AVEVA PI WORLD

Leveraging data to drive continuous improvement and optimize polystyrene production at AmSty

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AmSty Corporate Overview

THE WOODLANDS, TX

Headquarters

ST. JAMES, LA

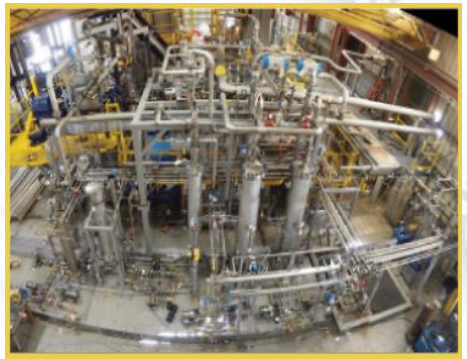
Monomer Plant
2.3B LBS

TORRANCE, CA

Polymer Plant
330MM LNS

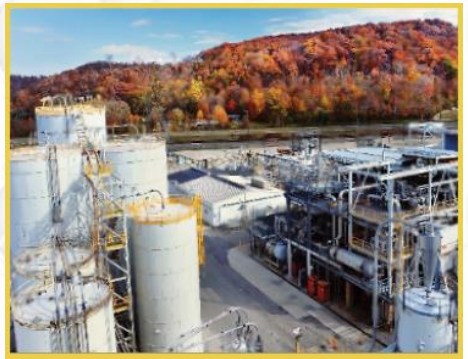
ALLYN'S POINT, CT

Polymer Plant
250MM LBS



TIGARD, OR

Recycled Styrene Monomer JV
1 MM LBS



HANGING ROCK, OH

Polymer Plant
400MM LBS

JOLIET, IL

Polymer Plant
270MM LBS

MARIETTA, OH

Polymer Plant
400MM LBS

CARTAGENA, COLOMBIA

Polymer Plant
270MM LBS

AmSty

AmSty Introduction

- AmSty is a leading integrated producer of polystyrene and styrene monomer, offering solutions and services to customers in a variety of global markets.

- Assets include 6 polystyrene plants located throughout the Americas and 1 large styrene plant located in Louisiana. Corporate offices are based in The Woodlands, TX

- AmSty is taking a leadership role on long-term sustainability and development of the circular economy for plastics. Additionally, the company is committed to reducing its environmental footprint by producing products as efficiently as possible.

SUSTAINABILITY MILESTONES

Today, ***AmSty is a leading integrated producer*** *of polystyrene and styrene monomer, offering solutions and service to customers in a variety of markets throughout the Americas.*

THIS IS HOW WE GOT HERE.

AmSty

2011

POLYRENEW® LAUNCH
The PolyRenew® brand of resin is launched as the first post-consumer recycled polystyrene product with FDA approval for foodservice in the U.S.

2013

POLYRENEW® RESINS FIRST USED
in recycled foam containers.

2014

AMSTY JOINS AMERICAN CHEMISTRY COUNCIL ADVANCED RECYCLING ALLIANCE FOR PLASTICS
as charter member.

2015

AMSTY CONTRIBUTES TO FUNDING RECYCLING
infrastructure as a founding member of the Foodservice Packaging Institute's Foam Recycling Coalition.

2019

REGENYX
AmSty forms Regenyx, a joint venture with Agilyx, to commercialize a new way of recycling polystyrene. With this process, used polystyrene products are collected, converted to feedstock, then remade into products with the same quality and durability – like aluminum cans. This circular recycling process means polystyrene products are no longer single use and they don't end up in a landfill. We call this the PolyUsable™ cycle; a way to recover and reuse products that were once single-use.

2020

ACC SUSTAINABILITY LEADERSHIP AWARD
The American Chemistry Council Recognizes AmSty with a Sustainability Leadership Award for the success in circular polystyrene recycling through joint venture Regenyx.

AMSTY AND INEOS STYROLUTION PARTNER
to accelerate the realization of circular polystyrene by announcing plans for Channahon, IL facility.

SUSTAINABILITY COMMITMENT
AmSty commits to 25% recycled polystyrene in all foodservice food packaging by 2030.

POLYRENEW® EXPANSION
AmSty expands the PolyRenew® brand resin line with the launch of additional high efficiency products.

1,500,000 LBS RECYCLED
Through Regenyx, AmSty has recycled more than 1.5 million tons of polystyrene – the equivalent of more than 56 million foam cups.

OSI-PI/TrendMiner 1st Implementation

- AmSty 1st implemented OSI-PI at its Torrance, California PS production site in 2018
- We worked with an integration company for initial installation, configuration and training
- Initial objectives were to:
  - Improve process monitoring via standard overviews and dashboards using Torrance as the Pilot for the company
  - Facilitate DCS data extraction
  - Provide notifications of pre-conditions or events
  - Compare events by overlaying time-series data on the same trend graphic
- TrendMiner was licensed for in-depth and accelerated troubleshooting, in addition to advanced analytics

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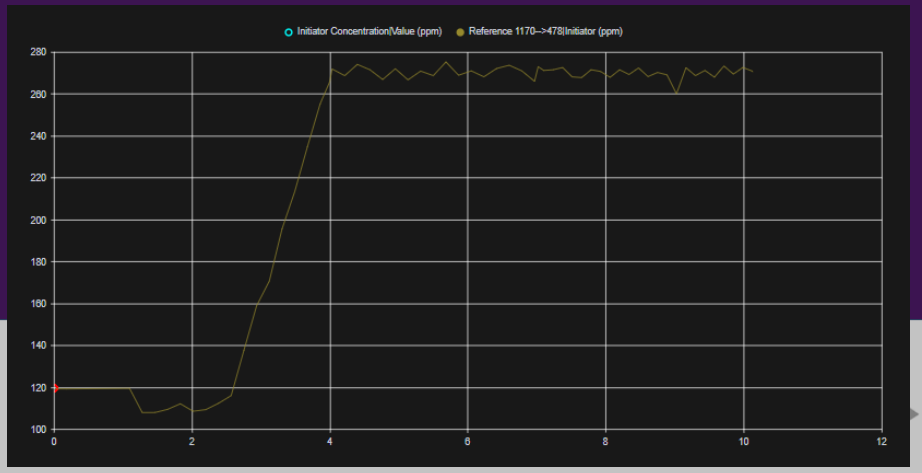
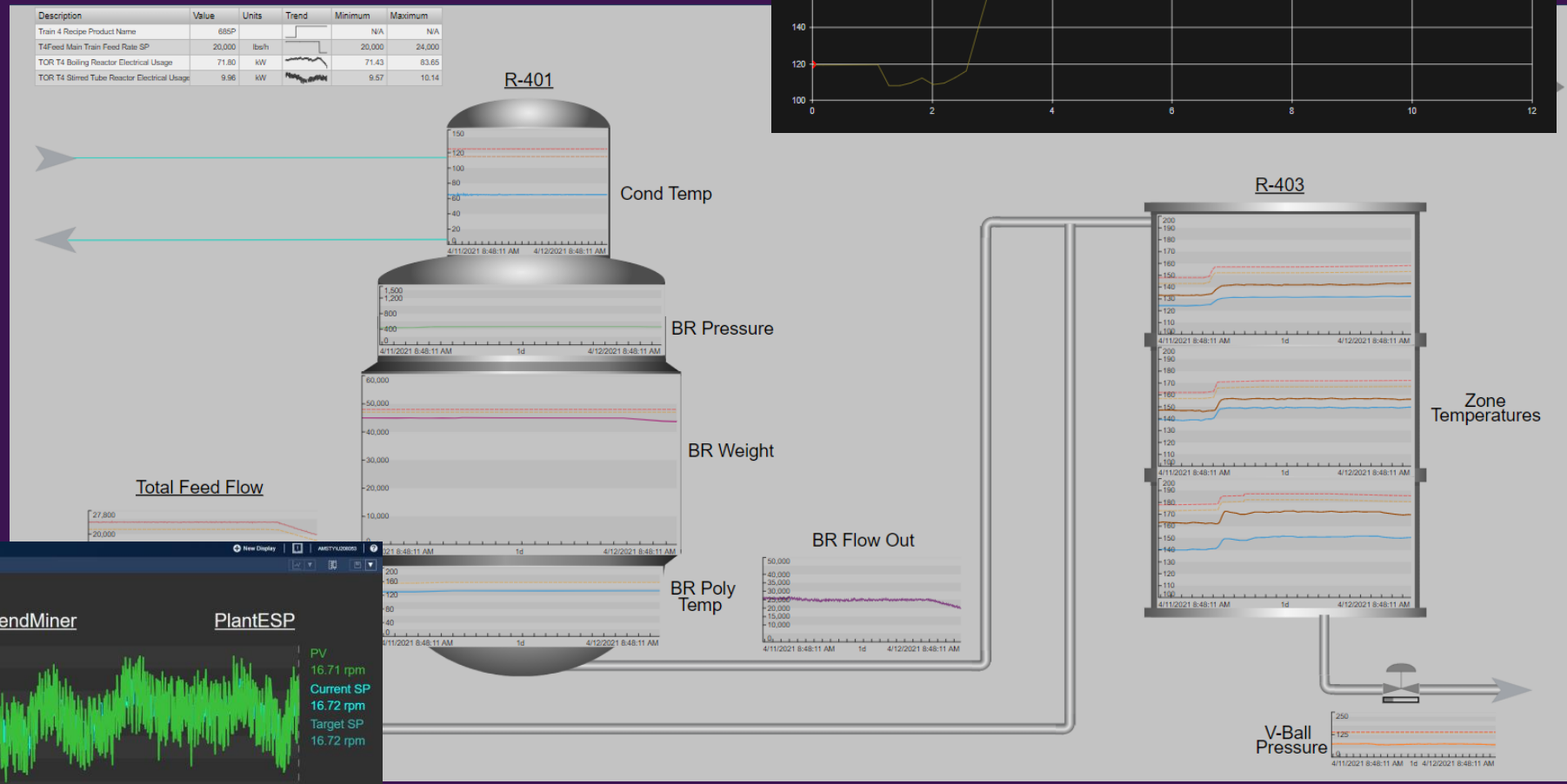
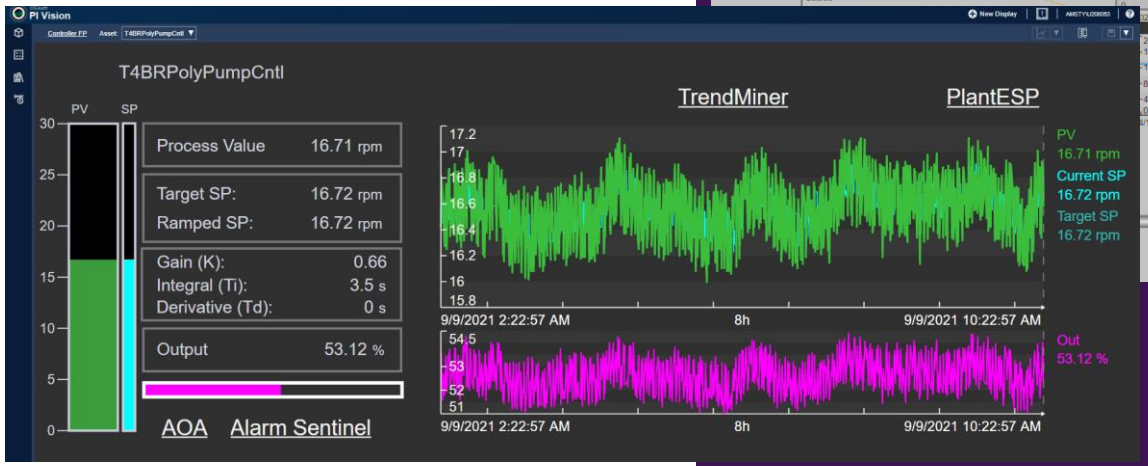
PI Vision

- Initially PI data was used for process monitoring
- High level process flow diagrams and dashboards
- Links incorporated to complementing tools
- TrendMiner, PlantESP, etc.







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Applying process data to a Burner Management Audit

Challenge

Provide real-time process data analytics to make Burner Management auditing more holistic, beyond the concepts of safe combustion.

Solution

Utilized the TrendMiner software to analyze data and event frames on the PI System. Areas of abnormalities were identified along with potential causation factors.

Benefits

Rapid diagnostic of process abnormalities was performed in TrendMiner. Alerts were also defined to provide indication of future abnormal operating conditions.

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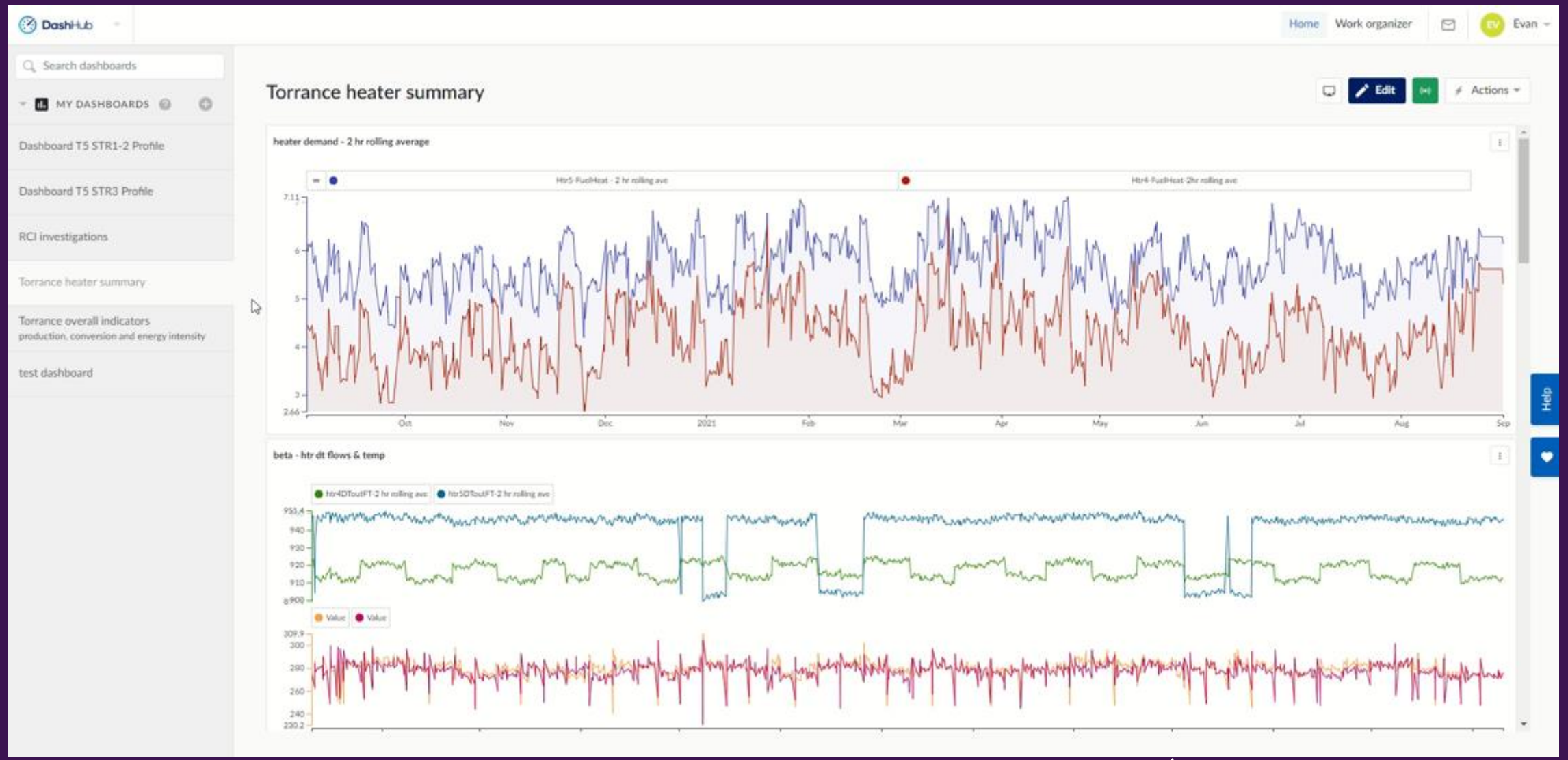
TrendMiner applied – AmSty burner management



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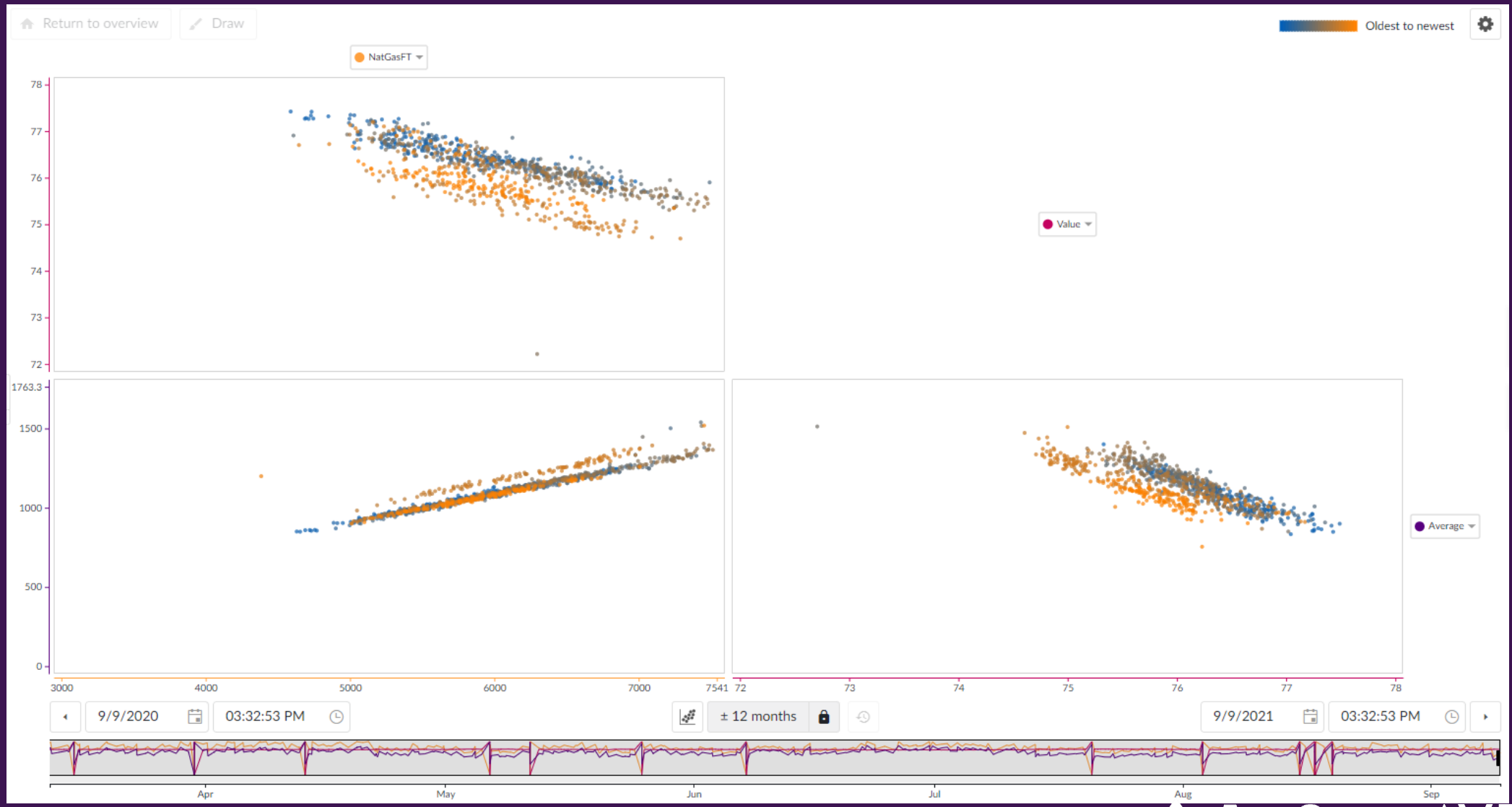
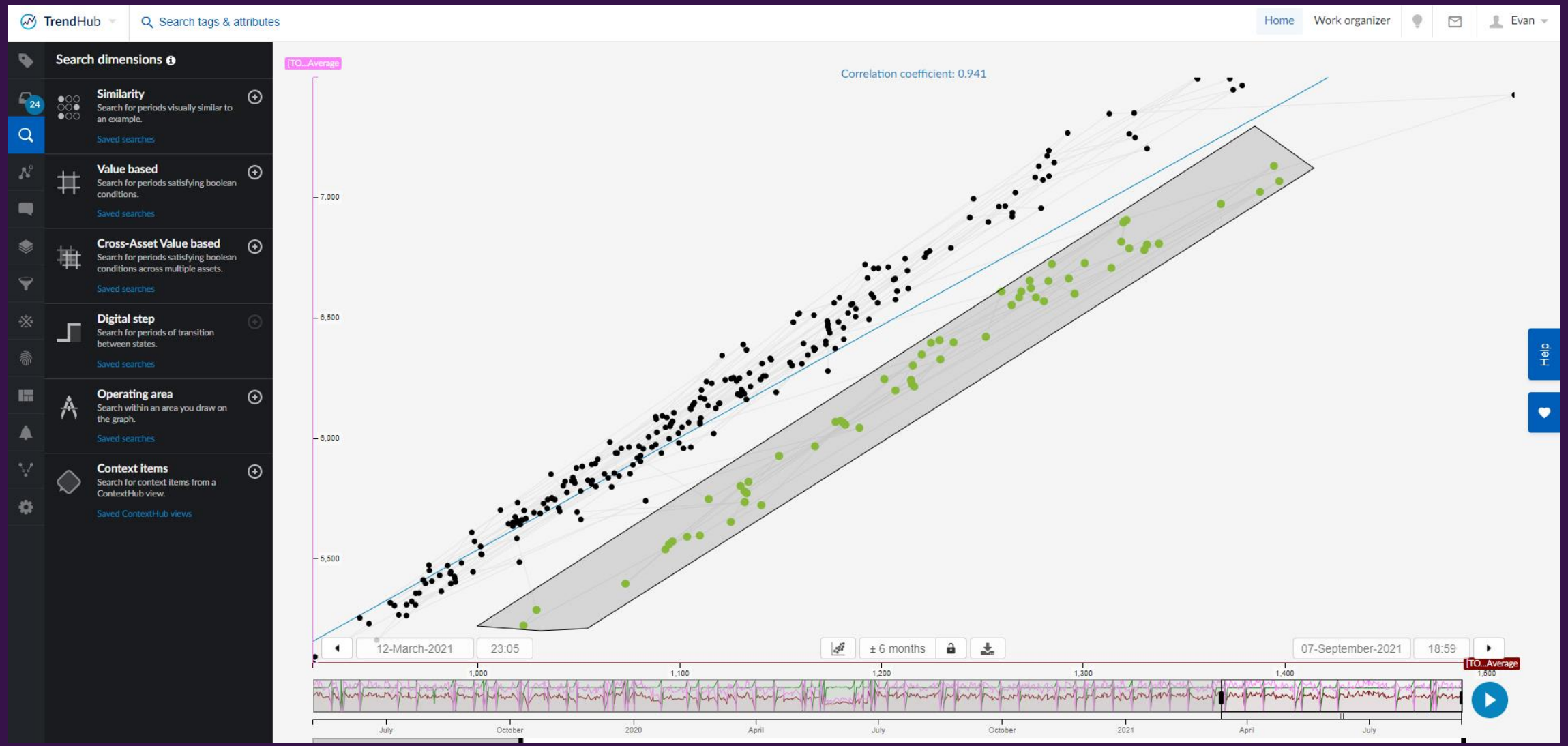
TrendMiner applied – AmSty burner management



TrendMiner applied – AmSty burner management



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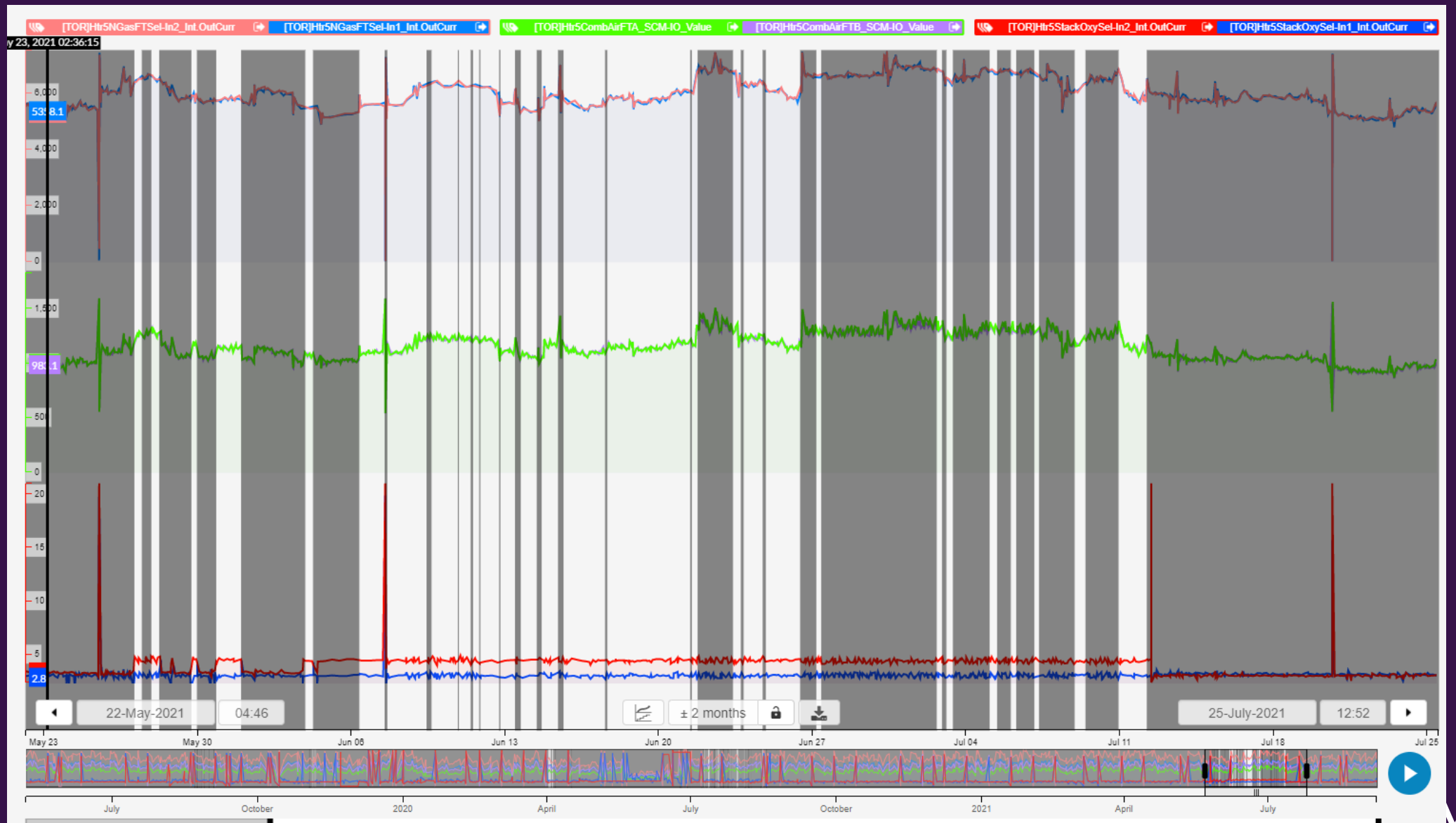

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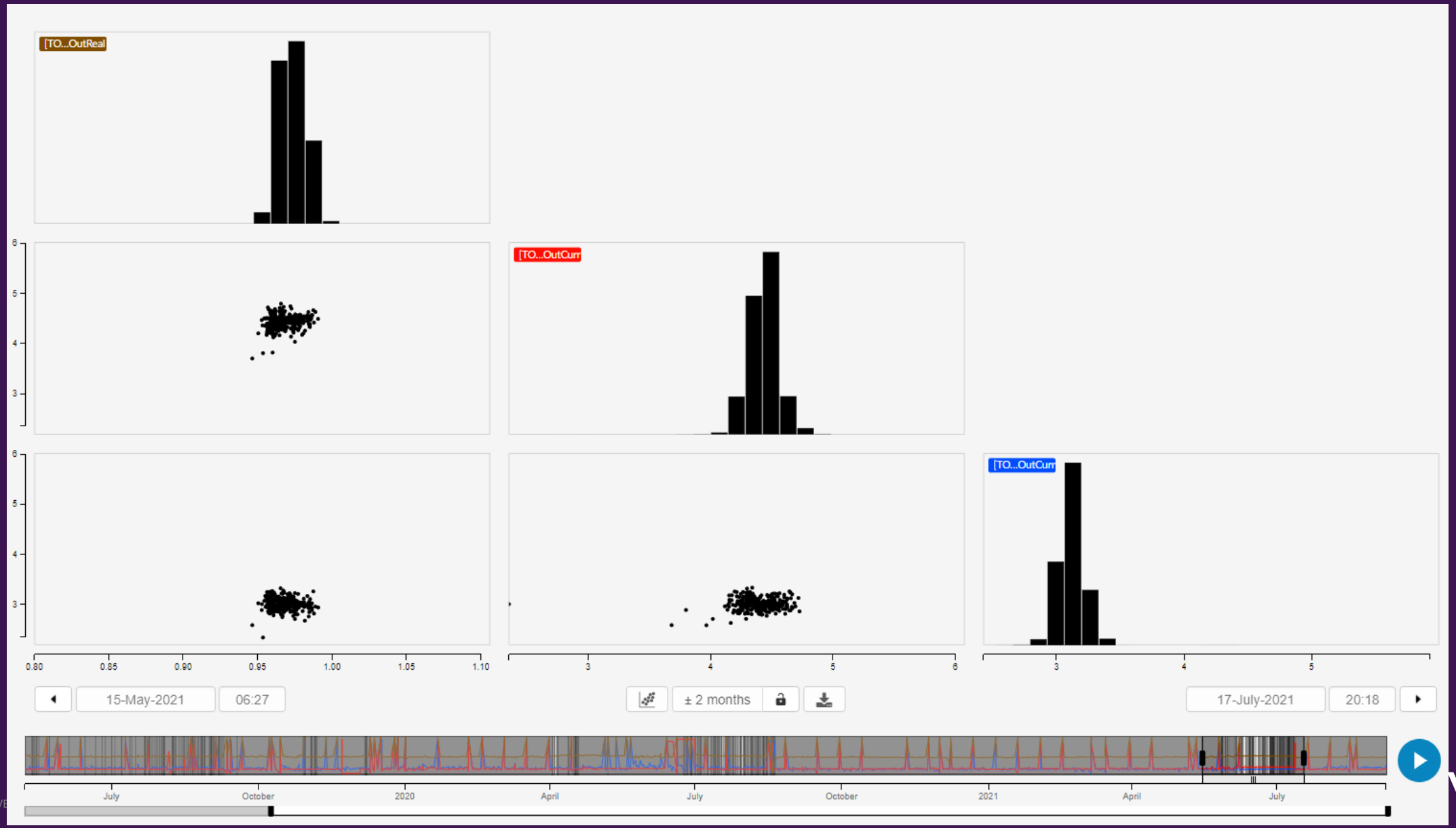
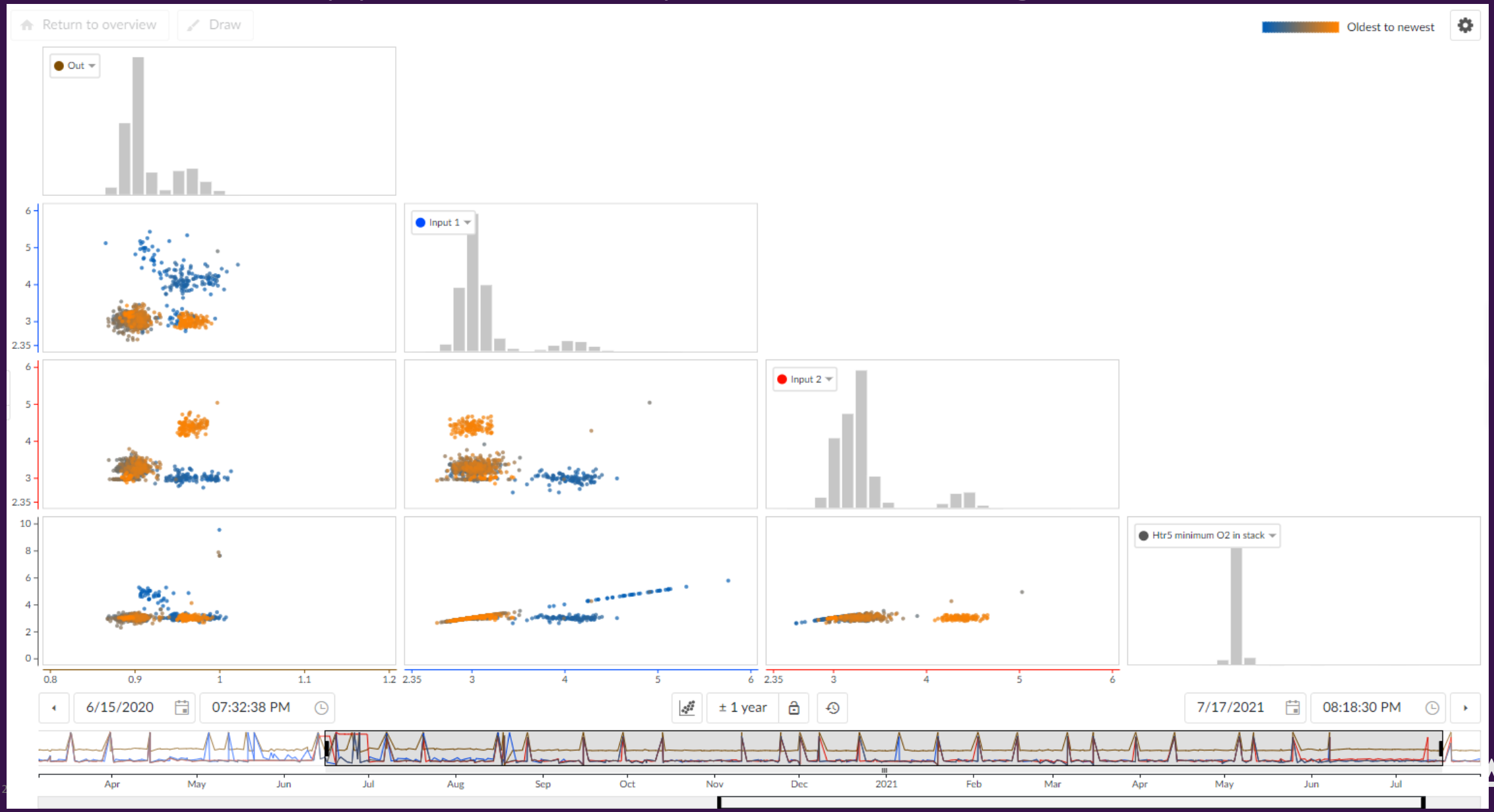


TrendMiner applied – AmSty burner management



PI Event Frames to monitor/optimize product transitions

Challenge	Solution	Benefits
Automate transition monitoring and evaluate how to best optimize product transitions.	Generate Event Frames in PI which are then imported into TrendMiner. These can then be layered to assess anomalies between events. Future developments seek to incorporate a Theoretical/ Machine Learning model to compare against real-time data	TrendMiner is able to search for Influence Factors which may not be considered initially. Machine Learning models also facilitate optimizing product transitions.

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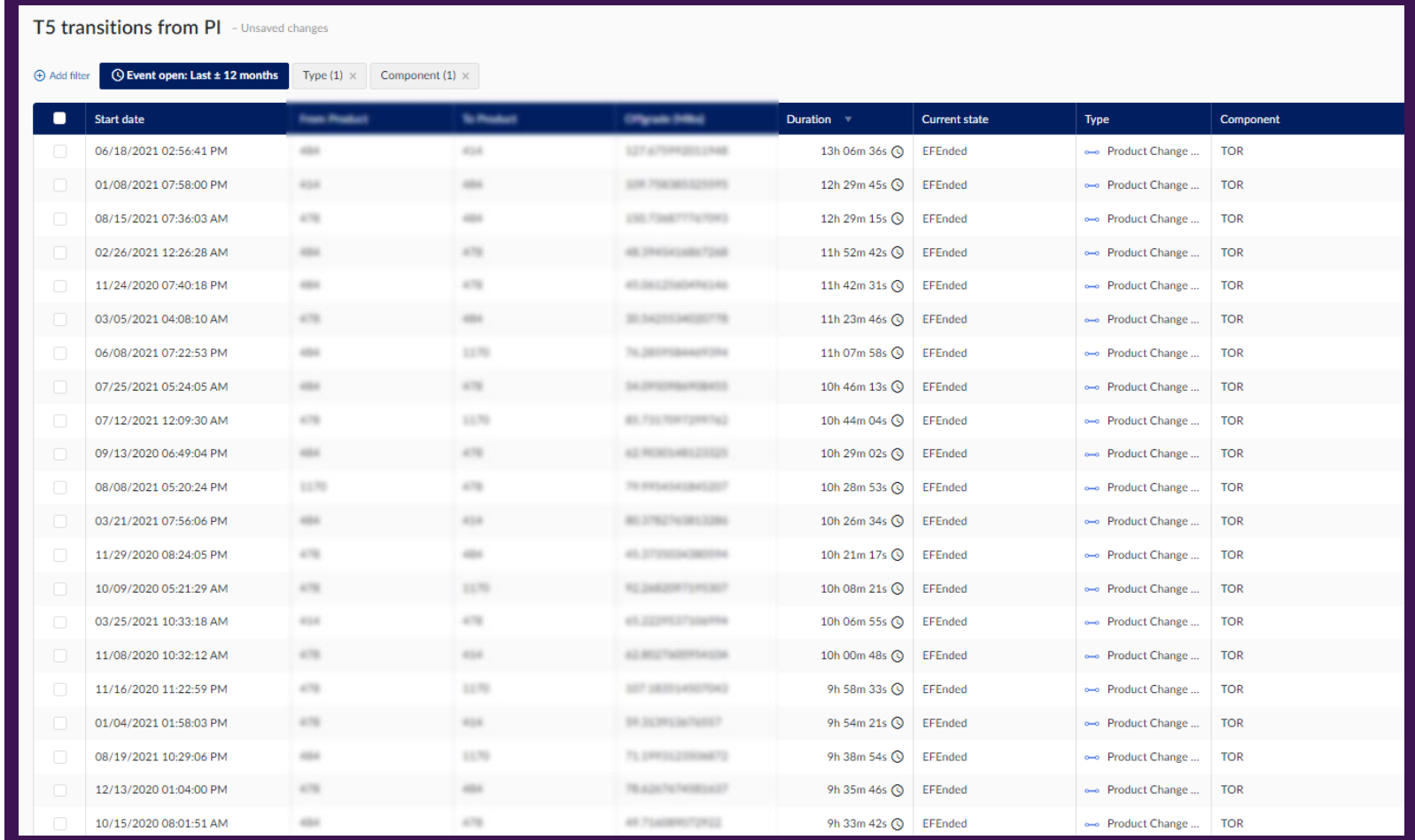
PI Event Frames

Integration into TrendMiner

- Event frames generated in Pi are managed/sorted in TrendMiner's Context Hub to identify "bad actors"
- AmSty has been working with TrendMiner to influence improvements in upcoming product versions to allow for greater utilization of event frames or context items.



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01/08/2021 07:58:00 PM	12h 29m 45s	EFEnded	Product Change ...	TOR
08/15/2021 07:36:03 AM	12h 29m 15s	EFEnded	Product Change ...	TOR
02/26/2021 12:26:28 AM	11h 52m 42s	EFEnded	Product Change ...	TOR
11/24/2020 07:40:18 PM	11h 42m 31s	EFEnded	Product Change ...	TOR
03/05/2021 04:08:10 AM	11h 23m 46s	EFEnded	Product Change ...	TOR
06/08/2021 07:22:53 PM	11h 07m 58s	EFEnded	Product Change ...	TOR
07/25/2021 05:24:05 AM	10h 46m 13s	EFEnded	Product Change ...	TOR
07/12/2021 12:09:30 AM	10h 44m 04s	EFEnded	Product Change ...	TOR
09/13/2020 06:49:04 PM	10h 29m 02s	EFEnded	Product Change ...	TOR
08/08/2021 05:20:24 PM	10h 28m 53s	EFEnded	Product Change ...	TOR
03/21/2021 07:56:06 PM	10h 26m 34s	EFEnded	Product Change ...	TOR
11/29/2020 08:24:05 PM	10h 21m 17s	EFEnded	Product Change ...	TOR
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03/25/2021 10:33:18 AM	10h 06m 55s	EFEnded	Product Change ...	TOR
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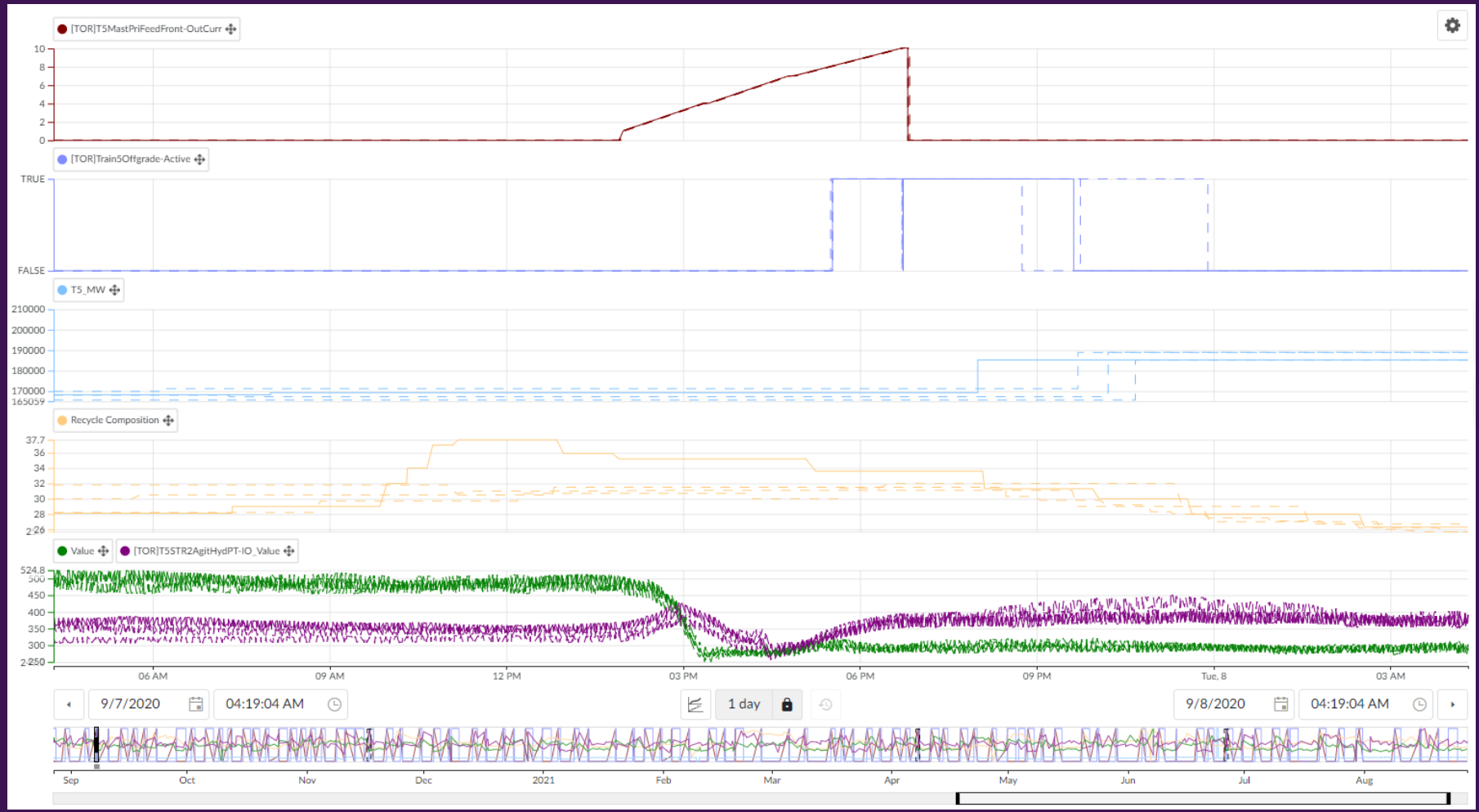
11/16/2020 11:22:59 PM	9h 58m 33s	EFEnded	Product Change ...	TOR
01/04/2021 01:58:03 PM	9h 54m 21s	EFEnded	Product Change ...	TOR
08/19/2021 10:29:06 PM	9h 38m 54s	EFEnded	Product Change ...	TOR
12/13/2020 01:04:00 PM	9h 35m 46s	EFEnded	Product Change ...	TOR
10/15/2020 08:01:51 AM	9h 33m 42s	EFEnded	Product Change ...	TOR

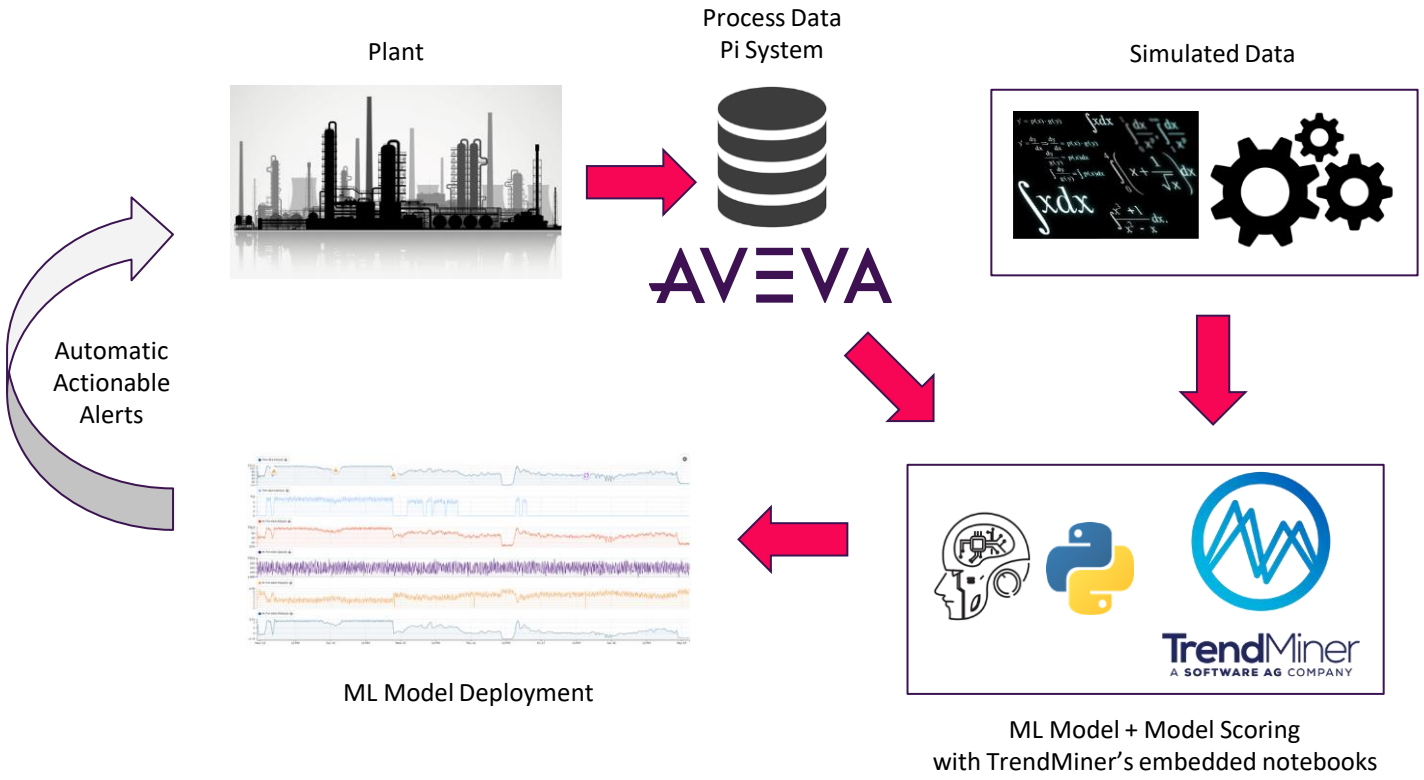
PI Event Frames

- Transforming context items into layers is simple
- Because the PI event frames use the same trigger point, they all line up perfectly
- Visually its easy to see where specific events deviate from normal operations



Hybrid Approach to Machine Learning at AmSty

Next steps for advanced process monitoring



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