

# Incorporate Event Frames into your Operations

Ellery Murdock



# Introduction

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# Agenda

- Introduction
- Event Frame Context
- Best Practices
- Summary



# Introduction to Event Frames



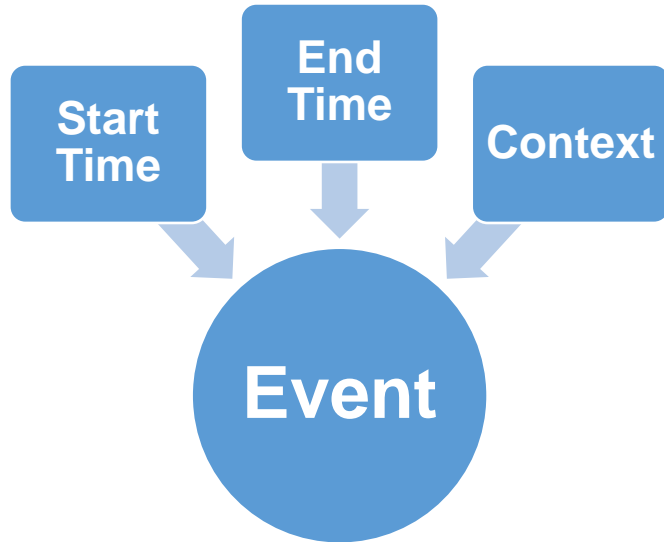
# What are Event Frames?

- Bookmarks for time-series data
  - Capture critical event contexts
  - Provide meaning to users by making it easier to find, analyze, and report on an event





# Event Frames



Referenced Elements	Name
	OW-206
	OW-207

Name	Value
Category: General Info	
Operator	Bobby Wolf
Operator Comment	
Phase	Dwell
Type	LOW TEMP
Category: Limits	
Temp.Limit.High1	88 °C
Temp.Limit.Low	70 °C
Category: Manual Logger	
Comment	0
Category: Process Parameters	
Level.Start	42.743 L
Temp.End	71.154 °C
Temp.Max	71.154 °C
Temp.Min	62.166 °C
Temp.Range	8.988 °C
Temp.Start	62.166 °C

**Asset(s)**  
associated to the  
event











**Text entries** useful  
for filtering/group-  
by analysis

Placeholders for  
**manual data entry**

**Calculated data**  
using event start &  
end time context



# Event Frame Introduction

	    Name	S [00:47:30] .	Duration	Start Time	End Time	Template	
	   Pulp_BID-111605		0:47:30	9/13/2017 11:49:53 AM	9/13/2017 12:37:23 PM	Procedure	



# Event Frame Introduction

		Name	§ [00:47:30]	Duration	Start Time	End Time	Template	
		Pulp_BID-111605		0:47:30	9/13/2017 11:49:53 AM	9/13/2017 12:37:23 PM	Procedure	
		Procedure 104		0:14:00	9/13/2017 11:49:53 AM	9/13/2017 12:03:53 PM	UnitProcedure	
		Procedure A204		0:39:30	9/13/2017 11:57:53 AM	9/13/2017 12:37:23 PM	UnitProcedure	

Parent Event Frame  
Children Event Frames



# Event Frame Introduction

	Name	S [00:47:30]	Duration	Start Time	End Time	Template
[-]	Pulp_BID-111605		0:47:30	9/13/2017 11:49:53 AM	9/13/2017 12:37:23 PM	Procedure
[-]	Procedure 104		0:14:00	9/13/2017 11:49:53 AM	9/13/2017 12:03:53 PM	UnitProcedure
[-]	Procedure A204		0:39:30	9/13/2017 11:57:53 AM	9/13/2017 12:37:23 PM	UnitProcedure
[+]	Idle		0:03:00	9/13/2017 11:58:23 AM	9/13/2017 12:01:23 PM	Operation
[+]	Prehydrolysis		0:22:00	9/13/2017 12:01:23 PM	9/13/2017 12:23:23 PM	Operation














Parent Event Frame

Children Event Frames

Grandchildren Event Frames



# Event Frame Introduction

Name		Value
Category: General Info		
	Operator	Bobby Wolf
	Operator Comment	
	Phase	Dwell
	Type	LOW TEMP
Category: Limits		
	Temp.Limit.High1	88 °C
	Temp.Limit.Low	70 °C
Category: Manual Logger		
	Comment	0
Category: Process Parameters		
	Level.Start	42.743 L
	Temp.End	71.154 °C
	Temp.Max	71.154 °C
	Temp.Min	62.166 °C
	Temp.Range	8.988 °C
	Temp.Start	62.166 °C



# Creating Event Frames

- Batch Framework Interfaces
- Asset Analytics
- AFSDK



# Asset Analytics

- Perform calculations on a specified schedule
- Use AF Attribute values as inputs
- Outputs:
  - Calculation Results
  - Rollup
  - Event Frames
  - SQC



# Asset Analytics

- Configuration Options
  - Event Frame Template
  - Scheduling
- Event Frame Definition
  - Start/End Trigger
  - Additional Variables
  - Outputs at close



# Building Event Frame Context



# Event Frame Context – “Why?”

- Why do critical events matter?
- Why should users invest in Event Frames?



# Event Frame Context – “Why?”

- Critical events define success (or lack thereof)
- Event Frames have a direct impact on solving a business problem



# Building Event Frame Context

- Define business case
- Create measurable objectives
- Event Frame implementation
- Event Frame Evaluation



# Define Business Case

- Goal or objective
  - Problem or opportunity
- Positive commercial or internal impact
- Realistic time horizon
- Define audience / impacted persons
- Involved Risk



# Create measurable objectives

- Application of data to business case
- Tangible outcomes
- Event Frames Utilization
  - Event Frame count
  - Attributes
  - Summary information



# Event Frame Implementation

- Event Frame templates
  - Correlate attributes to measurable objectives
- Verify Event Frame creation method
- Event Frame testing and recovery



# Event Frame Evaluation

- Event Frame verification:
  - Measurable objectives met
  - Events created on time and when appropriate
  - Each Event has a direct impact on business case
- May need to revisit previously defined steps



# Building Event Frame Context Example

- **Business case:** Pump Downtime Alarm
- Problem!
- Internal **and** customer impact
- Effective immediately
- Audience – Equipment operators
- Low risk



# Building Event Frame Context Example

- **Measurable Objectives:**
  - Event Frame that spans downtime
  - Each Event needs:
    - Downtime reason code
    - Downtime duration
    - Important process parameters affected



# Building Event Frame Context Example

- **Event Frame Implementation:**

- Define EF template
- Analysis on pump element
  - Reads status codes
- Attributes
- Recovery mode

- **Event Frame Evaluation:**

- Business case met?
- Measurable objectives met?
- EFs created appropriately?



# Building Event Frame Context Takeaways

- Start with the 'Why'
- Business case is key!
- Each Event Frame should contribute to overall goal



# Capturing Meaningful Data



# Capture Meaningful Data

- What percentage of your Event Frames are utilized after creation?



# Capture Meaningful Data

- Capture *meaningful* data – not *all* data
- Data Archive – All data
- Asset Framework – Context, Metadata
- Event Frames – Data Bookmarks



# Capture Meaningful Data

## Ideal Scenario

- Capture critical event contexts

## Observed Scenario

- Tendency to capture *anything* and *everything*



# Problem Statement

- What counts as critical event contexts?
  - What events need to be captured?



# Solution

- Create business cases!
- Create evaluation process:
  - Templates
  - Asset Analytics
  - PI EFGGen config nodes



# Result

- Addition and deletion:
  - Templates
  - Analyses
- Bulk Event Frame recovery/deletion
- Refined business cases



# Customer Hesitancy

- “We may need these in the future”
- Repeat evaluation process and update accordingly



# Customer Hesitancy

- “These Event Frames are essential to our operation”
- What business case is directly impacted?



# Customer Hesitancy

- “We don’t know who may be depending on these Event Frames”
- Evaluation process!
- Business case application!



# Customer Hesitancy

- “Too much time and effort to change the status quo”
- How and when are changes made?



# Common Mistakes

- How many events can I create?

**What events will you use?**



# Common Mistakes

- Can I capture everything?

**No. Start with what is needed to meet current goals and objectives!**



# Capture Meaningful Takeaway

- Capture *meaningful* data – not *all* data
- Leverage business case accordingly
- Utilize the strengths of the PI System
  - Event Frame recalculation/recovery



# Best Practices: Creation

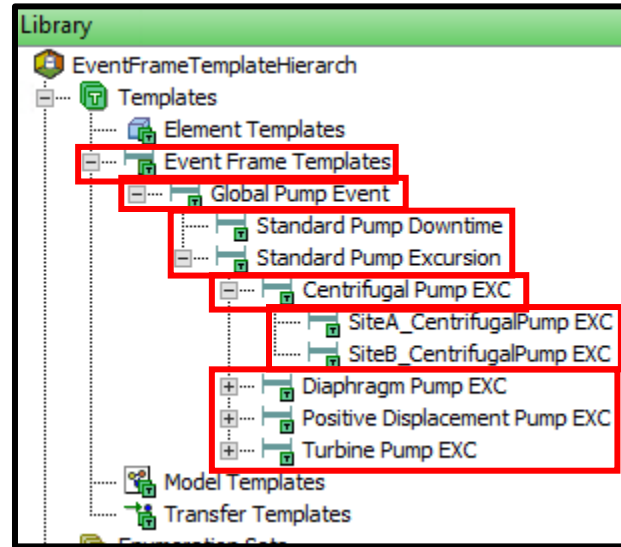


# Best Practices: Creation

- Derived Templates
- Event Frames with Varying Severity
- Event Frame Calculations



# Derived Templates



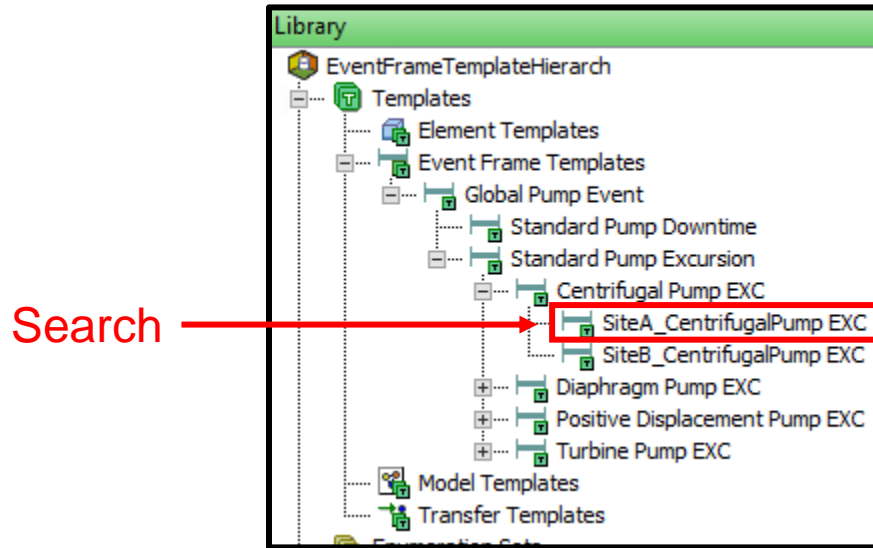


# Derived Templates

- Create Event Frame Template Hierarchy
- Enables:
  - Efficient searching
  - Comprehensive results
  - Standardized Event Frames and Attributes

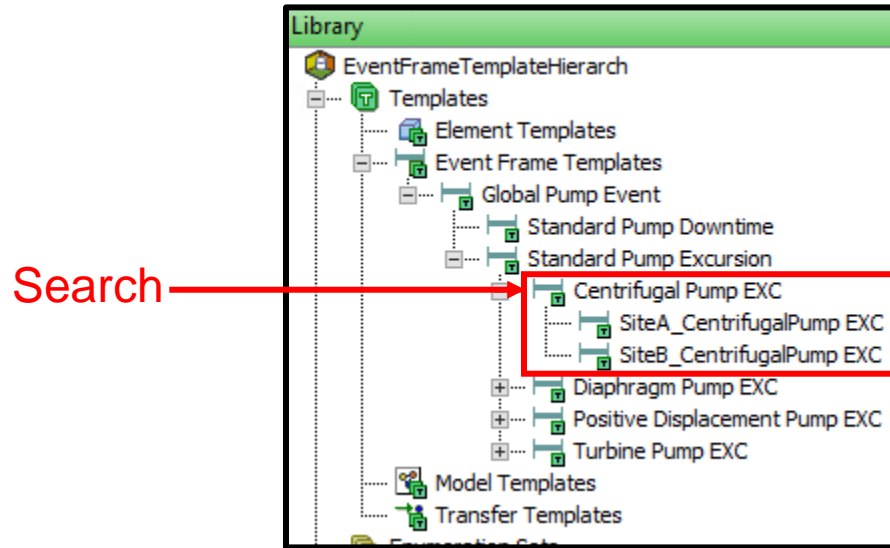


# Derived Templates



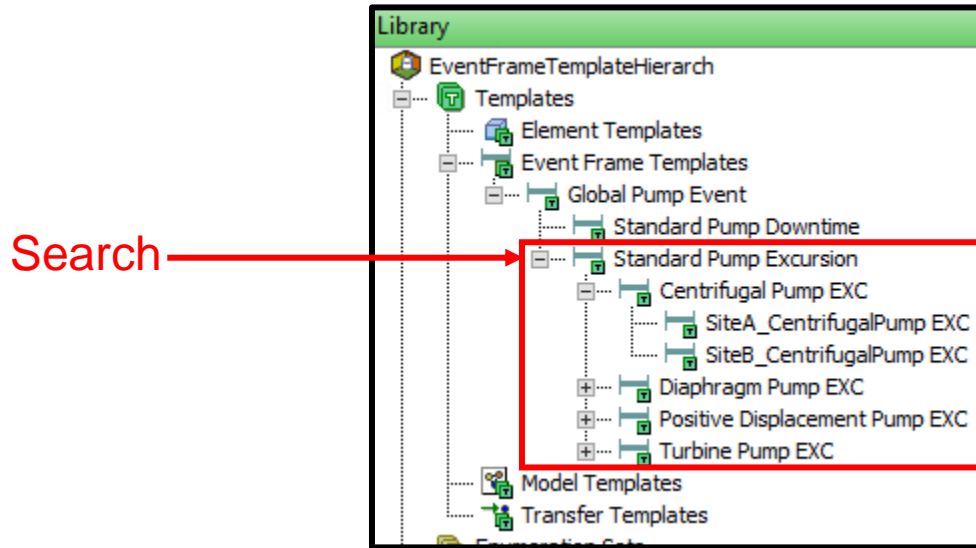


# Derived Templates








# Derived Templates





# Event Frames with Varying Severity

Event Frame Search 1						
Filter						
	Name	[00:02:47]	Duration	Start Time	End Time	Severity
	 SiteA - Centrifugal Pump Excursion_2019-04-01 13:49.15.000		0:02:47	4/1/2019 1:49:15 PM	4/1/2019 1:52:02 PM	Critical



# Event Frames with Varying Severity

Event Frame Search 1							
Filter							
	Name	[00:02:47]	Duration	Start Time	End Time	Severity	
<input checked="" type="checkbox"/>	SiteA - Centrifugal Pump Excursion_2019-04-01 13:49:15.000		0:02:47	4/1/2019 1:49:15 PM	4/1/2019 1:52:02 PM	Critical	
	SiteA - Centrifugal Pump Excursion_2019-04-01 13:49:15.000		0:00:54	4/1/2019 1:49:15 PM	4/1/2019 1:50:09 PM	Minor	
	SiteA - Centrifugal Pump Excursion_2019-04-01 13:50:09.000		0:00:50	4/1/2019 1:50:09 PM	4/1/2019 1:50:59 PM	Major	
	SiteA - Centrifugal Pump Excursion_2019-04-01 13:50:59.000		0:01:03	4/1/2019 1:50:59 PM	4/1/2019 1:52:02 PM	Critical	



# Event Frames with Varying Severity

- Create multiple child Event Frames
  - Single start trigger needs to be true
  - Only create direct children
- Ideal use cases:
  - Increasing/decreasing severity alarms
  - Simple process monitoring
  - “Grouped alarm” scenario




# Event Frames with Varying Severity

- Create multiple start triggers
  - Minor Severity – Pump Speed greater than HI limit
  - Major Severity – Pump Speed greater than HHI limit
  - Critical Severity – Pump Speed greater than maximum limit



# Event Frames with Varying Severity

Event Frame Search 1					
Filter					
Name	[00:00:01]	Duration	Start Time	End Time	Severity
SiteA - Centrifugal Pump Excursion_2019-04-01 13:49:15.000		0:00:07.278	4/1/2019 1:49:15 PM		Minor



# Event Frames with Varying Severity

Event Frame Search 1						
Filter						
	Name	[00:00:54]	Duration	Start Time	End Time	Severity
	SiteA - Centrifugal Pump Excursion_2019-04-01 13:49:15.000		0:01:06.272	4/1/2019 1:49:15 PM		Major
	SiteA - Centrifugal Pump Excursion_2019-04-01 13:49:15.000		0:00:54	4/1/2019 1:49:15 PM	4/1/2019 1:50:09 PM	Minor
	SiteA - Centrifugal Pump Excursion_2019-04-01 13:50:09.000		0:00:12.274	4/1/2019 1:50:09 PM		Major



# Event Frames with Varying Severity

Event Frame Search 1						
Filter						
	Name	[00:01:44]	Duration	Start Time	End Time	Severity
<input checked="" type="checkbox"/>	SiteA - Centrifugal Pump Excursion_2019-04-01 13:49:15.000		0:01:53.157	4/1/2019 1:49:15 PM		Critical
<input type="checkbox"/>	SiteA - Centrifugal Pump Excursion_2019-04-01 13:49:15.000		0:00:54	4/1/2019 1:49:15 PM	4/1/2019 1:50:09 PM	Minor
<input type="checkbox"/>	SiteA - Centrifugal Pump Excursion_2019-04-01 13:50:09.000		0:00:50	4/1/2019 1:50:09 PM	4/1/2019 1:50:59 PM	Major
<input type="checkbox"/>	SiteA - Centrifugal Pump Excursion_2019-04-01 13:50:59.000		0:00:09.165	4/1/2019 1:50:59 PM		Critical



# Event Frames with Varying Severity

Event Frame Search 1						
Filter						
	Name	[00:02:47]	Duration	Start Time	End Time	Severity
<input checked="" type="checkbox"/>	SiteA - Centrifugal Pump Excursion_2019-04-01 13:49:15.000		0:02:47	4/1/2019 1:49:15 PM	4/1/2019 1:52:02 PM	Critical
<input type="checkbox"/>	SiteA - Centrifugal Pump Excursion_2019-04-01 13:49:15.000		0:00:54	4/1/2019 1:49:15 PM	4/1/2019 1:50:09 PM	Minor
<input type="checkbox"/>	SiteA - Centrifugal Pump Excursion_2019-04-01 13:50:09.000		0:00:50	4/1/2019 1:50:09 PM	4/1/2019 1:50:59 PM	Major
<input type="checkbox"/>	SiteA - Centrifugal Pump Excursion_2019-04-01 13:50:59.000		0:01:03	4/1/2019 1:50:59 PM	4/1/2019 1:52:02 PM	Critical



# Event Frame Calculations

- Asset Analytics
- Variables and Output Expressions
- Utilize Event Frame Context
  - Start Time
  - End Time
  - Duration



# Event Frame Calculations

- Store calculation results
  - Captured on EF close
  - Event Frame attribute
  - PI Tag

Outputs at close	
Output1	<code>TagAvg('Pump Speed',EventFrame("StartTime"), EventFrame("EndTime"))</code>



# Event Frame Calculations

- Ideal Use Cases:
  - Calculations that require Event Frame context
  - Capture information unique to particular events
  - Conditional calculations
  - Shift calculations



# Best Practices: Visualization



# Best Practices: Visualization

- Reason Codes
- Pinned Events
- Event Frame Comparison
- Event Frame Details



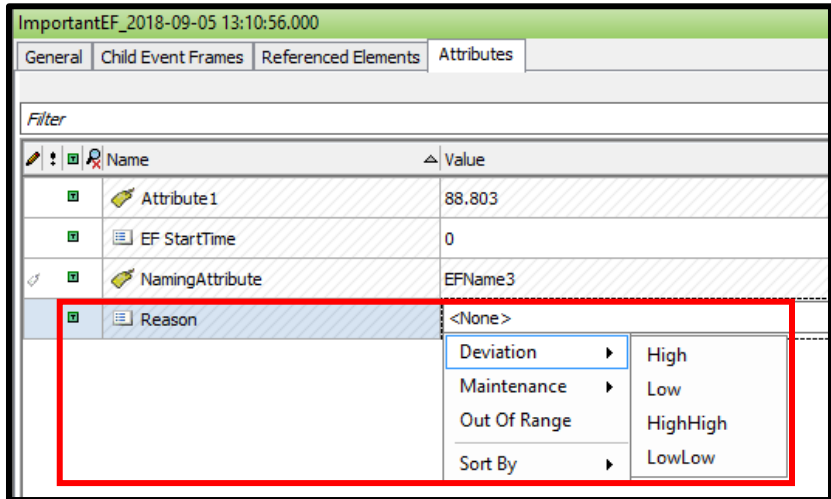
# Reason Codes

- How can we write back to Event Frames?
- How can operators update Event Frames with pertinent information after the fact?




# Reason Codes

- Write back to Event Frames
- Select options from multi-tiered enumeration set



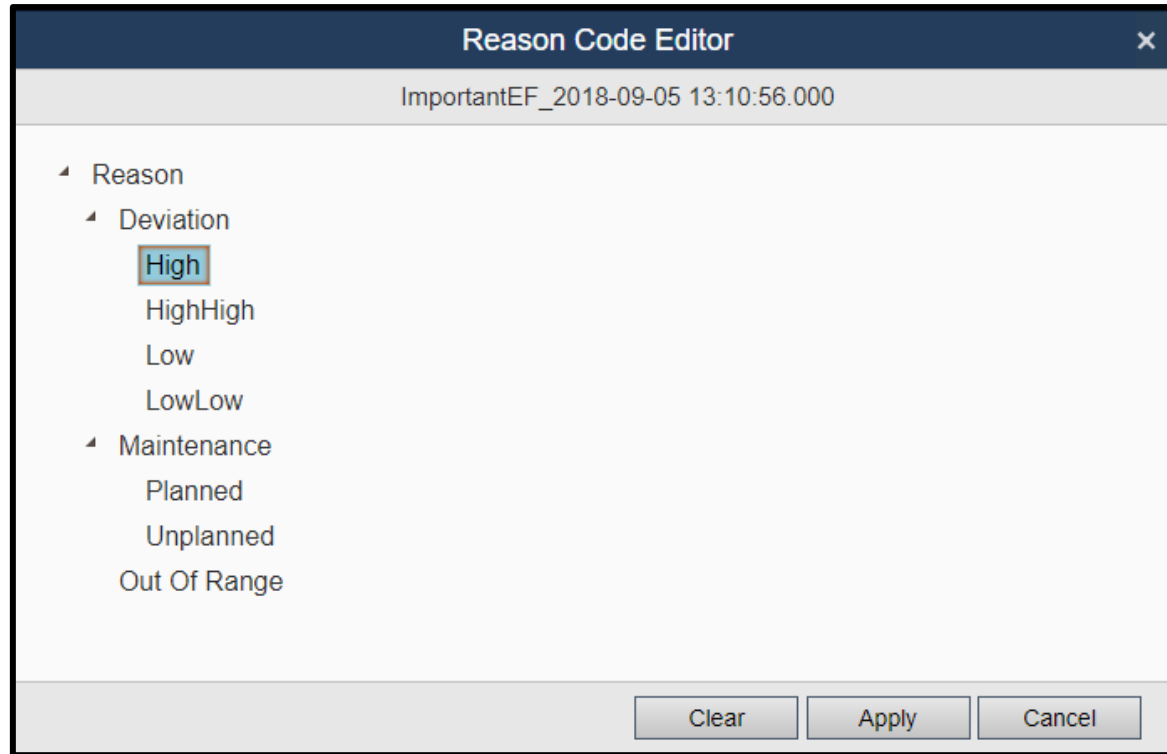


# Reason Codes

Event Name	▲ Start Time	End Time	Reason
ImportantEF_2018-09-05 13:10:56.000	9/5/2018 1:10:56 PM	9/5/2018 1:11:12 PM	



# Reason Codes



A screenshot of a software dialog box titled "Reason Code Editor". The dialog has a dark blue header bar with the title and a close button (X). Below the header is a light gray bar containing the text "ImportantEF\_2018-09-05 13:10:56.000". The main area is white and contains a tree view with the following structure:

- Reason
  - Deviation
    - High (highlighted with a blue border)
    - HighHigh
    - Low
    - LowLow
  - Maintenance
    - Planned
    - Unplanned
    - Out Of Range

At the bottom of the dialog is a light gray bar containing three buttons: "Clear", "Apply", and "Cancel".

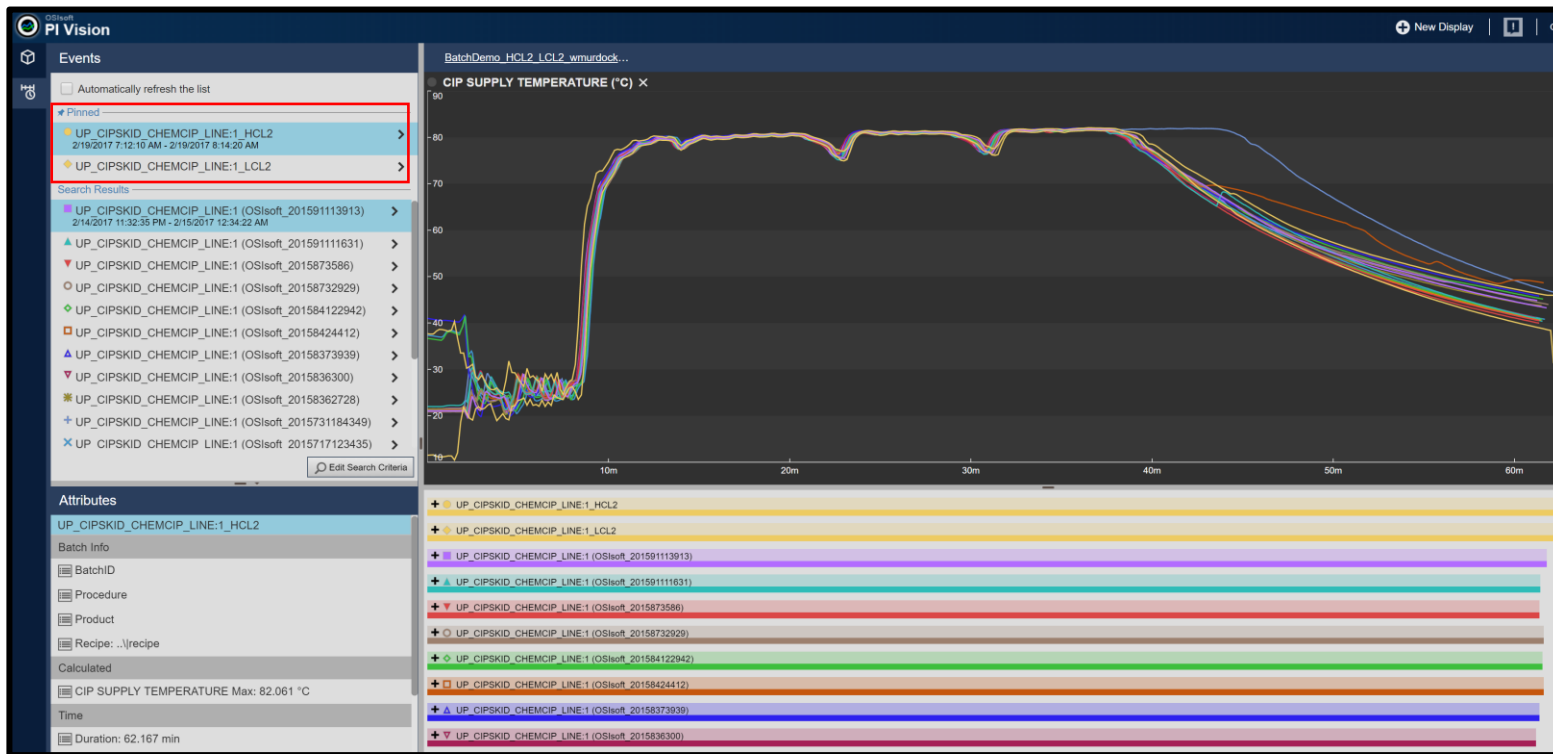


# Reason Codes

Event Name	Start Time	End Time	Reason
ImportantEF_2018-09-05 13:10:56.000	9/5/2018 1:10:56 PM	9/5/2018 1:11:12 PM	Deviation HighHigh

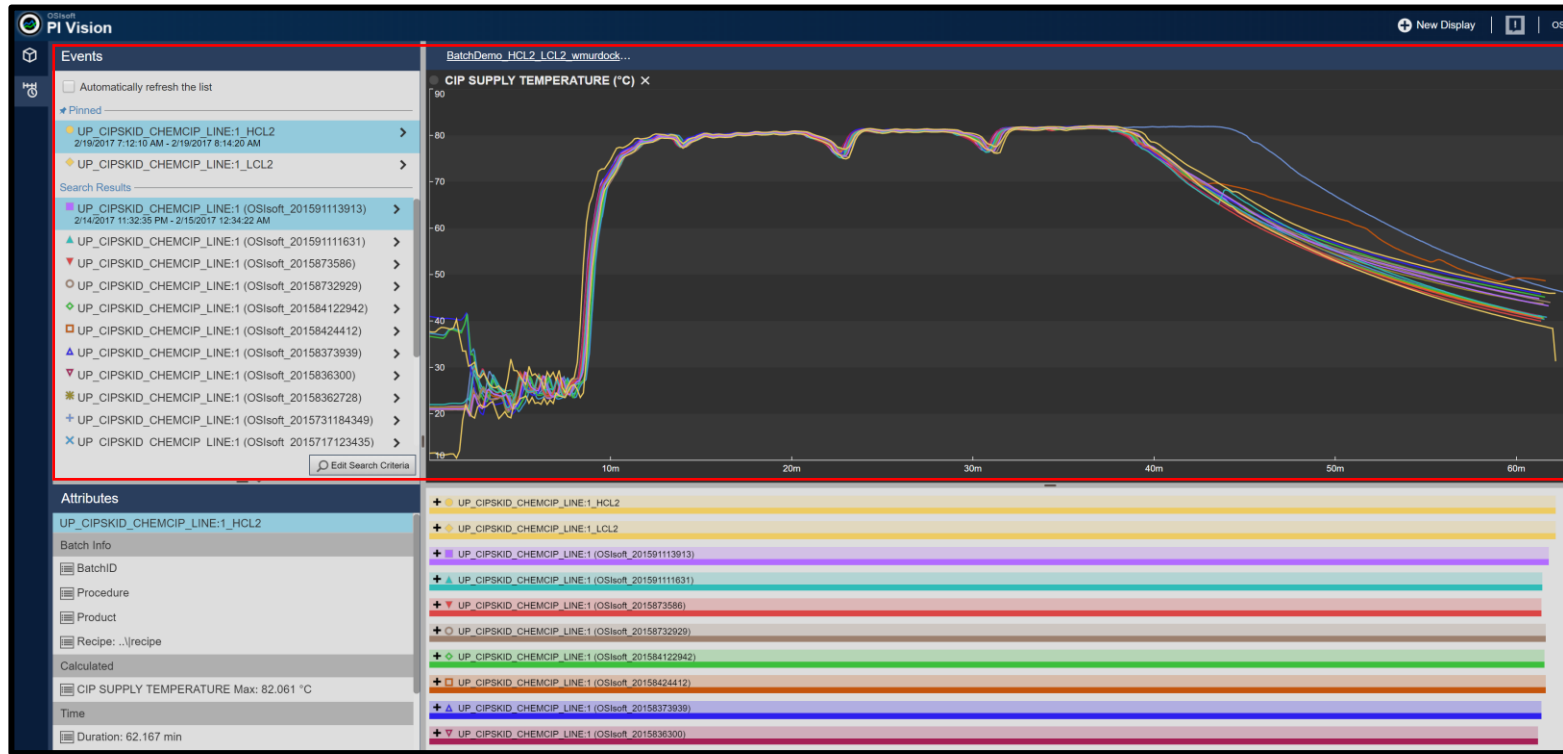


# Pinned Events



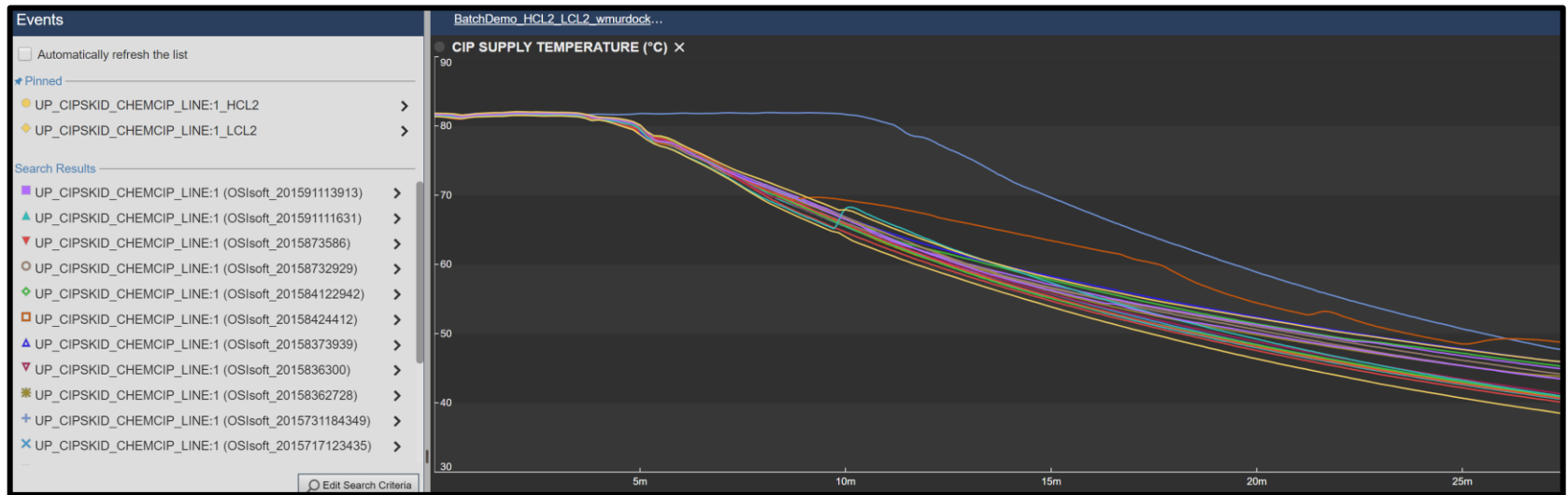


# Pinned Events



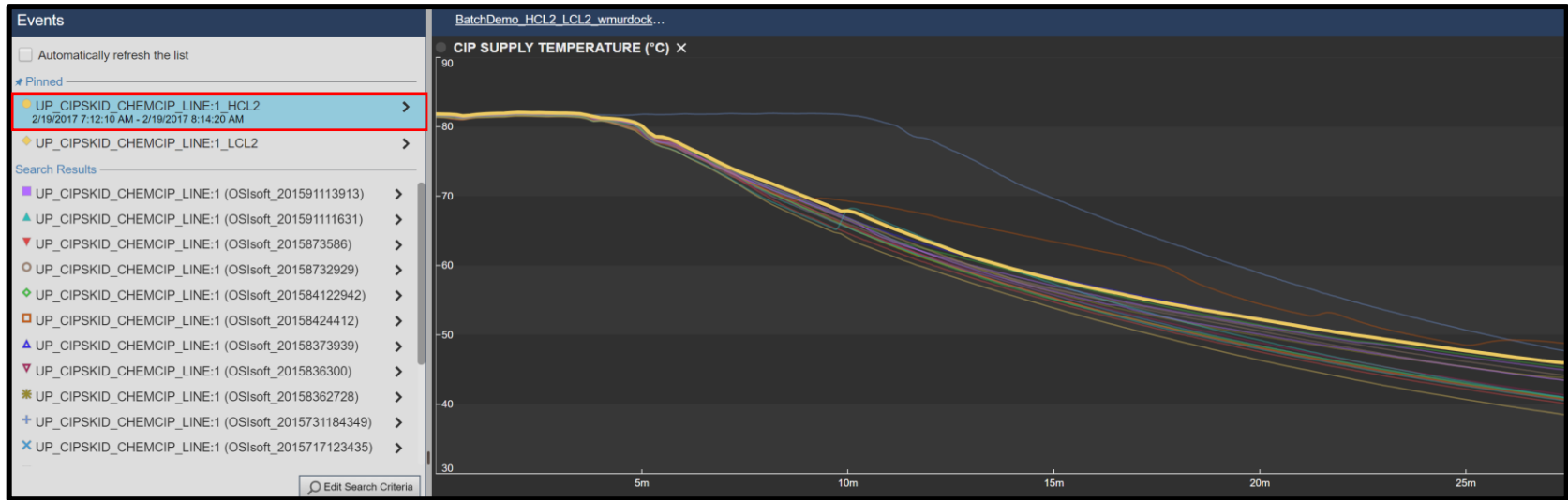


# Pinned Events



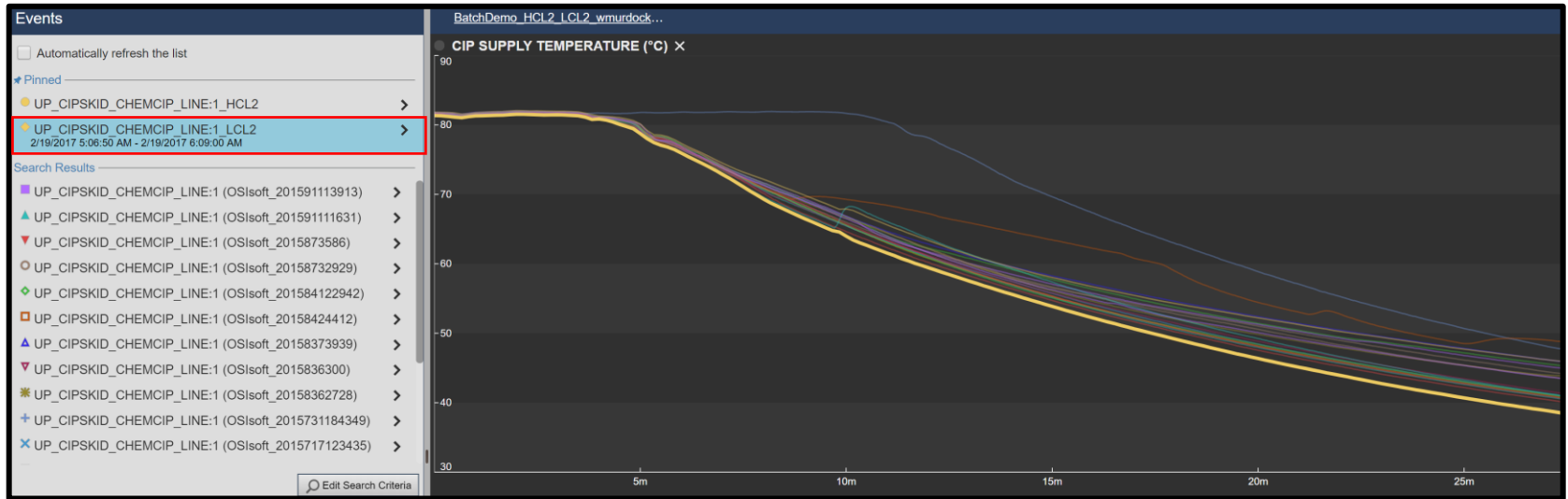


# Pinned Events



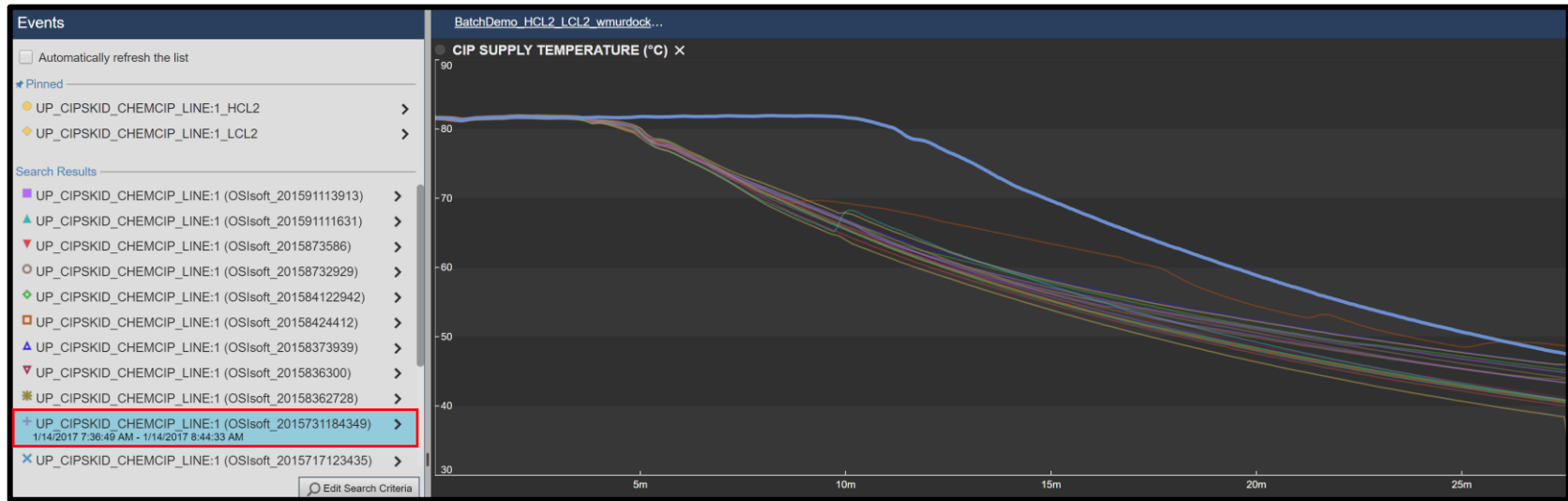


# Pinned Events





# Pinned Events



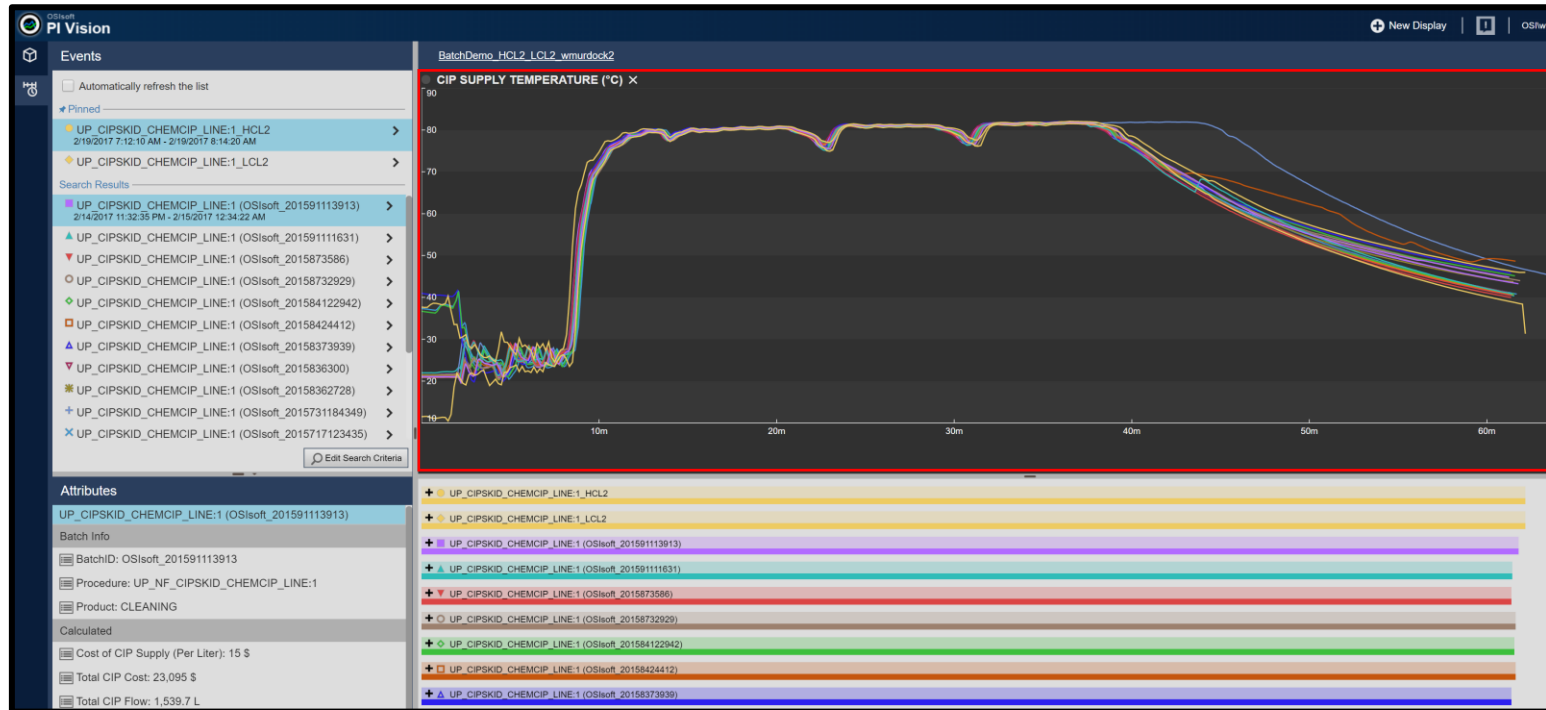


# Event Frame Comparison

- View and analyze data within Event time range
- Context visualization
- Utilizes the power of templates
  - Compare like events
  - Analyze root cause

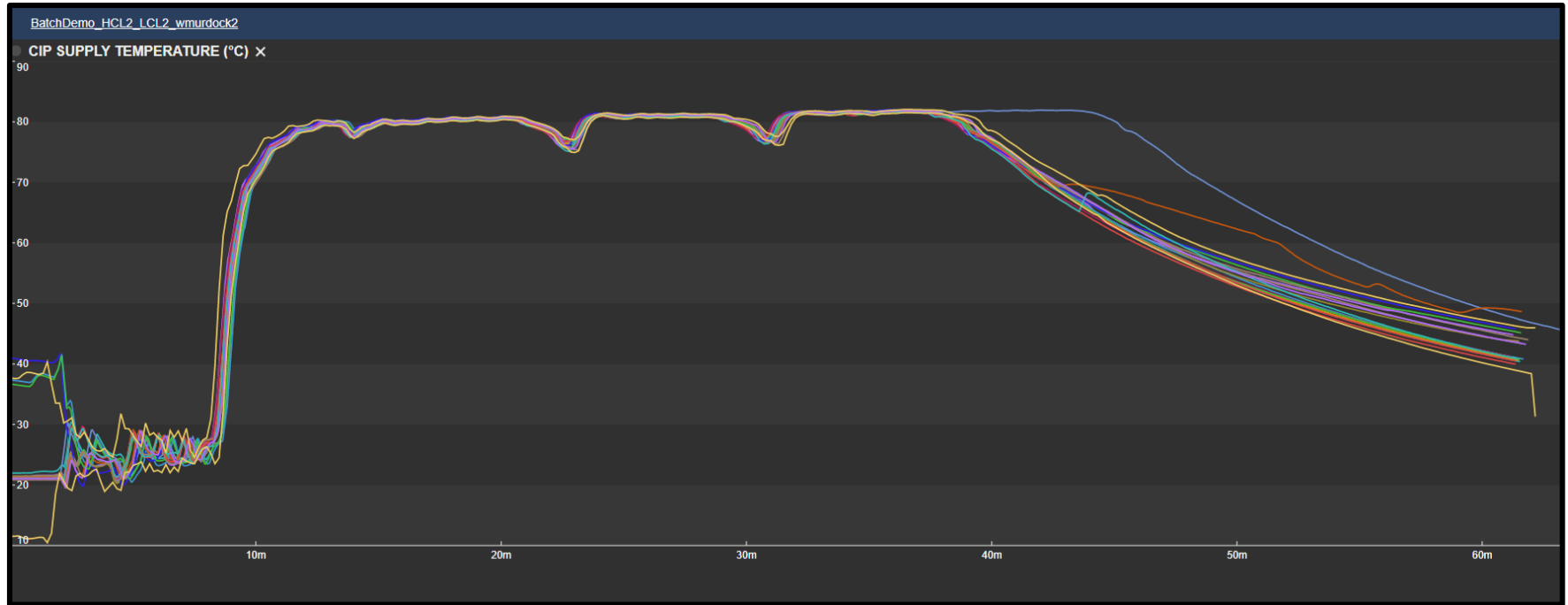


# Event Frame Comparison



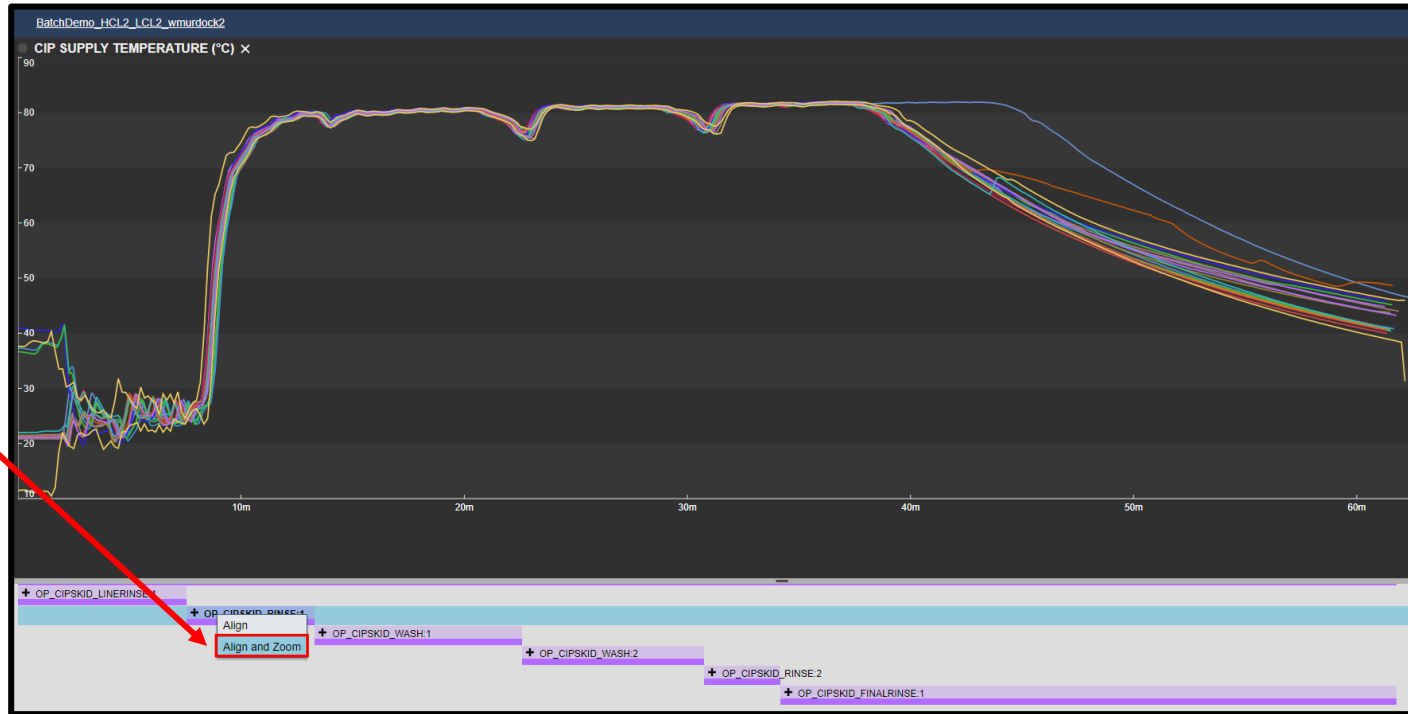


# Event Frame Comparison



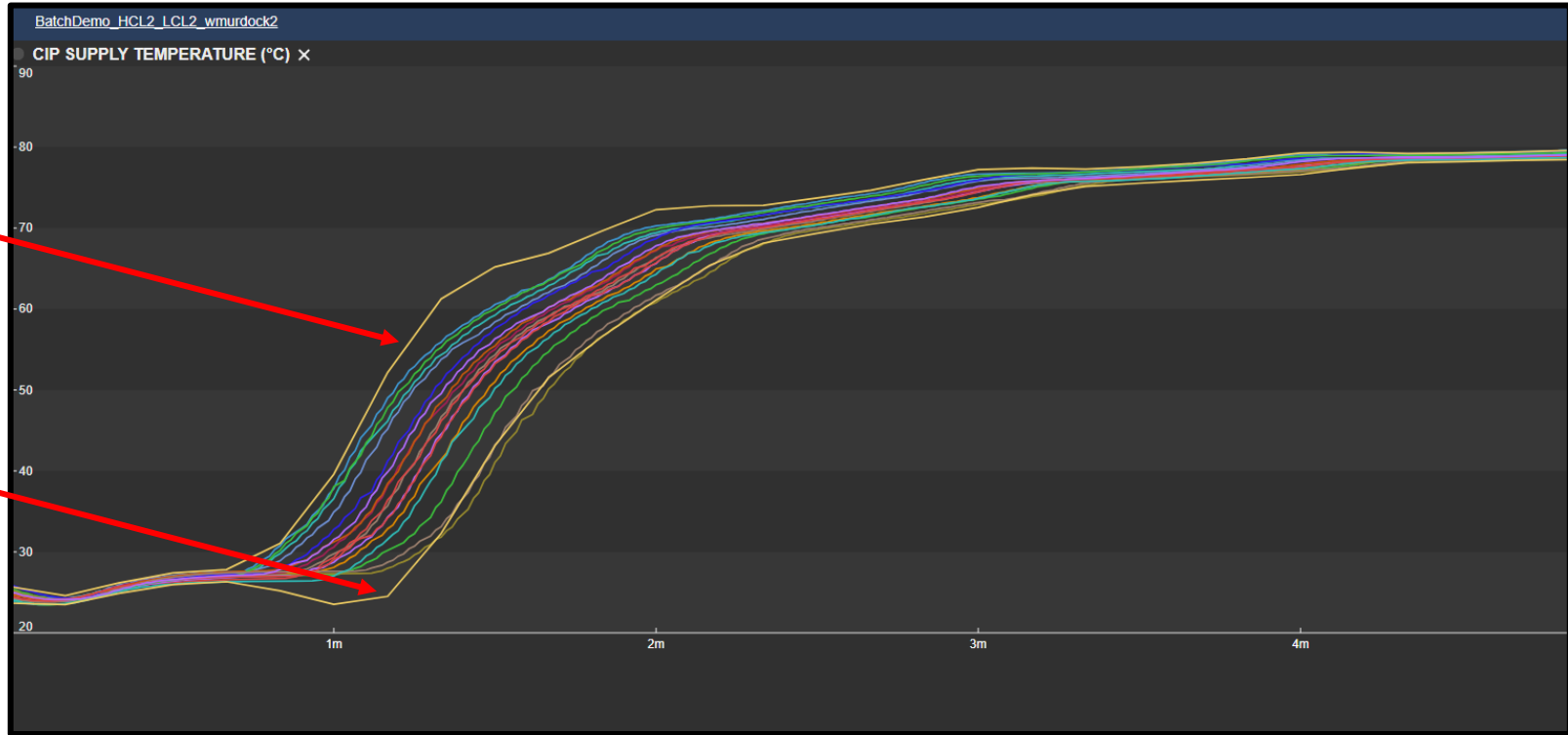


# Event Frame Comparison





# Event Frame Comparison





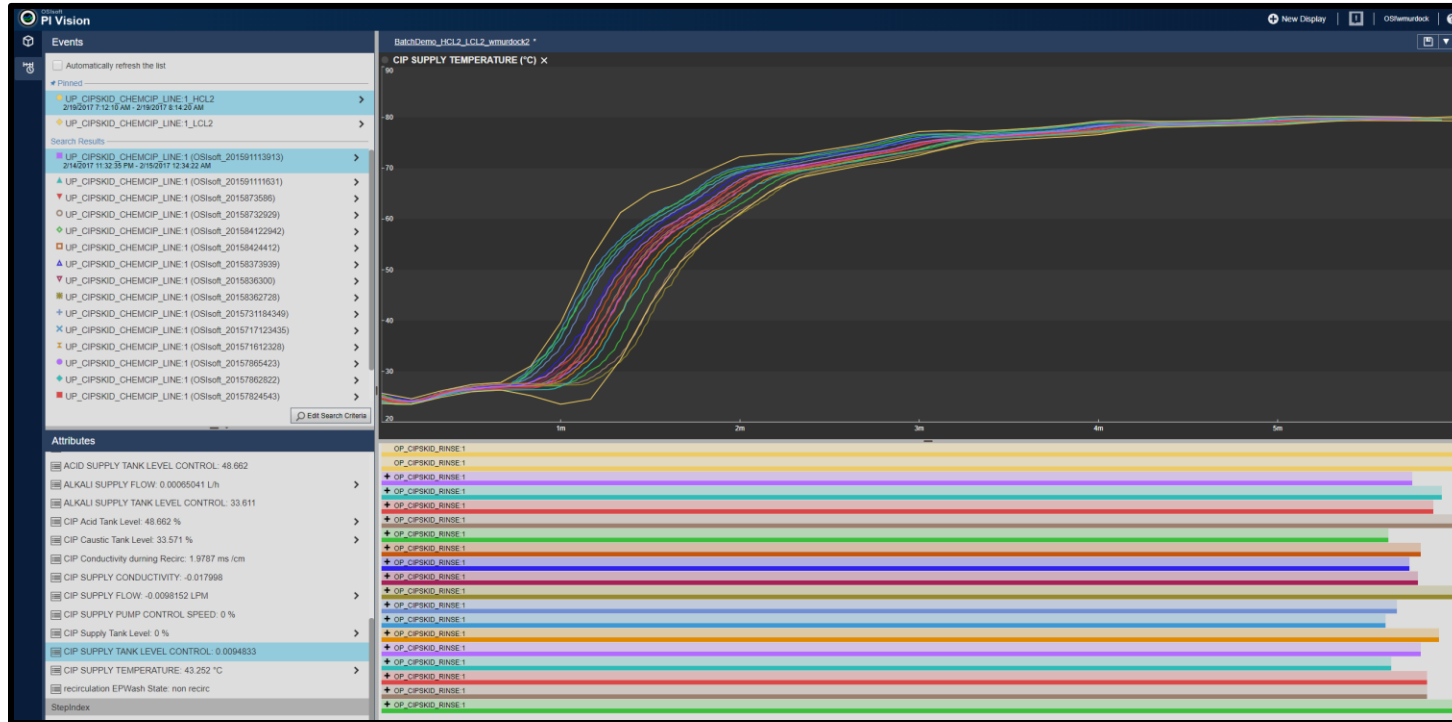
# Event Comparison

Events	
<input type="checkbox"/> Automatically refresh the list	
★ Pinned	
UP_CIPSKID_CHEMCIP_LINE:1_HCL2 2/19/2017 7:12:10 AM - 2/19/2017 8:14:20 AM	>
UP_CIPSKID_CHEMCIP_LINE:1_LCL2	>
Search Results	
UP_CIPSKID_CHEMCIP_LINE:1 (OSIsoft_201591113913) 2/14/2017 11:32:35 PM - 2/15/2017 12:34:22 AM	>
UP_CIPSKID_CHEMCIP_LINE:1 (OSIsoft_201591111631)	>
UP_CIPSKID_CHEMCIP_LINE:1 (OSIsoft_2015873586)	>
UP_CIPSKID_CHEMCIP_LINE:1 (OSIsoft_20158732929)	>
UP_CIPSKID_CHEMCIP_LINE:1 (OSIsoft_201584122942)	>
UP_CIPSKID_CHEMCIP_LINE:1 (OSIsoft_20158424412)	>
UP_CIPSKID_CHEMCIP_LINE:1 (OSIsoft_20158373939)	>
UP_CIPSKID_CHEMCIP_LINE:1 (OSIsoft_2015836300)	>
UP_CIPSKID_CHEMCIP_LINE:1 (OSIsoft_20158362728)	>
UP_CIPSKID_CHEMCIP_LINE:1 (OSIsoft_2015731184349)	>
UP_CIPSKID_CHEMCIP_LINE:1 (OSIsoft_2015717123435)	>
UP_CIPSKID_CHEMCIP_LINE:1 (OSIsoft_201571612328)	>
UP_CIPSKID_CHEMCIP_LINE:1 (OSIsoft_20157865423)	>
UP_CIPSKID_CHEMCIP_LINE:1 (OSIsoft_20157862822)	>
UP_CIPSKID_CHEMCIP_LINE:1 (OSIsoft_20157824543)	>
Edit Search Criteria	

Attributes	
ACID SUPPLY TANK LEVEL CONTROL: 48.662	
ALKALI SUPPLY FLOW: 0.00065041 L/h	>
ALKALI SUPPLY TANK LEVEL CONTROL: 33.611	
CIP Acid Tank Level: 48.662 %	>
CIP Caustic Tank Level: 33.571 %	>
CIP Conductivity during Recirc: 1.9787 ms /cm	
CIP SUPPLY CONDUCTIVITY: -0.017998	
CIP SUPPLY FLOW: -0.0098152 LPM	>
CIP SUPPLY PUMP CONTROL SPEED: 0 %	
CIP Supply Tank Level: 0 %	>
CIP SUPPLY TANK LEVEL CONTROL: 0.0094833	
CIP SUPPLY TEMPERATURE: 43.252 °C	>
recirculation EPWash State: non recirc	
StepIndex	
Step Indexes: 0	>

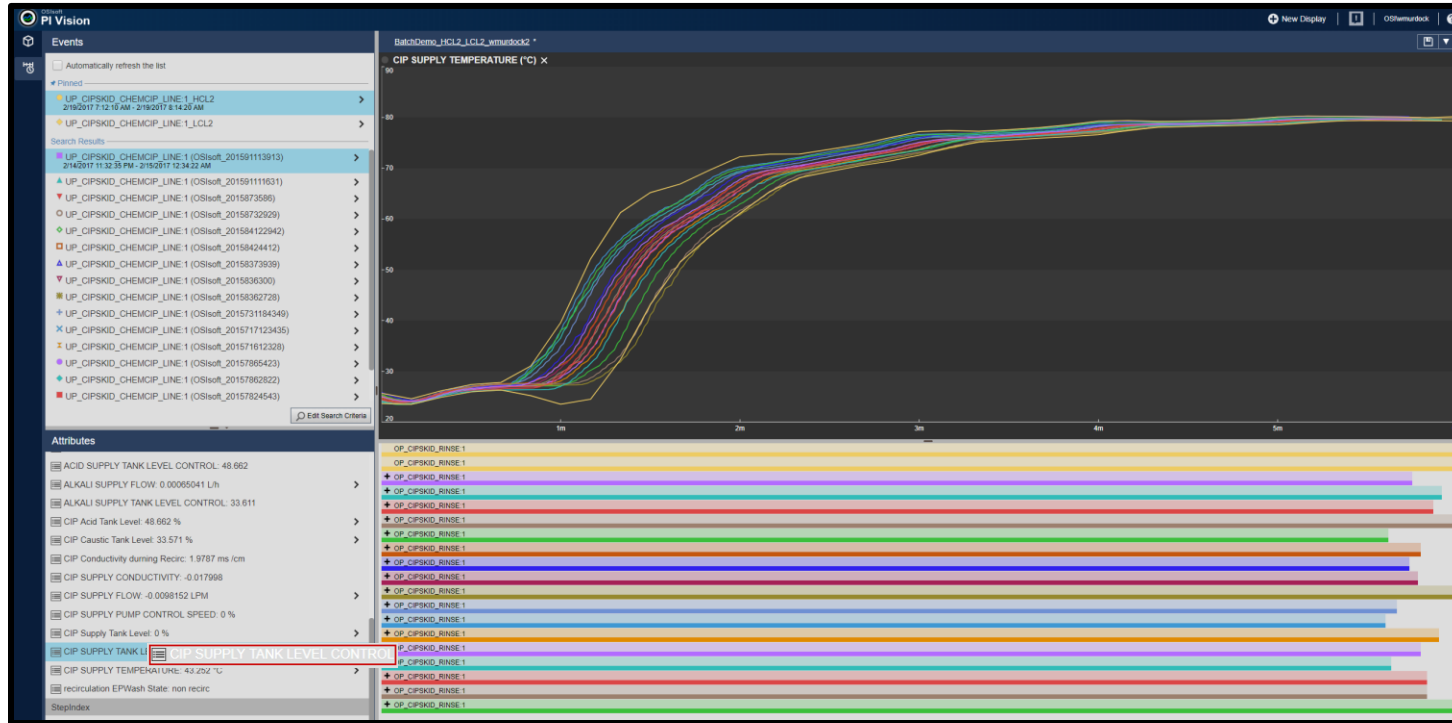


# Event Frame Comparison



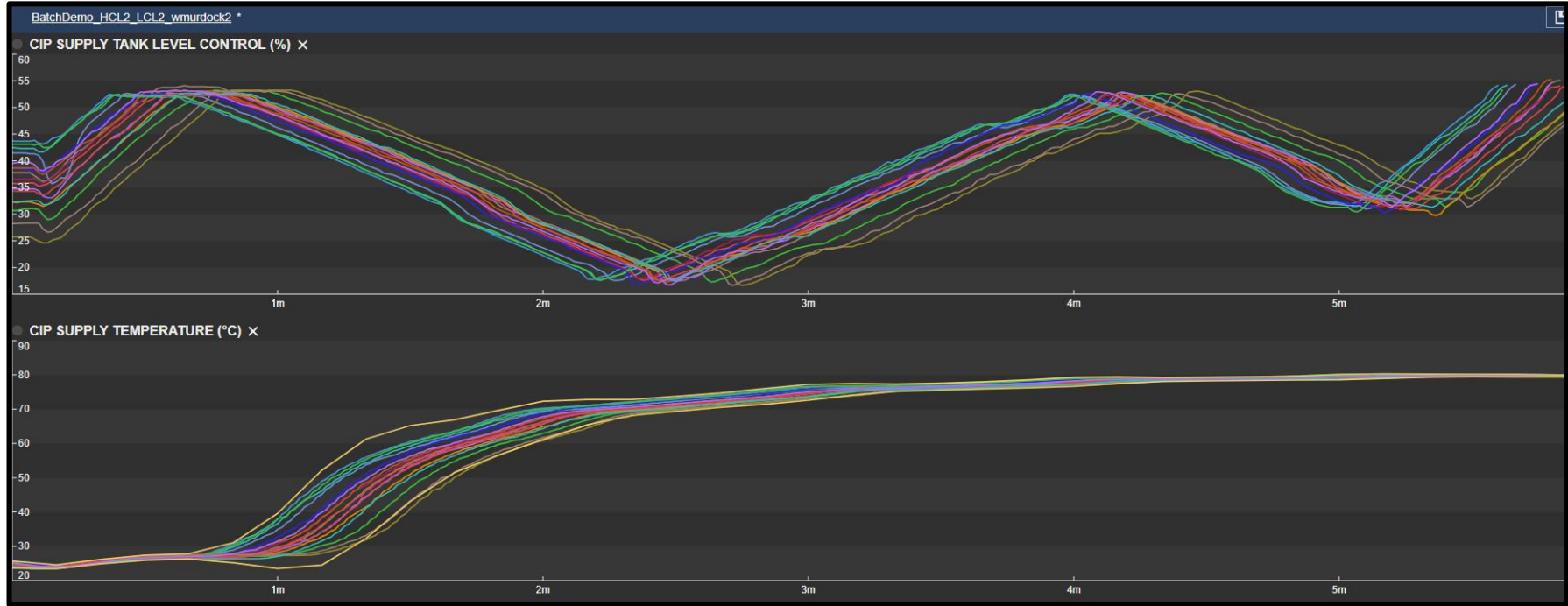


# Event Frame Comparison



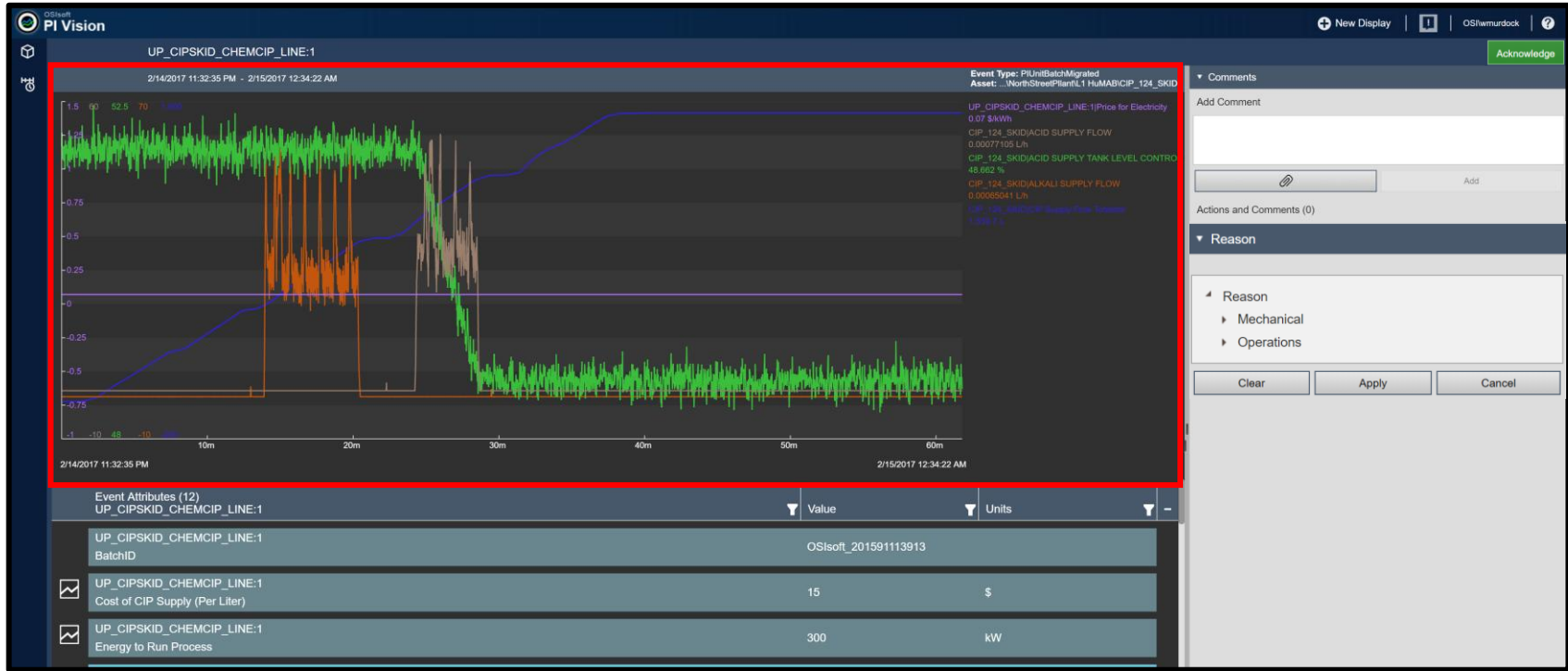


# Event Frame Comparison



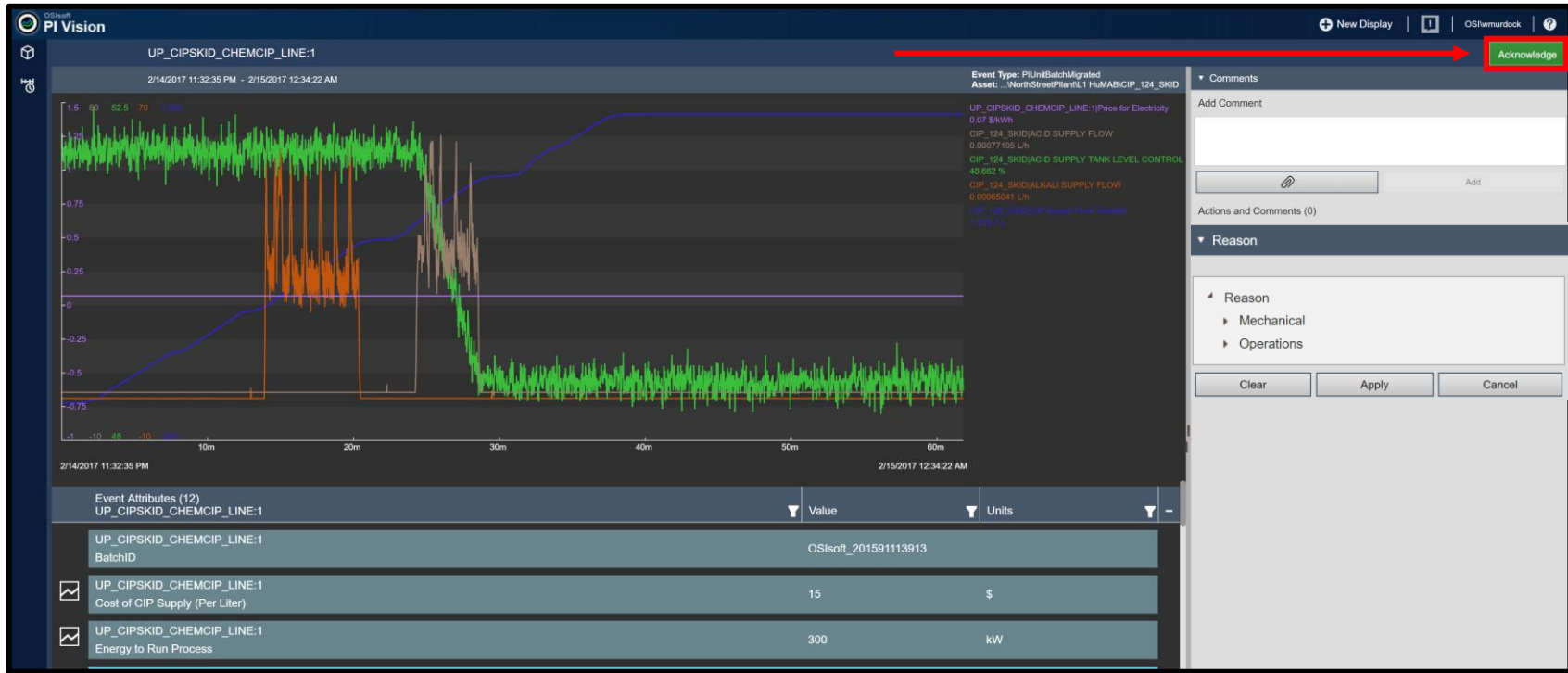


# Event Details Page



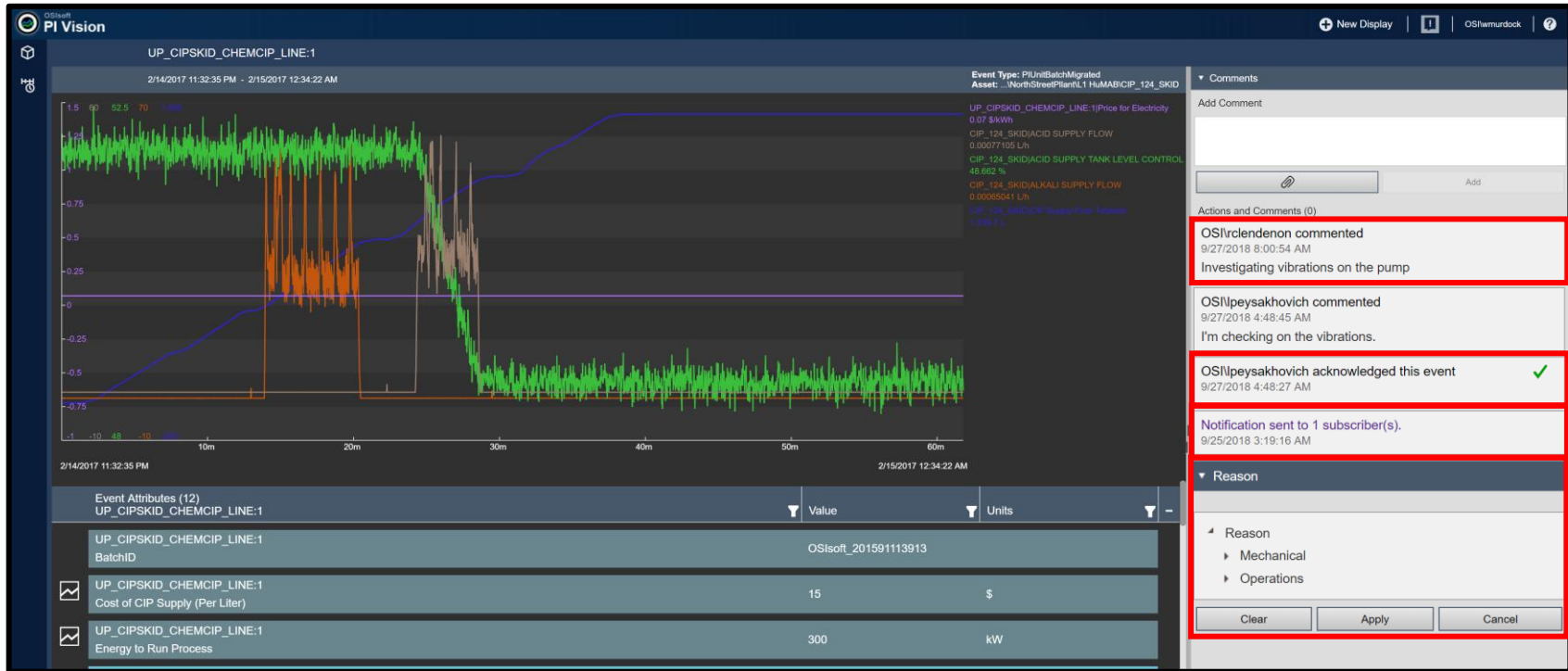


# Event Details Page





# Event Details Page





# Best Practices: Utilization



# Best Practices: Utilization

- Index Important Attributes
- Bulk Event Frame Deletion
- Event Frame Searches



# Index Important Attributes

- Allows for:
  - Quick search results
  - Fast value retrieval
- Index attributes that users are likely to search for frequently

Group by: ☐ Category ☐ Template

Name: Important Event Frame Attribute

Description:

Properties: Indexed ▼

Categories: Configuration Item

Default UOM: Excluded

Value Type: Hidden

Default Value: ☒ Indexed

Data Reference: Manual Data Entry

Display Digits: Location ▶

Reason

Settings...



# Index Important Attributes

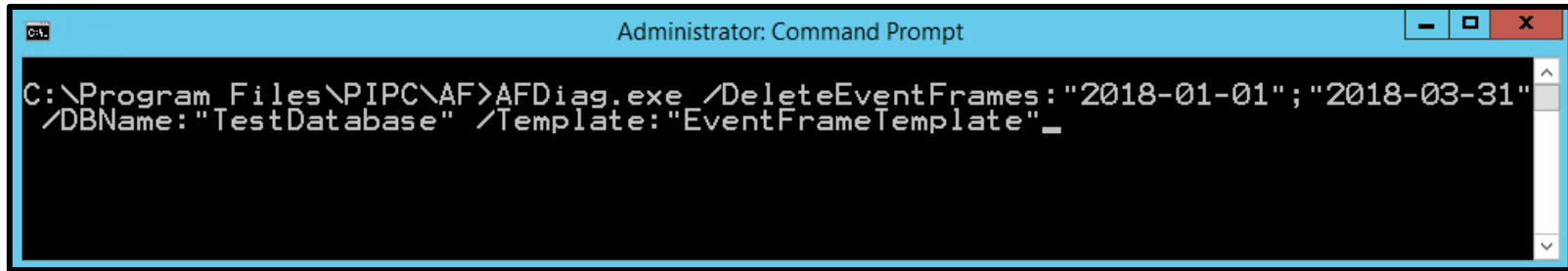
- Improves performance with stored attribute values
- Behavior slightly differs between elements and Event Frames



# Bulk Event Frame Deletion

- AFDiag command line utility
- Example:

*AFDiag.exe /DeleteEventFrames:"2018-01-01";"2018-03-31"  
/DBName:"TestDatabase" /Template:"EventFrameTemplate"*



The screenshot shows a Windows Command Prompt window titled "Administrator: Command Prompt". The command entered is: `C:\Program Files\PIPC\AF>AFDiag.exe /DeleteEventFrames:"2018-01-01";"2018-03-31" /DBName:"TestDatabase" /Template:"EventFrameTemplate"`. The cursor is at the end of the command line.



# Event Frame Searches

- Utilize Indexed Attributes
- Latest release improved simple queries (time range + 1 attribute)
- Event Frame Template Hierarchies



# Summary



# Building Event Frame Context

- Define business case
- Create measurable objectives
- Event Frame implementation
- Event Frame Evaluation



# Key Takeaways

- Start with the ‘Why’
- Business case is key!
- Each Event Frame should contribute to overall goal
- Capture *meaningful* data – not *all* data



# Summary

- Best practices:
  - Creation
  - Visualization
  - Utilization
- No *one right way*
- Combination of best practices is key



# Summary

- Context can change over time
- Critical events can change over time
- Evaluation process is necessary!



# Speaker Information

- Ellery Murdock
- Technical Product Manager
- OSIsoft
- [wmurdock@osisoft.com](mailto:wmurdock@osisoft.com)



# Communicate with OSIsoft Product Managers



<https://feedback.osisoft.com>

.....  
If it is not shared on the feedback portal, it didn't happen!



# Questions?

Please wait for  
the **microphone**

State your  
**name & company**



# Please remember

TO DOWNLOAD  
APP, SEARCH  
OSISOFT



Download on the  
App Store



GET IT ON  
Google Play











# IT'S THROWBACK THURSDAY AT GEEK NIGHT TONIGHT!

Hilton – Grand Ballroom 7:00 – 10:00 PM



# PARTNER & PRODUCT EXPO

Today's Expo Hours

10:00 am – 3:00 pm

Golden Gate and Yosemite





# LUNCH IN TWO LOCATIONS TODAY

General Attendee Lunch – Hilton  
Developer Lunch – Parc 55

