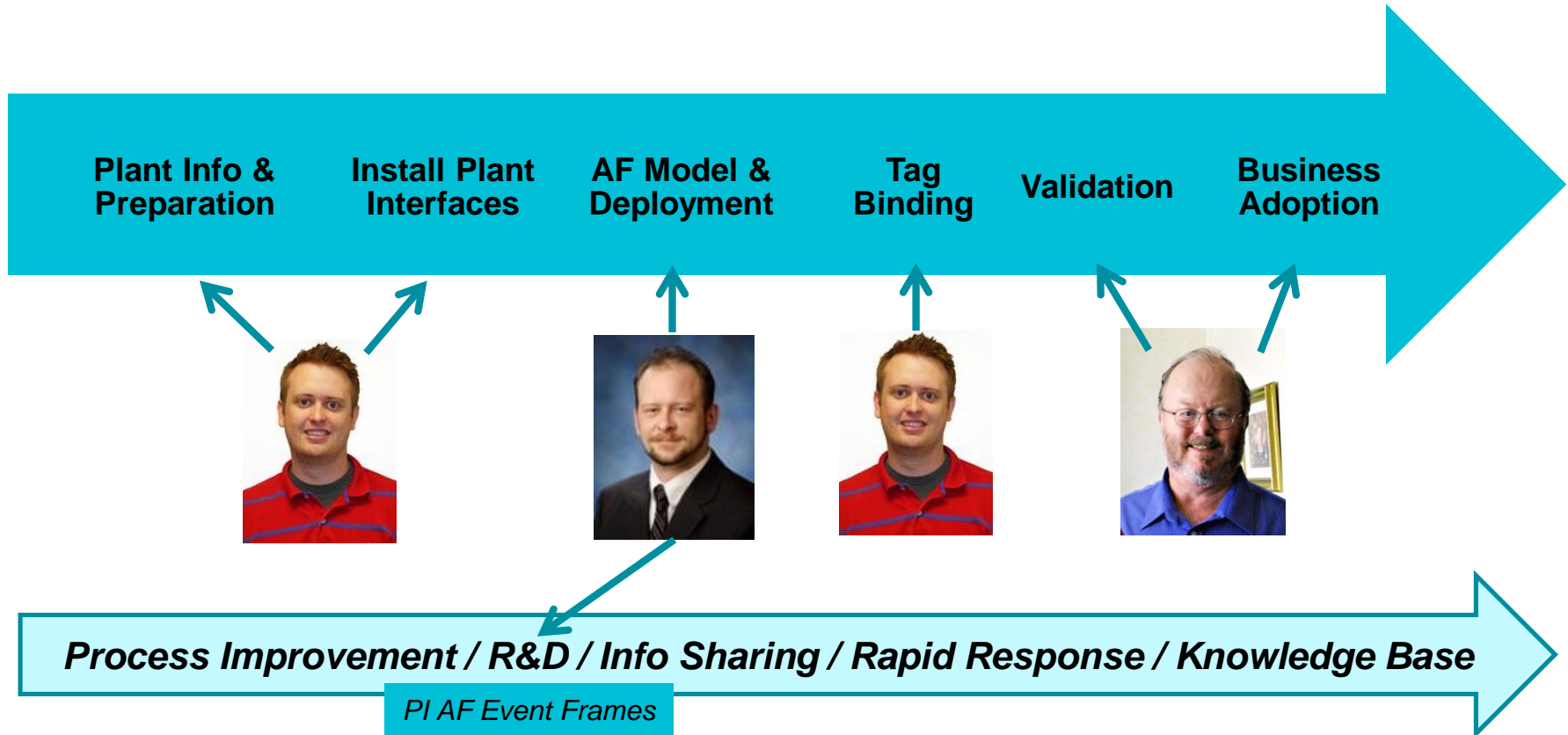
- Selected the PI System as our integration and applications infrastructure
- Leveraged new PI System tools such as PI Coresight, PI Cloud Connect with PI AF as a foundation
- Developed a consultative development and deployment process around the PI System



## Results and Benefits

- Flexible, scalable, cost efficient PI System & Cloud based solution
- Repeatable development and deployment process
- Opportunity to continuously improve offering with PI System roadmap items
- Alignment with Syngenta's vision and needs – positioned for the 21<sup>st</sup> century

# Process Overview



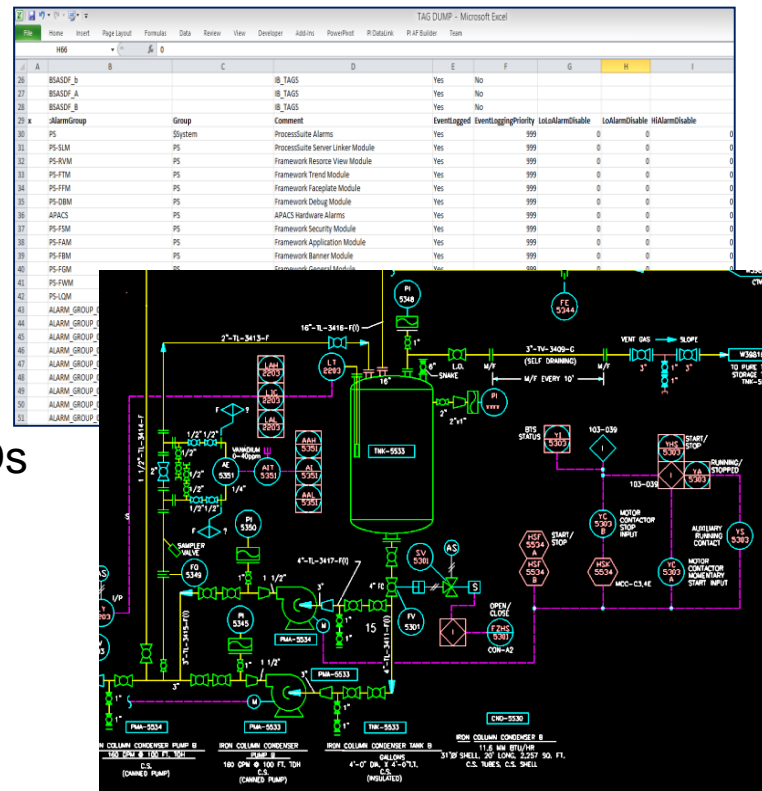
# Data Disclaimer



*Any resemblance to actual data,  
living or dead, is purely coincidental.*

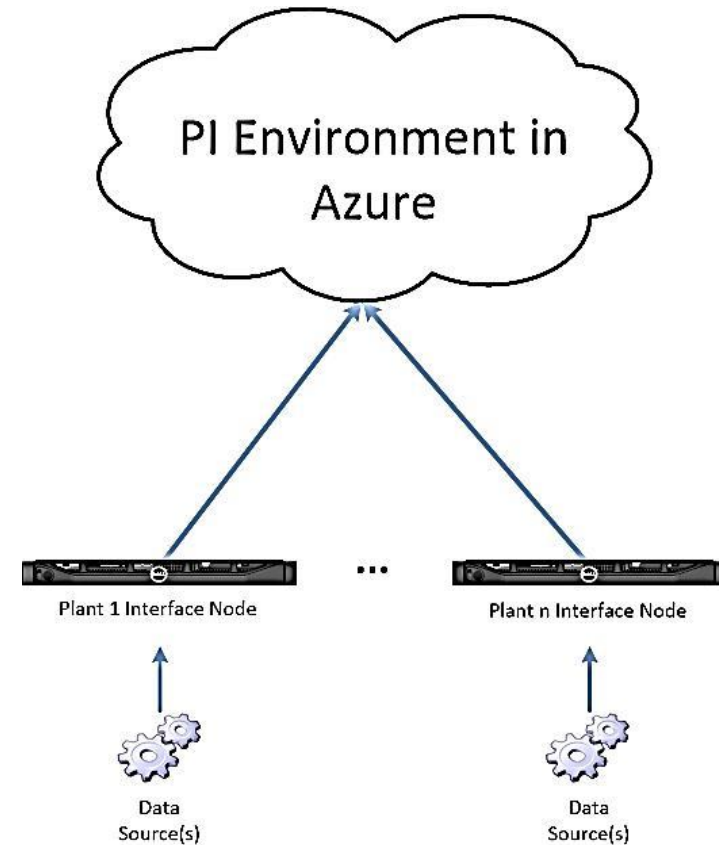
# Plant Information & Preparation

- Establish framework for plant information
  - Standardized requests to each plant
    - Key Contacts
    - DCS utilized
    - Network architecture drawings
    - HMI screenshots, DCS Tag List, and P&IDs
  - Outline approach to plant contacts
- Configure interface node in house, ship to site



# Plant PI Interface Install

- Minimal time onsite
- Connect to plant business network
  - Provides connectivity to Azure
- Connect to plant control network
  - Configure DCOM
  - Connect to OPC
- Create test tag and ensure data flow from control network to Azure



# Plant Document Review

- Compare documents to previously modeled plants
  - If possible, identify a similar previously modeled plant

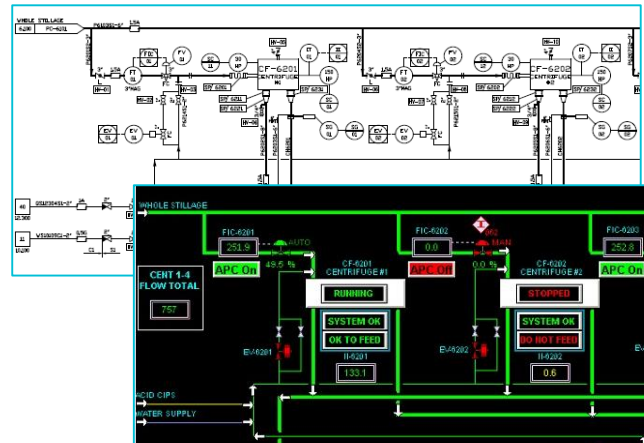
**Elements**

- ABC Plant
  - Chemicals
  - Cooking
  - Distillation
  - Drying
  - Fermentation
  - Interfaces
  - Milling
  - Product Storage
  - Separation
    - Centrifuges
      - Centrifuge 1
        - Control
          - Peripherals
            - Concentrate Valve
            - Current Indicator
            - Whole Stillage Flow Controller
              - Totalizer

**Control**

| Name               | Value                |
|--------------------|----------------------|
| Commanded Speed    | 2800 rpm             |
| Current            | 0 A                  |
| Differential Speed | 9.3223548583984 rpm  |
| Feed Bearing Temp  | 134 °F               |
| Gear Bearing Temp  | 134 °F               |
| M_Plant            | ABC                  |
| M_TagName          | CF_6201              |
| Speed              | 2809 rpm             |
| Torque             | 49 %                 |
| Vibration          | 10.6877250671387 rpm |

Similar?

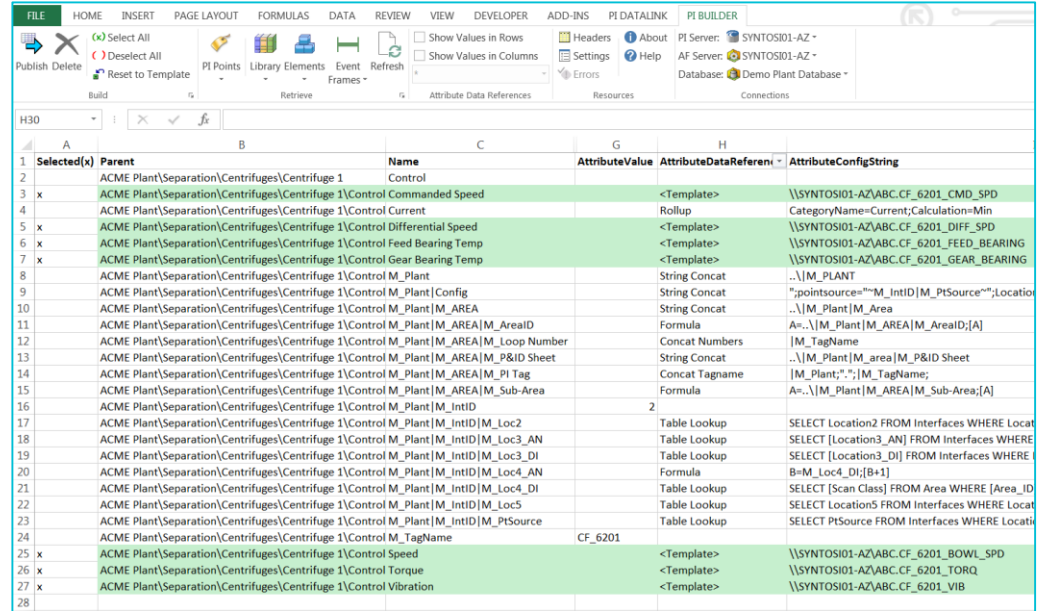


|       |                |        |                        |     |    |   |    |     |     |                        |      |
|-------|----------------|--------|------------------------|-----|----|---|----|-----|-----|------------------------|------|
| 7810  | FIC_6201-A1    | Cent   | centrifuge #1 feed     | No  | No | 0 | No | Off | OK  | HIGH                   | On   |
| 7811  | FIC_6201-A2    | Cent   | centrifuge #1 feed     | No  | No | 0 | No | Off | OK  | LOW                    | On   |
| 7812  | FIC_6201-A3    | System | centrifuge #1 feed     | No  | No | 0 | No | Off | OK  | ABSOLUTE               | On   |
| 7813  | FIC_6201-A4    | System | centrifuge #1 feed     | No  | No | 0 | No | Off | OK  | NONE                   | On   |
| 7938  | II_6201-A1     | Cent   | centrifuge #1 current  | No  | No | 0 | No | Off | OK  | HIGH                   | On   |
| 7939  | II_6201-A2     | Cent   | centrifuge #1 current  | No  | No | 0 | No | Off | OK  | LOW                    | On   |
| 7940  | II_6201-A3     | System | centrifuge #1 current  | No  | No | 0 | No | Off | OK  | NONE                   | On   |
| 7941  | II_6201-A4     | System | centrifuge #1 current  | No  | No | 0 | No | Off | OK  | NONE                   | On   |
| 9188  | FIC_6201-CTL   | System | Cent 1 feed            | Yes | No | 0 | No | Off | OK  | 0                      | None |
| 9190  | FIC_6201-III   | System | Cent 1 feed            | Yes | No | 0 | No | Off | OK  | 0                      | None |
| 18625 | FT6201SHIFTTOT | System | CENT1 SHIFT FEED TOTAL | Yes | No | 0 | No | No  | 0   | 0                      | 0    |
| 18641 | FT6201TOT      | System | CENT 1 FEED            | Yes | No | 0 | No | No  | 0   | 0                      | 0    |
| 18838 | FIC_6201-PV    | System | centrifuge #1 feed     | Yes | No | 0 | No | No  | 0   | 0                      | GPM  |
| 18839 | FIC_6201-SP    | System | centrifuge #1 feed     | Yes | No | 0 | No | No  | 0   | 0                      | GPM  |
| 18844 | FIC_6201-VL    | System | centrifuge #1 feed     | Yes | No | 0 | No | No  | 0   | 0                      | PCT  |
| 18847 | FIC_6201-ALARM | System | centrifuge #1 feed     | No  | No | 0 | No | No  | 0   | 0                      | GPM  |
| 18976 | II_6201-PV     | System | centrifuge #1 current  | Yes | No | 0 | No | No  | 0   | 0                      | AMP  |
| 18977 | II_6201-ALARM  | System | centrifuge #1 current  | No  | No | 0 | No | No  | 0   | 0                      | AMP  |
| 18978 | II_6201-LO     | System | Cent 1 feed            | Yes | No | 0 | No | No  | 0   | 0                      | 0    |
| 18979 | II_6201-TGT    | System | Cent 1 Feed Target     | No  | No | 0 | No | No  | 0   | 0                      | 0    |
| 18980 | II_6201-ESP    | System | Cent 1 feed            | Yes | No | 0 | No | No  | 0   | 0                      | 0    |
| 18981 | II_6201-TYPE   | System | CF6201 alarm           | No  | No | 0 | No | No  | 32  | APACS - DISCRETE_ALARM | 0    |
| 18982 | II_6201-TYPE   | System | CF6201 alarm           | No  | No | 0 | No | No  | 131 | FPW_Discrete           | 0    |
| 18983 | II_6201-TYPE   | System | CF6201 feed permissive | No  | No | 0 | No | No  | 32  | APACS - DISCRETE_ALARM | 0    |



# Plant PI AF Model Build - Re-use

- Copy existing plant
- Reset all Attributes using PI AFBUILDER
- Edit model as necessary

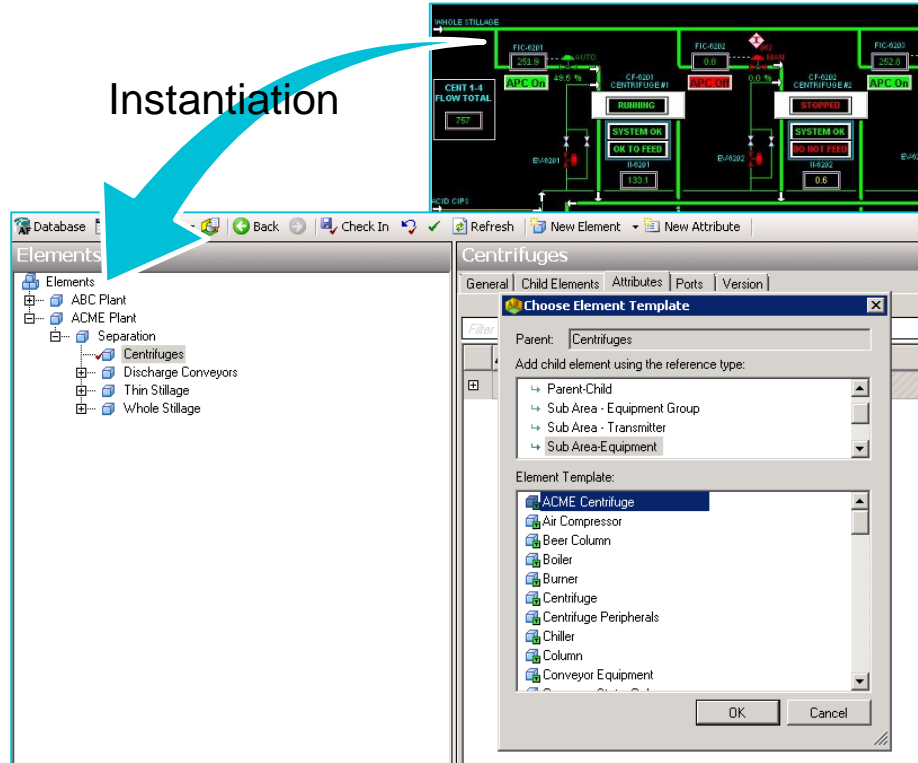


The screenshot shows the PI AFBUILDER application window. The top menu bar includes FILE, HOME, INSERT, PAGE LAYOUT, FORMULAS, DATA, REVIEW, VIEW, DEVELOPER, ADD-INS, PI DATALINK, and PI BUILDER. The PI BUILDER tab is active, displaying a table of attributes for a selected parent object: ACME Plant\Separation\Centrifuges\Centrifuge 1. The table has columns for Parent, Name, AttributeValue, AttributeDataReference, and AttributeConfigString. The table lists various attributes such as Control Commanded Speed, Control Current, Control Differential Speed, Control Feed Bearing Temp, Control Gear Bearing Temp, Control M\_Plant, Control M\_Plant\Config, Control M\_Plant|M\_Area, Control M\_Plant|M\_AreaID, Control M\_Plant|M\_Area|M\_Loop Number, Control M\_Plant|M\_Area|M\_P&ID Sheet, Control M\_Plant|M\_Area|M\_Pi Tag, Control M\_Plant|M\_Area|M\_Sub-Area, Control M\_Plant|M\_IntID, Control M\_Plant|M\_IntID|M\_Loc2, Control M\_Plant|M\_IntID|M\_Loc3\_AN, Control M\_Plant|M\_IntID|M\_Loc3\_DI, Control M\_Plant|M\_IntID|M\_Loc4\_AN, Control M\_Plant|M\_IntID|M\_Loc4\_DI, Control M\_Plant|M\_IntID|M\_Loc5, Control M\_Plant|M\_IntID|M\_PtSource, Control M\_TagName, Control M\_Speed, Control Torque, and Control Vibration. The AttributeValue column contains values like <Template>, Rollup, String Concat, Formula, Concat Numbers, String Concat, Concat Tagname, Table Lookup, and Formula. The AttributeDataReference column contains values like <Template>, Rollup, String Concat, Formula, Concat Numbers, String Concat, Concat Tagname, Table Lookup, and Formula. The AttributeConfigString column contains values like \\SYNTO5101-AZ\ABC.CF\_6201\_CMD\_SPD, \\SYNTO5101-AZ\ABC.CF\_6201\_DIFF\_SPD, \\SYNTO5101-AZ\ABC.CF\_6201\_FEED\_BEARING, \\SYNTO5101-AZ\ABC.CF\_6201\_GEAR\_BEARING, ..\|M\_PLANT, ..\|M\_Plant|M\_Area, A=..\|M\_Plant|M\_AreaID, [M\_TagName], ..\|M\_Plant|M\_Area|M\_P&ID Sheet, [M\_Plant;";";|M\_TagName], A=..\|M\_Plant|M\_Area|M\_Sub-Area;[A], 2, SELECT Location2 FROM Interfaces WHERE Locat, SELECT [Location3\_AN] FROM Interfaces WHERE, SELECT [Location3\_DI] FROM Interfaces WHERE, B=M\_Loc4\_DI[B+1], SELECT [Scan Class] FROM Area WHERE [Area\_ID], SELECT Location5 FROM Interfaces WHERE Locat, SELECT PtSource FROM Interfaces WHERE Locat, \\SYNTO5101-AZ\ABC.CF\_6201\_BOWL\_SPD, \\SYNTO5101-AZ\ABC.CF\_6201\_TORQ, and \\SYNTO5101-AZ\ABC.CF\_6201\_VIB.

|    | A           | B   | C              | G                      | H   |
|----|-------------|---|----------------|------------------------|---|
|    | Parent      | Name  | AttributeValue | AttributeDataReference | AttributeConfigString                         |
| 1  | Selected(x) | ACME Plant\Separation\Centrifuges\Centrifuge 1                                      | Control        |                        |   |
| 2  |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control Commanded Speed              | <Template>     |                        | \\SYNTO5101-AZ\ABC.CF_6201_CMD_SPD            |
| 3  | x           | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control Current                      | Rollup         |                        | CategoryName=Current;Calculation=Min          |
| 4  |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control Differential Speed           | <Template>     |                        | \\SYNTO5101-AZ\ABC.CF_6201_DIFF_SPD           |
| 5  | x           | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control Feed Bearing Temp            | <Template>     |                        | \\SYNTO5101-AZ\ABC.CF_6201_FEED_BEARING       |
| 6  | x           | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control Gear Bearing Temp            | <Template>     |                        | \\SYNTO5101-AZ\ABC.CF_6201_GEAR_BEARING       |
| 7  | x           | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Plant                      | String Concat  |                        | ..\ M_PLANT                                   |
| 8  |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Plant\Config               | String Concat  |                        | "pointsource""M_IntID M_PtSource""Location    |
| 9  |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Plant M_Area               | String Concat  |                        | ..\ M_Plant M_Area                            |
| 10 |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Plant M_AreaID             | Formula        |                        | A=..\ M_Plant M_AreaID;[A]                    |
| 11 |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Plant M_Area M_Loop Number | Concat Numbers |                        | [M_TagName]                                   |
| 12 |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Plant M_Area M_P&ID Sheet  | String Concat  |                        | ..\ M_Plant M_Area M_P&ID Sheet               |
| 13 |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Plant M_Area M_Pi Tag      | Concat Tagname |                        | [M_Plant;";"; M_TagName]                      |
| 14 |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Plant M_Area M_Sub-Area    | Formula        |                        | A=..\ M_Plant M_Area M_Sub-Area;[A]           |
| 15 |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Plant M_IntID              |                | 2                      |   |
| 16 |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Plant M_IntID M_Loc2       | Table Lookup   |                        | SELECT Location2 FROM Interfaces WHERE Locat  |
| 17 |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Plant M_IntID M_Loc3_AN    | Table Lookup   |                        | SELECT [Location3_AN] FROM Interfaces WHERE   |
| 18 |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Plant M_IntID M_Loc3_DI    | Table Lookup   |                        | SELECT [Location3_DI] FROM Interfaces WHERE   |
| 19 |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Plant M_IntID M_Loc4_AN    | Formula        |                        | B=M_Loc4_DI[B+1]                              |
| 20 |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Plant M_IntID M_Loc4_DI    | Table Lookup   |                        | SELECT [Scan Class] FROM Area WHERE [Area_ID] |
| 21 |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Plant M_IntID M_Loc5       | Table Lookup   |                        | SELECT Location5 FROM Interfaces WHERE Locat  |
| 22 |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Plant M_IntID M_PtSource   | Table Lookup   |                        | SELECT PtSource FROM Interfaces WHERE Locat   |
| 23 |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_TagName                    | CF_6201        |                        |   |
| 24 |             | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control M_Speed                      | <Template>     |                        | \\SYNTO5101-AZ\ABC.CF_6201_BOWL_SPD           |
| 25 | x           | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control Torque                       | <Template>     |                        | \\SYNTO5101-AZ\ABC.CF_6201_TORQ               |
| 26 | x           | ACME Plant\Separation\Centrifuges\Centrifuge 1\Control Vibration                    | <Template>     |                        | \\SYNTO5101-AZ\ABC.CF_6201_VIB                |

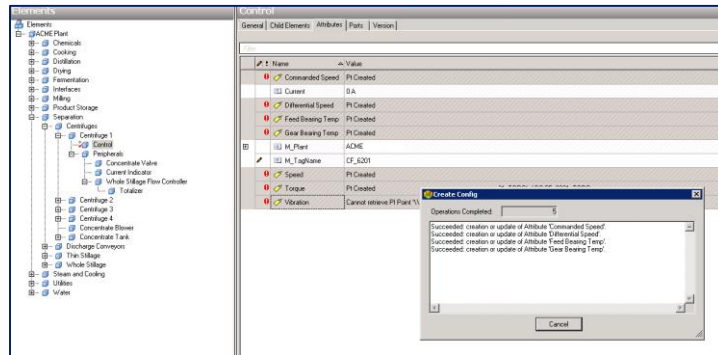
# Plant PI AF Model - New Build

- Create New Model using PI System Explorer
- Derive Templates as necessary
- Re-use similar Areas or Elements whenever possible

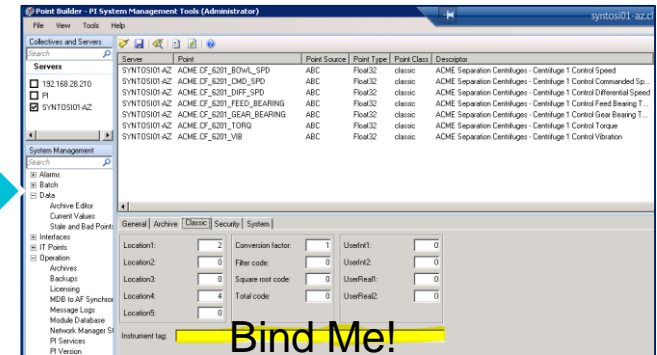


# Plant PI AF Model Publishing

- Use PI AF Point Creation functionality to deploy PI Points
- All attributes except for “instrumenttag” are derived from the PI AF context and PI AF Tables



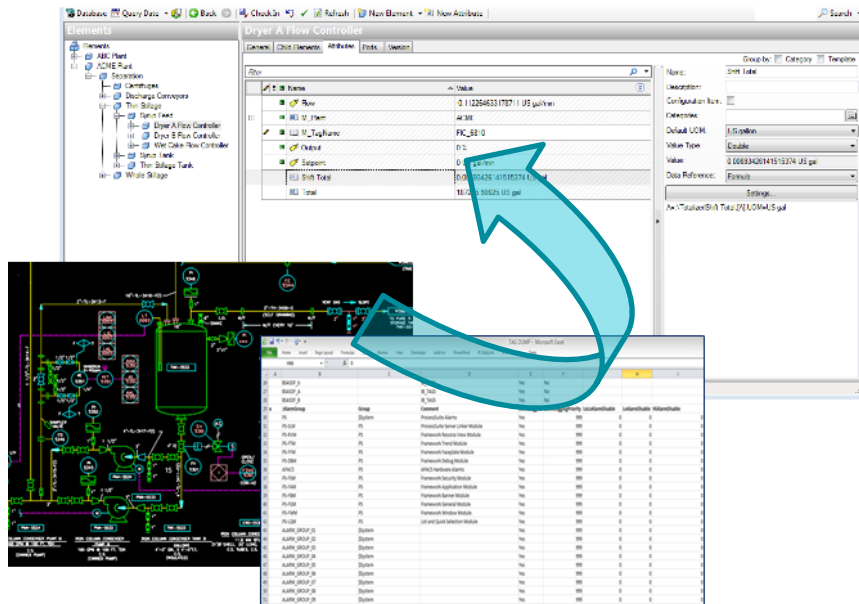
Auto Point Creation



Bind Me!

# Tag Binding

- Load all PI tags from Model into Excel
- Macros developed to bind ~75% of tags
  - Fine-tuning from site to site
  - Automated bindings double-checked manually
- Remaining tags are bound manually
  - Utilize DCS tag dump, P&ID, and HMIs
- Generate an issue list of unbound tags
  - Do we need more information?
  - Who is responsible to resolve?



# Data Validation

- PI Coresight Visualization





# Data Validation

- Issue Logged  
Tracked / Resolved

Enogen

Overview Activity Issues New Issue Calendar Settings

Issues

Filters

Status: ☒ Status ☐ Category  is not  Closed  is  GLWT  is

Options

Apply Clear Save

| #     | Tracker | Status   | Priority | Subject   | Assignee         | Updated             |
|-------|---------|----------|----------|---|------------------|---------------------|
| 13713 | Support | New      | Normal   | ACME   Distillation Side 2   Rectifier   Rectifier Column   Density Transmitter   Density               | Support, RoviSys | 03/04/2014 11:30 pm |
| 13712 | Support | New      | Normal   | ACME   Distillation Side 2   Beer Column & Side Stripper   Beer Column   Beer Well Feed Valve   Command | Support, RoviSys | 03/04/2014 10:55 pm |
| 13711 | Support | New      | Normal   | ACME   Distillation Side 2   2nd Effect Evaporators   Syrup Draw   Density Transmitter   Density        | Support, RoviSys | 03/04/2014 10:29 pm |
| 13710 | Support | New      | Normal   | ACME   Distillation Side 2   1st Effect Evaporators   | Support, RoviSys | 03/04/2014 10:06 pm |
| 13706 | Support | Feedback | Normal   | ACME   Distillation Side 1   Beer Column and Side Stripper  | Support, RoviSys | 03/04/2014 04:27 pm |
| 13705 | Support | Feedback | Normal   | ACME   Distillation Side 1   2nd Effect Evaporators   | Support, RoviSys | 03/04/2014 04:01 pm |
| 13704 | Support | Feedback | Normal   | ACME   Distillation Side 1   1st Effect Evaporators   | Support, RoviSys | 03/04/2014 03:49 pm |
| 13701 | Support | Feedback | Normal   | ACME   Cooking   Slurry Tanks   Slurry Infeed   | Support, RoviSys | 03/04/2014 03:44 pm |
| 13699 | Support | New      | Normal   | ACME_Cooking_Liquefaction Tanks   | Support, RoviSys | 03/04/2014 01:19 pm |
| 13698 | Support | New      | Normal   | ACME   Cooking   Enzyme Tanks   Alpha Amylase   | Support, RoviSys | 03/04/2014 12:52 pm |
| 13697 | Support | Feedback | Normal   | ACME   Cooking   Cook Water Tanks   | Support, RoviSys | 03/04/2014 12:28 pm |
| 13695 | Support | New      | Normal   | ACME   Cooking  | Prosser, Jason   | 03/04/2014 11:23 am |
| 13694 | Support | Feedback | Normal   | ACME   Chemicals   NaOH CIP System  | Support, RoviSys | 03/04/2014 08:48 am |
| 13656 | Support | Feedback | Normal   | ACME   Tag Discrepancy Issue List   | Prosser, Jason   | 03/03/2014 02:49 pm |

## Support #13706



ACME | Distillation Side 1 | Beer Column and Side Stripper

Added by Holtmeier, Rick about 18 hours ago. Updated about 18 hours ago.

Status: Feedback Start date:  
Priority: Normal Due date:  
Assignee: Support, RoviSys % Done:  
Category: GLWT Spent time:  
Target version: -

### Description

Colors as per attachment:

1. In red, Beer Column contains 2nd Effect Vapor Pressure Transmitter. Is the 1st Effect missing or is this object mis-labeled?
2. IN blue, the following objects show "Scan Off"
  - a. Beer Column | BEER\_DP
  - b. Side Stripper | STRIP\_DP

Capture140.JPG (200 kB) Holtmeier, Rick, 03/04/2014 04:05 pm

### Subtasks

### Related issues

### History



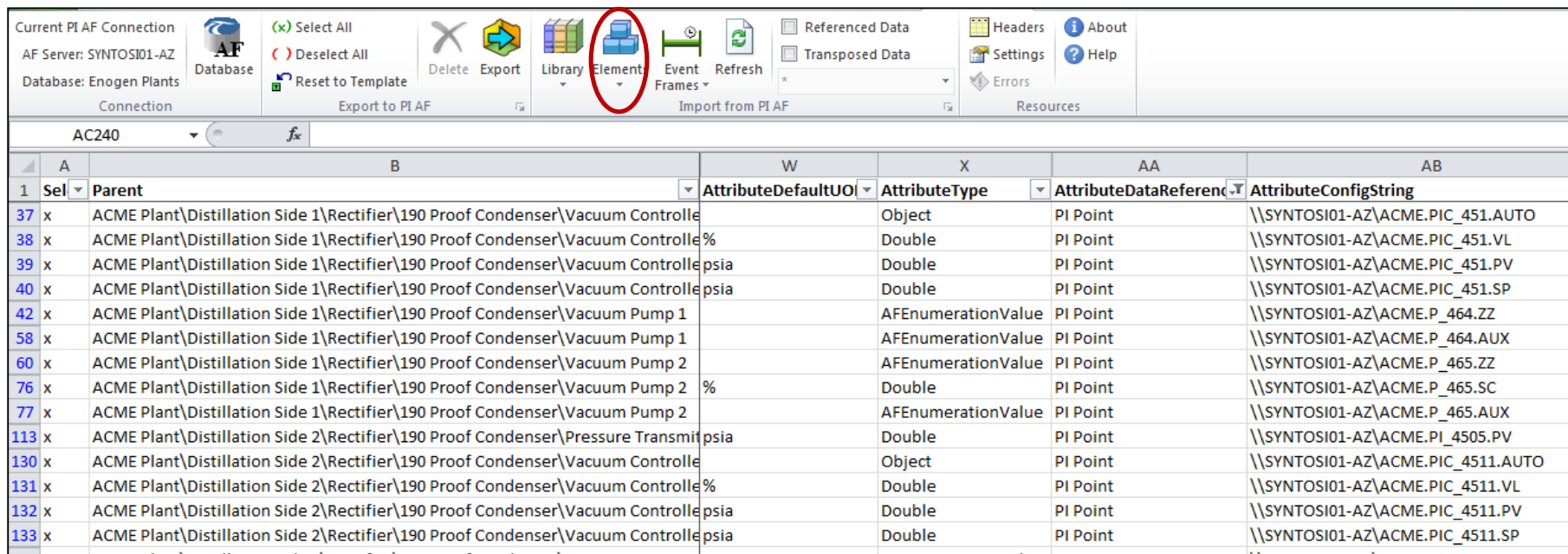
Updated by Froehlich, Chris about 18 hours ago

- Status changed from New to Feedback

1. In general we like to put a flow near it's destination. In many cases it splits to several places and doing so is of no help. In this case it shows on the HMI also in this location. If it is desired to be at another location we can do so no problem. Other times, we can create a new object we can do that also.

2. RoviSys to review. I am finding DP.PV and DT.PV and then finding G509.\_44\_45.BEERCOLTEMPDIF, G509.\_44\_45.BEERCOLPRES

- PI Data Link / PI AF Builder - Gap Analysis



# Reporting Needs – Alignment & Use

- Must align PI system data and visualizations with in-place plant data, metrics and reporting
- Data used for many purposes:
  - Monitor
  - Analyze
  - Troubleshoot
  - Evaluate
  - Learn

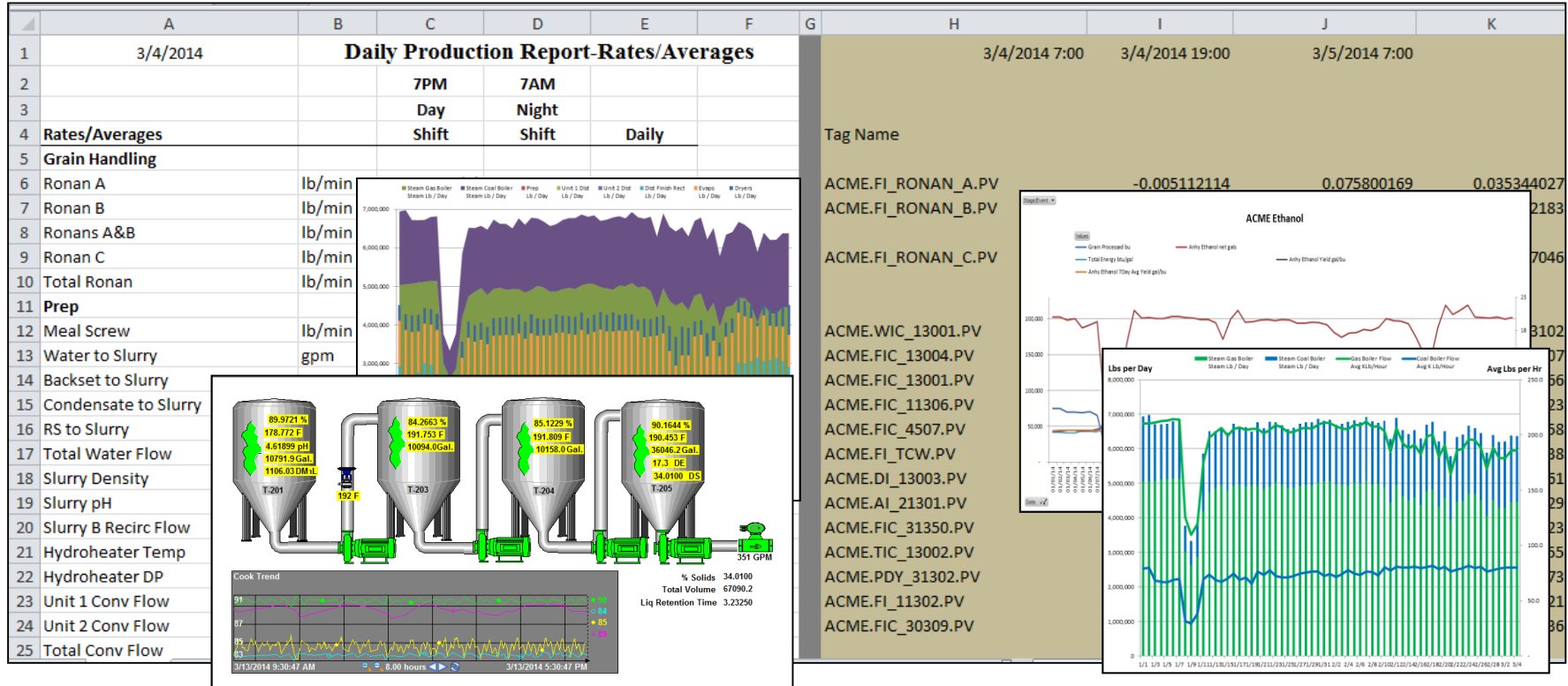




# Reporting Needs – Using PI Coresight

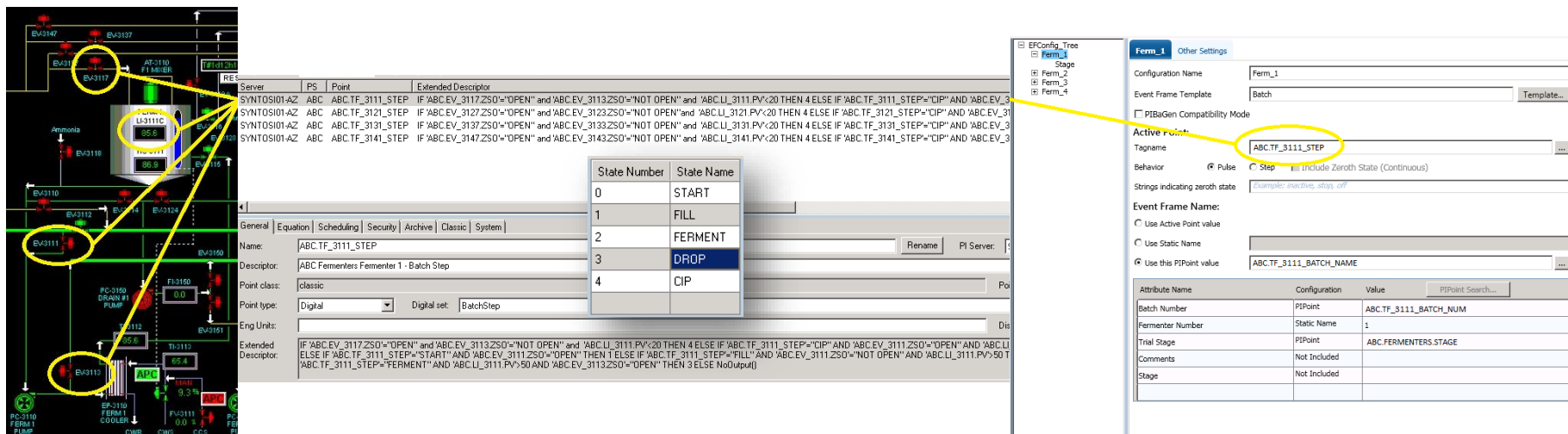


# Reporting – Using PI DataLink & ProcessBook



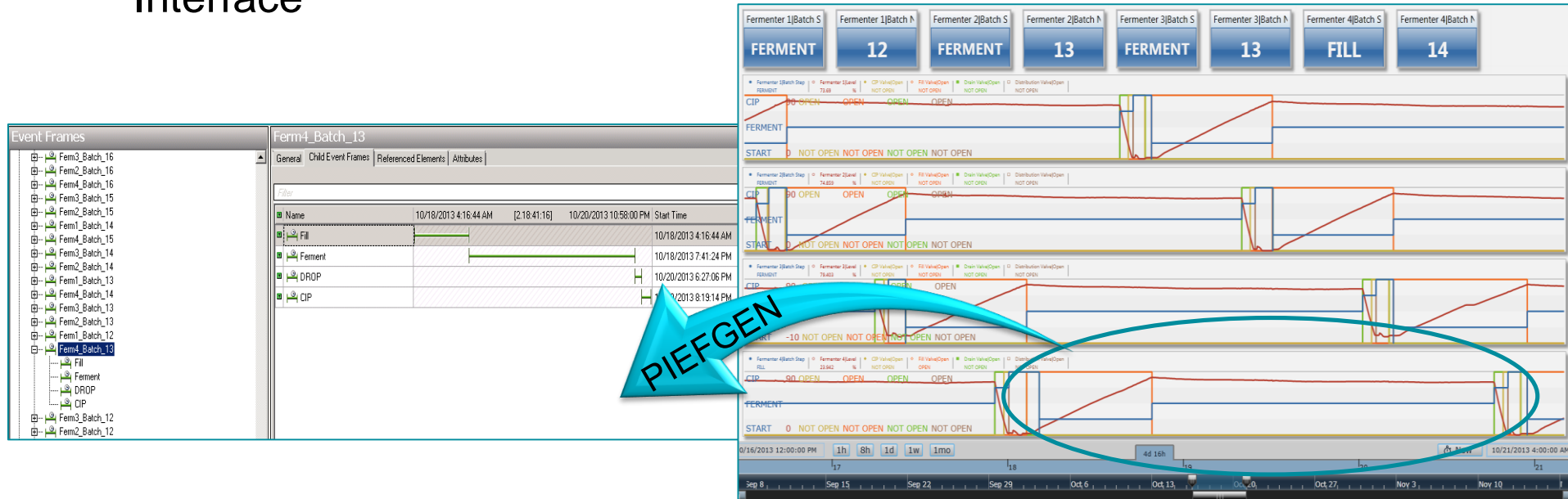
# Future World: PI AF Event Frames

- PI AF Event Frames used for Fermentation Batch Tracking
- Custom PI Performance Equation batch trigger defined for each Fermentation Vessel



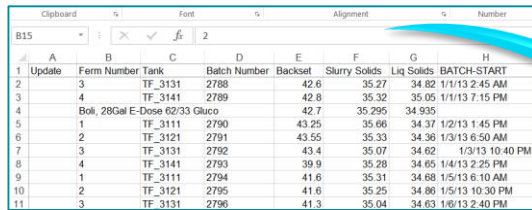
# PI AF Event Frames

- Process-triggered Batch Event Frames created using the PIEFGEN Interface



# Adding Data To Process PI Event Frames

- Reconcile Non-Process Data to Process Event Frames from various sources



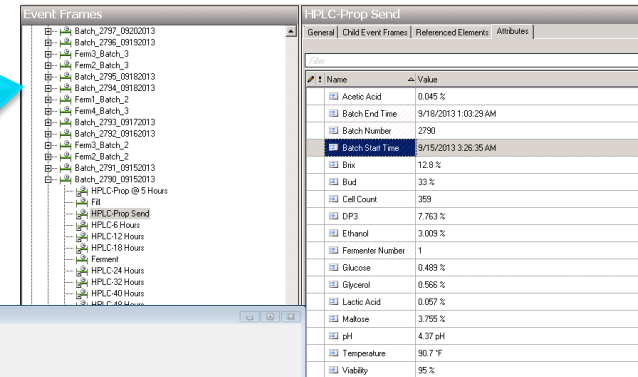
|    | A      | B           | C                        | D            | E       | F             | G               | H           |
|----|--------|-------------|--------------------------|--------------|---------|---------------|-----------------|-------------|
| 1  | Update | Form Number | Tank                     | Batch Number | Backset | Slurry Solids | Liqu Solids     | BATCH-START |
| 2  | 3      | TF_3131     | 2788                     | 42.6         | 35.27   | 34.82         | 1/1/13 2:45 AM  |             |
| 3  | 4      | TF_3141     | 2789                     | 42.8         | 35.32   | 35.05         | 1/1/13 7:15 PM  |             |
| 4  |        | Bol         | 28Gal E-Dose 62/33 Gluco | 42.7         | 35.295  | 34.935        |                 |             |
| 5  | 1      | TF_3111     | 2790                     | 43.25        | 35.66   | 34.37         | 1/2/13 1:45 PM  |             |
| 6  | 2      | TF_3121     | 2791                     | 43.55        | 35.33   | 34.36         | 1/3/13 6:50 AM  |             |
| 7  | 3      | TF_3131     | 2792                     | 43.4         | 35.07   | 34.62         | 1/3/13 10:40 PM |             |
| 8  | 4      | TF_3141     | 2793                     | 39.9         | 35.28   | 34.65         | 1/4/13 2:25 PM  |             |
| 9  | 1      | TF_3111     | 2794                     | 41.6         | 35.31   | 34.68         | 1/5/13 6:10 AM  |             |
| 10 | 2      | TF_3121     | 2795                     | 41.6         | 35.25   | 34.86         | 1/5/13 10:30 PM |             |
| 11 | 3      | TF_3131     | 2796                     | 41.3         | 35.04   | 34.63         | 1/6/13 2:40 PM  |             |

Excel Data



LIMS Database

To Event Frames

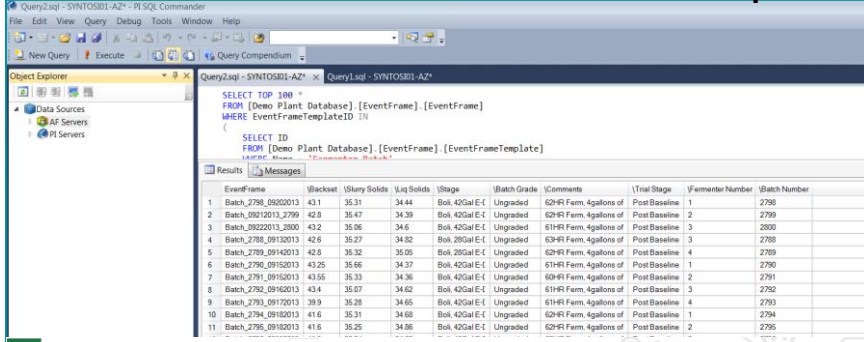


| General             | Child Event Frames | Referenced Elements | Attributes |
|---------------------|--------------------|---------------------|------------|
| Name                |                    |                     |            |
| Value               |                    |                     |            |
| Batch 2797_09202013 |                    |                     |            |
| Batch 2796_09192013 |                    |                     |            |
| Fem3_Batch_3        |                    |                     |            |
| Fem2_Batch_3        |                    |                     |            |
| Batch 2796_09182013 |                    |                     |            |
| Batch 2794_09182013 |                    |                     |            |
| Fem1_Batch_2        |                    |                     |            |
| Fem4_Batch_3        |                    |                     |            |
| Batch 2793_09172013 |                    |                     |            |
| Fem3_Batch_2        |                    |                     |            |
| Fem2_Batch_2        |                    |                     |            |
| Batch 2791_09152013 |                    |                     |            |
| Batch 2790_09152013 |                    |                     |            |
| HPLC-Prop @ 5 Hours |                    |                     |            |
| HPLC-Prop Send      |                    |                     |            |
| HPLC-6 Hours        |                    |                     |            |
| HPLC-12 Hours       |                    |                     |            |
| HPLC-18 Hours       |                    |                     |            |
| Fement              |                    |                     |            |
| HPLC-24 Hours       |                    |                     |            |
| HPLC-35 Hours       |                    |                     |            |
| HPLC-40 Hours       |                    |                     |            |
| HPLC-45 Hours       |                    |                     |            |

# Data Presentation of Events

PI OLEDB Enterprise

- Utilize ODBC Queries or PI OLEDB Enterprise to retrieve DataSets
- Standard Presentation tools can be used with the DataSets.
- PI Coresight
- PI ProcessBook
- PI Datalink in the Future



The screenshot shows a SQL Server Enterprise Manager window with a query result set. The query is a SELECT statement from the 'Demo Plant Database' table 'EventFrame'. The result set displays 11 rows of data, including columns for EventFrame, Batch, Start Time, End Time, Element, Batch End Time, Batch Start Time, Bins, Bins, Cell Count, ODS, Ethanol, Glucose, Glyceral, Lactic Acid, and pH. The data is presented in a table format with columns and rows.

| EventFrame         | Batch | Start Time | End Time | Element     | Batch End Time | Batch Start Time      | Bins          | Bins | Cell Count | ODS | Ethanol | Glucose | Glyceral | Lactic Acid | pH |
|--------------------|-------|------------|----------|-------------|----------------|-----------------------|---------------|------|------------|-----|---------|---------|----------|-------------|----|
| Batch_2798_0912013 | 43.1  | 35.31      | 34.44    | Bol_42Gal E | Ungraded       | 62H1 Farm, 4galons of | Post Baseline | 1    | 2798       |     |         |         |          |             |    |
| Batch_0812013_2799 | 42.8  | 35.47      | 34.39    | Bol_42Gal E | Ungraded       | 62H1 Farm, 4galons of | Post Baseline | 2    | 2799       |     |         |         |          |             |    |
| Batch_0822013_2800 | 43.2  | 35.06      | 34.6     | Bol_42Gal E | Ungraded       | 61H1 Farm, 4galons of | Post Baseline | 3    | 2800       |     |         |         |          |             |    |
| Batch_2788_0912013 | 42.6  | 35.27      | 34.82    | Bol_28Gal E | Ungraded       | 63H1 Farm, 4galons of | Post Baseline | 3    | 2788       |     |         |         |          |             |    |
| Batch_2789_0912013 | 42.8  | 35.32      | 35.05    | Bol_28Gal E | Ungraded       | 62H1 Farm, 4galons of | Post Baseline | 4    | 2789       |     |         |         |          |             |    |
| Batch_2790_0912013 | 43.25 | 35.68      | 34.37    | Bol_42Gal E | Ungraded       | 61H1 Farm, 4galons of | Post Baseline | 1    | 2790       |     |         |         |          |             |    |
| Batch_2791_0912013 | 43.55 | 35.33      | 34.36    | Bol_42Gal E | Ungraded       | 62H1 Farm, 4galons of | Post Baseline | 2    | 2791       |     |         |         |          |             |    |
| Batch_2792_0912013 | 43.4  | 35.07      | 34.62    | Bol_42Gal E | Ungraded       | 61H1 Farm, 4galons of | Post Baseline | 3    | 2792       |     |         |         |          |             |    |
| Batch_2793_0912013 | 39.9  | 35.28      | 34.65    | Bol_42Gal E | Ungraded       | 61H1 Farm, 4galons of | Post Baseline | 4    | 2793       |     |         |         |          |             |    |
| Batch_2794_0912013 | 41.6  | 35.31      | 34.68    | Bol_42Gal E | Ungraded       | 62H1 Farm, 4galons of | Post Baseline | 1    | 2794       |     |         |         |          |             |    |
| Batch_2795_0912013 | 41.6  | 35.25      | 34.86    | Bol_42Gal E | Ungraded       | 62H1 Farm, 4galons of | Post Baseline | 2    | 2795       |     |         |         |          |             |    |

Below the screenshot, there is a table titled 'ODBC Queries' showing a list of queries and their results. The table has columns for Name, Start Time, End Time, Element, Batch End Time, Batch Start Time, Bins, Bins, Cell Count, ODS, Ethanol, Glucose, Glyceral, Lactic Acid, and pH. The data is presented in a table format with columns and rows.

| Name                | Start Time       | End Time         | Element     | Batch End Time          | Batch Start Time        | Bins | Bins | Cell Count | ODS    | Ethanol | Glucose | Glyceral | Lactic Acid | pH    |
|---------------------|------------------|------------------|-------------|-------------------------|-------------------------|------|------|------------|--------|---------|---------|----------|-------------|-------|
| HPIC-Prop @ 5 Hours | 12/9/2013 18:28  | 12/9/2013 19:28  | Fermenter 1 | 2013-12-12 05:33:14.000 | 2013-12-09 00:28:50.000 | 15.7 |      | 7.375      | 0.725  | 1.853   | 0.319   | 0.08     | 3.07        | 4.7   |
| HPIC-Prop Send      | 12/9/2013 19:28  | 12/9/2013 23:28  | Fermenter 1 | 2013-12-12 05:33:14.000 | 2013-12-09 00:28:50.000 | 12.7 | 26   | 312        | 4.701  | 2.489   | 2.05    | 0.462    | 0.081       | 3.81  |
| HPIC-Ferm 6 Hours   | 12/9/2013 23:28  | 12/9/2013 0:28   | Fermenter 1 | 2013-12-12 05:33:14.000 | 2013-12-09 00:28:50.000 | 27.3 | 14   | 96         | 10.46  | 0.947   | 9.433   | 0.55     | 0.158       | 4.999 |
| HPIC-Ferm 12 Hours  | 12/9/2013 0:28   | 12/9/2013 6:28   | Fermenter 1 | 2013-12-12 05:33:14.000 | 2013-12-09 00:28:50.000 | 24.3 | 37   | 193        | 8.31   | 4.193   | 7.062   | 0.879    | 0.198       | 4.922 |
| HPIC-Ferm 18 Hours  | 12/9/2013 6:28   | 12/9/2013 12:28  | Fermenter 1 | 2013-12-12 05:33:14.000 | 2013-12-09 00:28:50.000 | 21.6 |      | 9.096      | 5.847  | 3.543   | 0.994   | 0.188    | 4.748       | 4.07  |
| HPIC-Ferm 24 Hours  | 12/9/2013 12:28  | 12/9/2013 18:28  | Fermenter 1 | 2013-12-12 05:33:14.000 | 2013-12-09 00:28:50.000 | 18.5 |      | 7.664      | 8.134  | 1.815   | 1.196   | 0.18     | 3.938       | 4.02  |
| HPIC-Ferm 32 Hours  | 12/9/2013 18:28  | 12/10/2013 2:28  | Fermenter 1 | 2013-12-12 05:33:14.000 | 2013-12-09 00:28:50.000 | 15.1 |      | 5.706      | 10.627 | 1.058   | 1.234   | 0.168    | 1.099       | 4.07  |
| HPIC-Ferm 40 Hours  | 12/10/2013 2:28  | 12/10/2013 10:28 | Fermenter 1 | 2013-12-12 05:33:14.000 | 2013-12-09 00:28:50.000 | 12.6 |      | 2.967      | 12.845 | 0.617   | 1.309   | 0.162    | 0.516       | 4.1   |
| HPIC-Ferm 48 Hours  | 12/10/2013 10:28 | 12/10/2013 18:28 | Fermenter 1 | 2013-12-12 05:33:14.000 | 2013-12-09 00:28:50.000 | 11.6 |      | 1.68       | 13.884 | 0.215   | 1.318   | 0.159    | 0.462       | 4.33  |
| HPIC-Ferm 56 Hours  | 12/10/2013 18:28 | 12/11/2013 2:28  | Fermenter 1 | 2013-12-12 05:33:14.000 | 2013-12-09 00:28:50.000 | 11.5 |      | 1.163      | 14.077 | 0.198   | 1.287   | 0.154    | 0.447       | 4.4   |
| HPIC-Drop           | 12/11/2013 2:28  | 12/11/2013 6:28  | Fermenter 1 | 2013-12-12 05:33:14.000 | 2013-12-09 00:28:50.000 | 11.5 | 4    | 279        | 1.015  | 14.337  | 0.224   | 1.304    | 0.157       | 0.464 |
| HPIC-Beer Well      | 12/11/2013 6:28  | 12/11/2013 10:28 | Fermenter 1 | 2013-12-12 05:33:14.000 | 2013-12-09 00:28:50.000 | 11.5 |      | 0.893      | 14.131 | 0.233   | 1.236   | 0.209    | 0.426       | 4.47  |
| HPIC                | 12/11/2013 9:53  | 12/11/2013 11:59 | Fermenter 1 |                         |                         |      |      |            |        |         |         |          |             |       |

ODBC Queries

# Closing Remarks

**Plant Info &  
Preparation**

**Install Plant  
Interfaces**

**AF Model &  
Deployment**

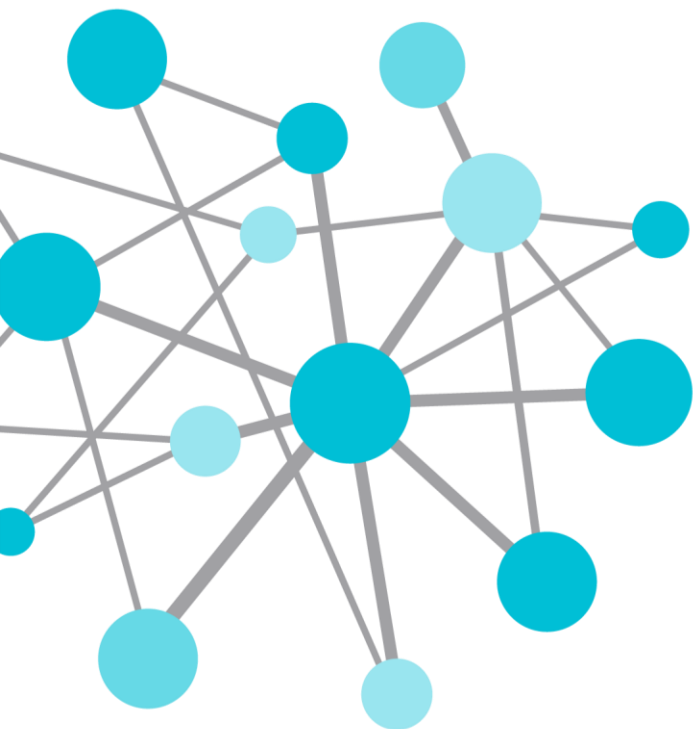
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