

NOVEMBER 16, 2022

Utilizing Event Frames with Downtime Reason Codes

Asset Utilization Analysis

Presented By: Mike Jonozzo, Jack Aude

AVEVA

About Us

Americas Styrenics, LLC (AmSty)

- Manufacturer of Styrene Monomer (SM) and Polystyrene (PS) in North America.
- Headquarters in The Woodlands, TX
- 6 sites in North America (US), 1 site in South America (CO)
- First Installation completed in 2019
- 2 additional sites have installation planned
- PI System is primary data historian (time-series data) with several third-party analytic tools in use





About Us

Enhanced Information Solutions (EIS)

- Founded in 1994
- eDatasheet Product – Manual Data Entry to PI
- OpsTrakker Product – Manual Entry to PI with Workflow, GMP Signature and Audit Trail (21 CFR-Part 11)
- MES Services
- PI Services (Aveva Endorsed Partner and OSIsoft Premier Partner)
- OT Cybersecurity
- 25+ Fortune 100 Customers
- 80% Repeat Clients
- 100+ Employees and Contractors

EIS Locations





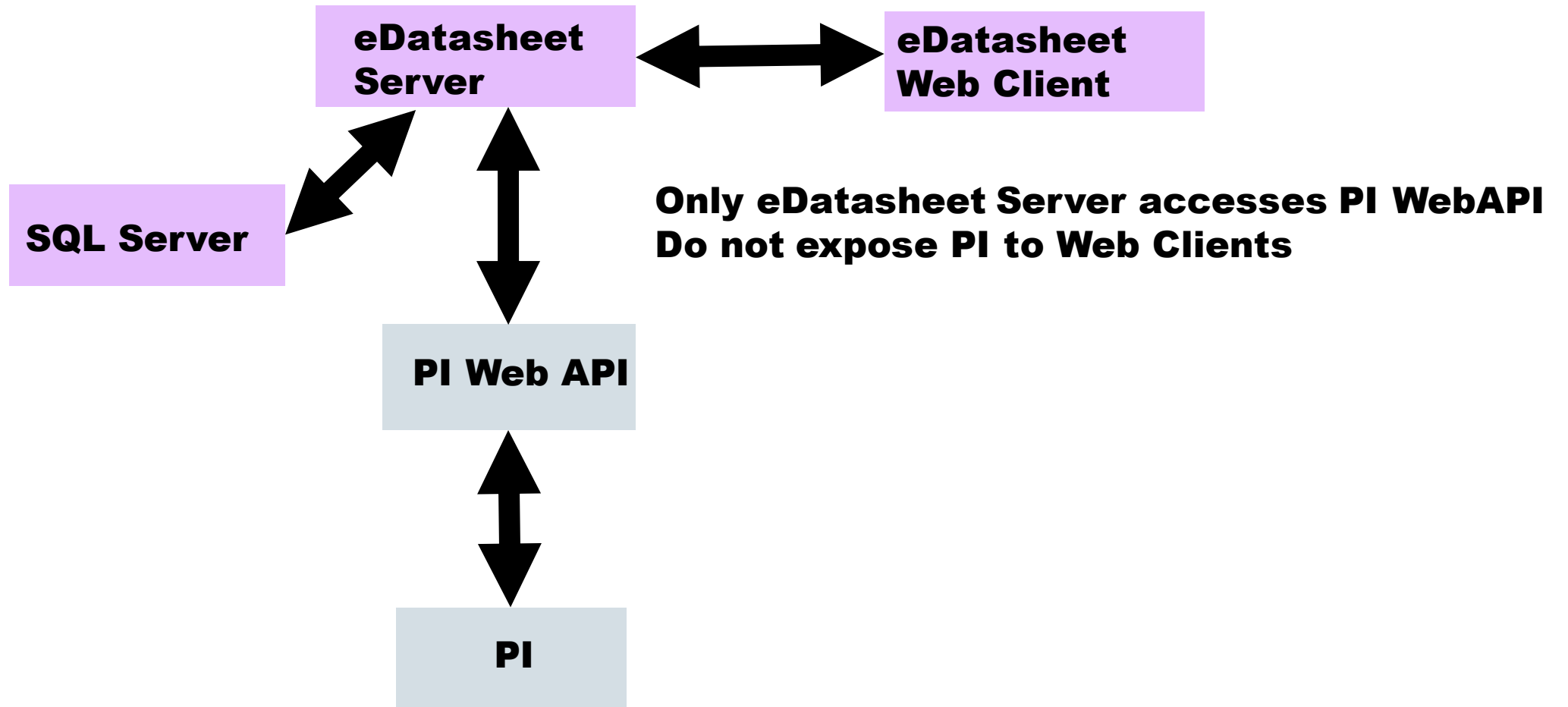
eDatasheet – Manual Entry to PI

- Web Based Client/ Mobile
- Configurable data entry types, display formats and orientation, and data validation
- Upper and Lower limits (Enforced or Enforced with Comment)

eDatasheet – Manual Entry to PI

- Comments stored as Free Format Text in AF Attributes/PI Tags
- Reason Codes stored Text or Enumerated Text in AF Attributes/PI Tags
- Optionally edit values once written to PI
- Integrated Security Model
- On Premises or Cloud deployment

Functional Architecture



eDatasheet

eDatasheet

Bryce Lawrence local

Demo Plant

FDS v1.4.0

Equipment

Tank 101

Forms

Tank Monitoring

Date

17-Feb-2022

Equipment Tag	16-Feb-2022 07:00:00 AM	16-Feb-2022 09:00:00 AM	16-Feb-2022 11:00:00 AM	16-Feb-2022 01:00:00 PM	16-Feb-2022 03:00:00 PM
Internal Tank Temperature (°F) [85 - 110]	103	94			
Tank Level Gauge (%) [0 - 100]	89	101			

10-Feb-2022

1 Week

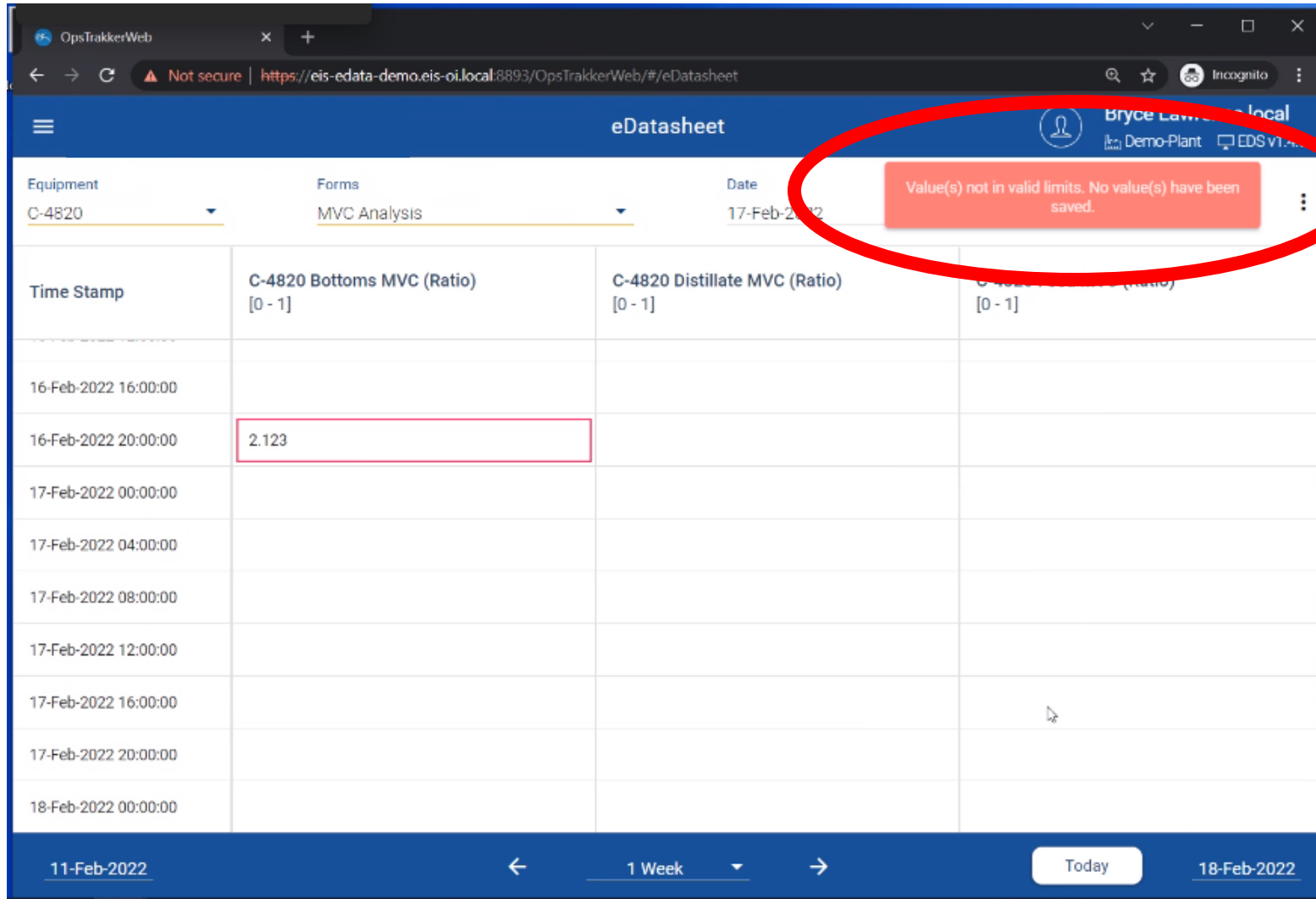
Today

17-Feb-2022

Range

Eng Units

eDatasheet– Enforced Limits / Enforced with Comment



OpsTrakkerWeb

Not secure | <https://eis-edata-demo.eis-oi.local:8893/OpsTrakkerWeb/#/eDatasheet>

eDatasheet

Bryce Law

Demo-Plant

EDS v1.4

Equipment: C-4820

Forms: MVC Analysis

Date: 17-Feb-2022

Value(s) not in valid limits. No value(s) have been saved.

Time Stamp	C-4820 Bottoms MVC (Ratio) [0 - 1]	C-4820 Distillate MVC (Ratio) [0 - 1]	C-4820 Bottoms MVC (Ratio) [0 - 1]
16-Feb-2022 16:00:00			
16-Feb-2022 20:00:00	2.123		
17-Feb-2022 00:00:00			
17-Feb-2022 04:00:00			
17-Feb-2022 08:00:00			
17-Feb-2022 12:00:00			
17-Feb-2022 16:00:00			
17-Feb-2022 20:00:00			
18-Feb-2022 00:00:00			

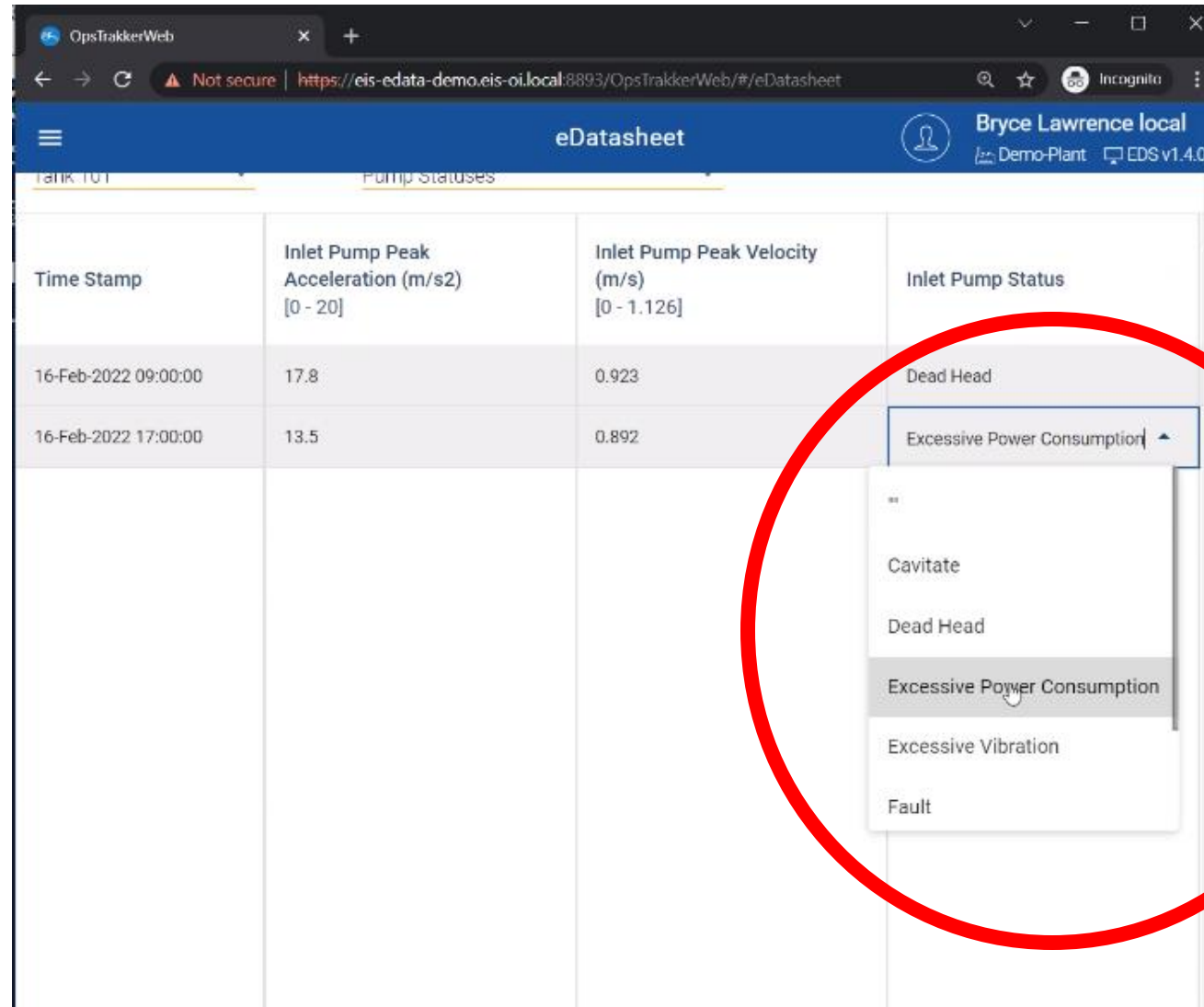
11-Feb-2022

1 Week

Today

18-Feb-2022

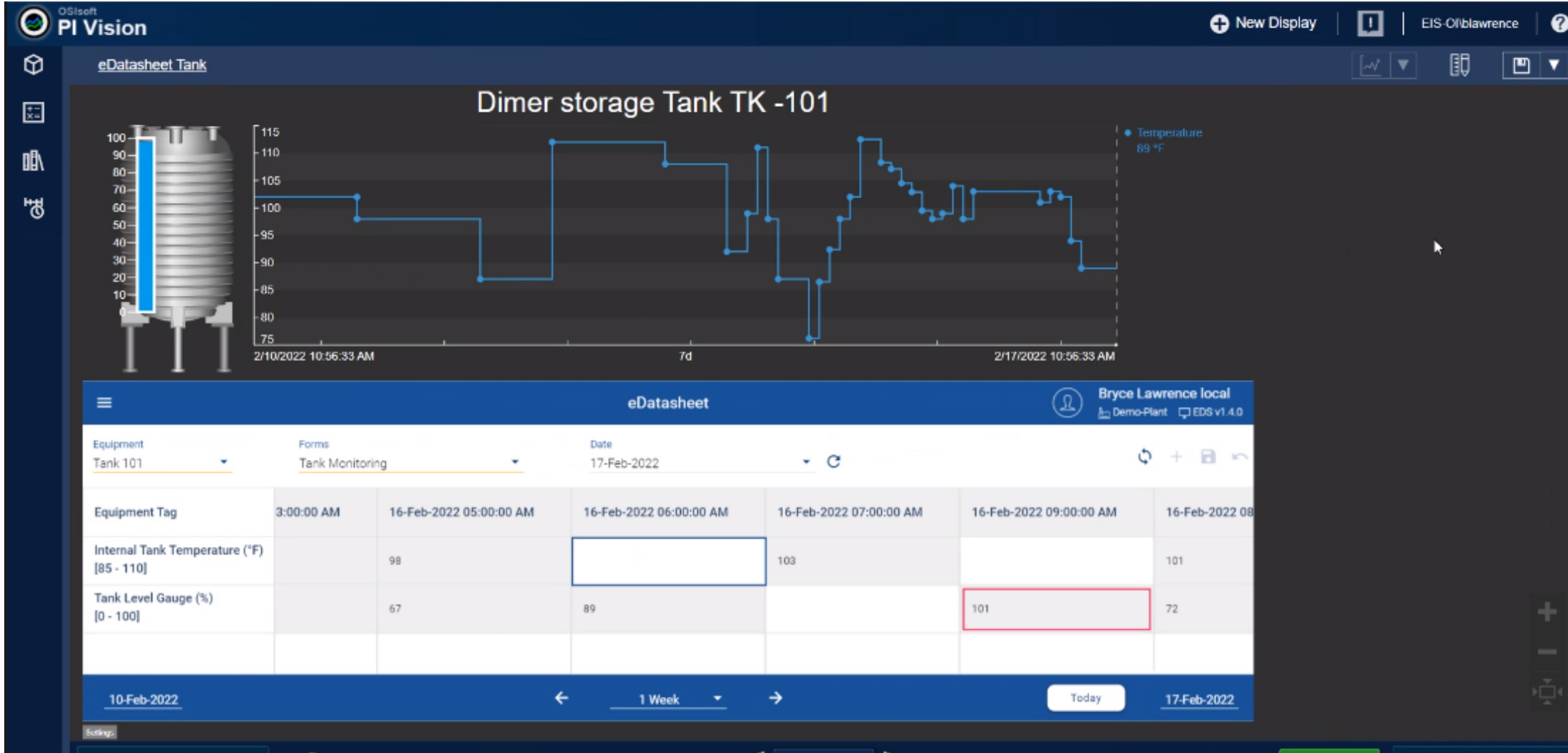
eDatasheet– Reason Codes



The screenshot shows the eDatasheet web application interface. The browser address bar indicates the URL: <https://eis-edata-demo.eis-oi.local:8893/OpsTrakkerWeb/#/eDatasheet>. The user is logged in as Bryce Lawrence local. The application displays a table titled "eDatasheet" with the following columns: Time Stamp, Inlet Pump Peak Acceleration (m/s²) [0 - 20], Inlet Pump Peak Velocity (m/s) [0 - 1.126], and Inlet Pump Status. The table contains two rows of data. A red circle highlights the "Inlet Pump Status" column, which shows "Dead Head" for the first row and "Excessive Power Consumption" for the second row. A dropdown menu is open for the second row, showing the following options: Cavitate, Dead Head, Excessive Power Consumption (selected), Excessive Vibration, and Fault.

Time Stamp	Inlet Pump Peak Acceleration (m/s ²) [0 - 20]	Inlet Pump Peak Velocity (m/s) [0 - 1.126]	Inlet Pump Status
16-Feb-2022 09:00:00	17.8	0.923	Dead Head
16-Feb-2022 17:00:00	13.5	0.892	Excessive Power Consumption

eDatasheet - Manual Entry from PI Vision



Asset Utilization (AU)

Background Information

- Each Asset at our facilities has a defined Maximum Asset Capability (MAC)
 - MAC – Volume of a product that can be produced on an asset in a 24-hour period
- Daily Production data is compared against MAC
 - Prime Production + Offgrade Production + Lost Production = MAC
 - Prime – Production within specified product properties
 - Offgrade – Production outside of specified product properties
 - Lost Production – Non-Produced Material
 - All Offgrade generated and Lost Production must be accounted for and assigned a reason code
 - Example Reason Codes: External Lack of Demand (market), Product Mixes/Transitional Losses, Equipment Failure, Process Control, Logistics, Raw Material Shortage, Planned Maintenance Turnaround, etc.
- Provides high level overview for trends with operational challenges across all assets

World-class manufacturing operations



Challenge

Compare Asset Utilization with Multiple databases per site

Manual entered data very difficult to analyze

Solution

Deployed AVEVA PI System

Installed eDatasheet for assigning reason codes

Benefits

Downtimes stored as Event Frames

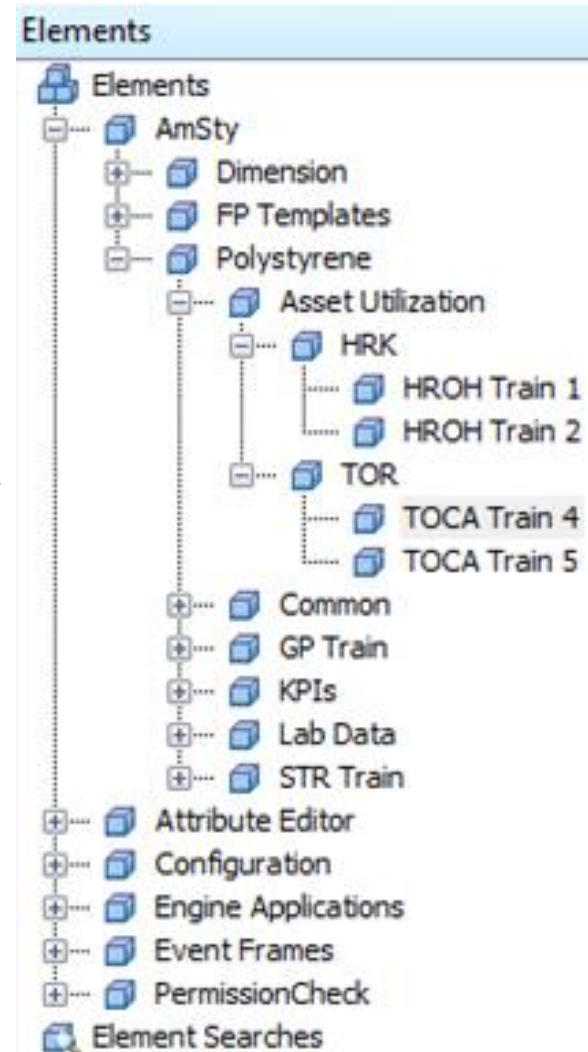
Downtime Reason Codes entered in eDatasheet and stored in PI

Enabled PI as System of Record for Downtime Events

PI Asset Framework for AU Data

PI System Event Frames

- Event Frames for Grade Transitions and End of Day
- Asset Framework element template for EF Calculations
- AF and EF Templates to simplify multi-site deployment



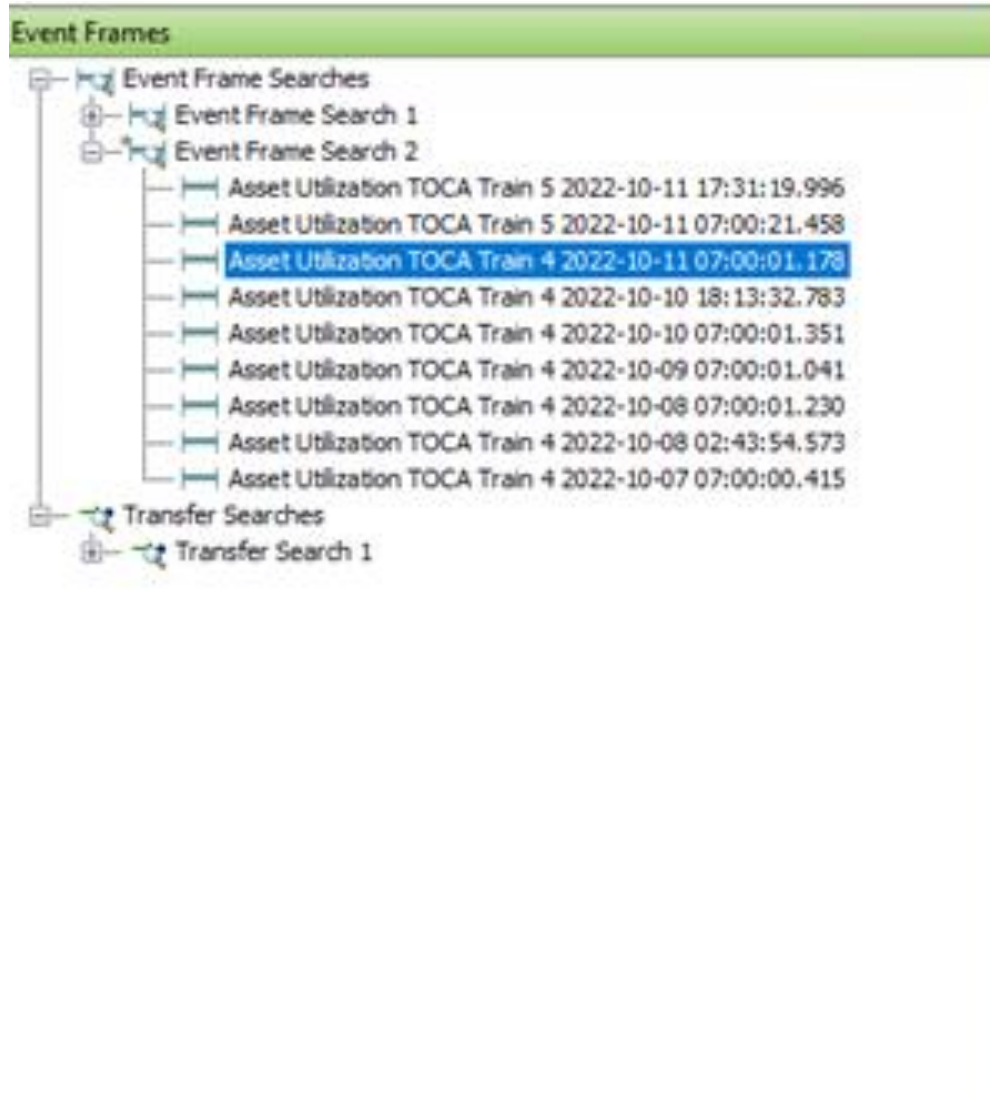
The screenshot shows the configuration window for 'TOCA Train 4'. The window has tabs for 'General', 'Child Elements', 'Attributes', 'Ports', 'Analyses', 'Notification Rules', and 'Version'. The 'Analyses' tab is selected, showing a table of analyses. The table has columns for 'Name' and 'Backfilling'. The analyses listed are 'AU Data', 'AU Expressions', and 'Previous Product', all with 'Backfilling' set to 'Yes'. Below the table, the 'Generation Mode' is set to 'Explicit Trigger'. The 'Event Frame' section shows a table with columns for 'Name' and 'Expression'. The table lists 'Start triggers' and 'End trigger'. The 'Start triggers' section contains 'StartTrigger1' with the expression 'Triggers|Start Trigger'. The 'End trigger' section contains 'EndTrigger' with the expression 'Triggers|Stop Trigger'.

Name	Backfilling
AU Data	Yes
AU Expressions	Yes
Previous Product	Yes

Generation Mode: Explicit Trigger

Name	Expression
Start triggers	
StartTrigger1	Triggers Start Trigger
End trigger	
EndTrigger	Triggers Stop Trigger

PI Event Frames



PI Event Frames

The screenshot displays the 'Event Frames' interface. On the left, a tree view shows a hierarchy starting with 'Event Frame Search', followed by 'Event Frame', and then a list of 'Asset Util' items. Below this are 'Transfer Searches' and 'Transfer Search'. The main panel on the right has tabs for 'General', 'Child Event Frames', 'Referenced Elements', and 'Attributes'. The 'General' tab is active, showing a 'Filter' bar and a table of event data. The table has columns for 'Name' and 'Value'. The 'Total Prime Production' row is highlighted with a blue background and a dashed border.

	Name	Value
	Area Designation	T4
	Duration	20.41 h
	Lost Production	6.2 Mlb
	MAC for this Run	389.5 Mlb
	Product From	685P
	Product To	685P
	StartTime	10/11/2022 02:00:01
	Total Offgrade Production	-16.6 Mlb
	Offgrade Production	0.0 Mlb
	Total Prime Production	416.6 Mlb
	Prime Production	399.9 Mlb
	Rework Production	16.6 Mlb
	Total Rework Production	-16.6 Mlb

PI Event Frames

The screenshot displays the PI Event Frames application interface. On the left, a tree view under 'Event Frames' shows a hierarchy including 'Event Frame Search', 'Event Frame', and 'Asset Util'. The main panel is divided into three tabs: 'General', 'Child Event Frames', and 'Reference'. The 'General' tab is active, showing a list of event frames with columns for Name, Area Designation, Duration, Lost Production, MAC for this Run, Product From, Product To, StartTime, Total Offgrade Production, Offgrade Production, Total Prime Production, Prime Production, Rework Production, and Total Rework Production. The 'Total Prime Production' event frame is selected. On the right, a detailed properties panel for the 'Total Prime Production' event frame is shown. It includes fields for Name, Description, Properties, Categories, Default UOM, Value Type, Value, Display Digits, and Data Reference. The 'Value' field is set to '416.6 Mlb'. Below these fields is a 'Settings...' button and a formula editor showing the formula: $A = . | \text{Prime Production}; B = . | \text{Rework Production}; [A + B]$.

Event Frames

Event Frame Search

Event Frame

Asset Util

Asset Util

Asset Util

Asset Util

Asset Util

Asset Util

Asset Util

Asset Util

Transfer Searches

Transfer Search

General Child Event Frames Reference

Filter

Name

Area Designation

Duration

Lost Production

MAC for this Run

Product From

Product To

StartTime

Total Offgrade Production

Offgrade Production

Total Prime Production

Prime Production

Rework Production

Total Rework Production

Name: Total Prime Production

Description:

Properties: <None>

Categories:

Default UOM: thousand pound(m)

Value Type: Double

Value: 416.6 Mlb

Display Digits: 1

Data Reference: Formula

Settings...

$A = . | \text{Prime Production}; B = . | \text{Rework Production}; [A + B]$

eDatasheet User Interface

- Production data and calculated values in event frame are added to a record in AU database using PI Interface for RDBMS.
- Run Plant Engineer will access database web interface to view and confirm the data to then push back to PI after assigning reason codes for losses.

eDatasheet								
Equipment TOCA Train 4			Forms AU Datasheet		Date 05-Sep-2022		Plant Admin User Torrance PS eDataSheet	
Time Stamp	Product To	Product From	Hours	MAC	Prime Amt	Lost Prod	Lost Prod Code	Offgrade
05-Sep-2022 23:59:00	685D		24	453	349.9	103.1	01. Lack of Demand/1.1 Direct External	0



Impact from Implementation

- Original AU Database used a deprecated technology.
- Improved User Adoption with eDatasheet
- Improved access and visibility of data via PI system and eDatasheet web interface.
- Records are automatically created and pre-populated with production data. This was entirely manual in the past. Run plant engineer still has capability to override the pre-populated production data.
- Using Event Frame Templates and PI System AF templates, the implementation is highly repeatable and re-usable.
- Access to the information is more visible and easier to extract and analyze. Before there were multiple separate AU databases, ERP system, control system where information was required for reporting of asset utilization.

THANK YOU!

Please visit us at Booth 56 in the Exhibitor Hall



Mike Jonozzo

Specialist – Process Control

- Americas Styrenics (AmSty) LLC
- 11 years' experience implemented projects in North America, South America, Europe and Asia.
- MJonozzo@amsty.com



Jack Aude

Senior Director of Sales - EIS

- 23+ Years at OSIsoft; (Account, Product and Service Management)
- Bailey Controls; Senior Application Engineer
- Firestone Polymers; Process Engineer
- Jack@EISinc.com

Questions?

Please wait for the microphone.
State your name and company.



Please remember to...

Navigate to this session in the mobile app to complete the survey.



Thank you!

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