

Success Series

- Automated Solutions in
- TrendMiner



Housekeeping



Listen Only
Mode



Use Question Box!



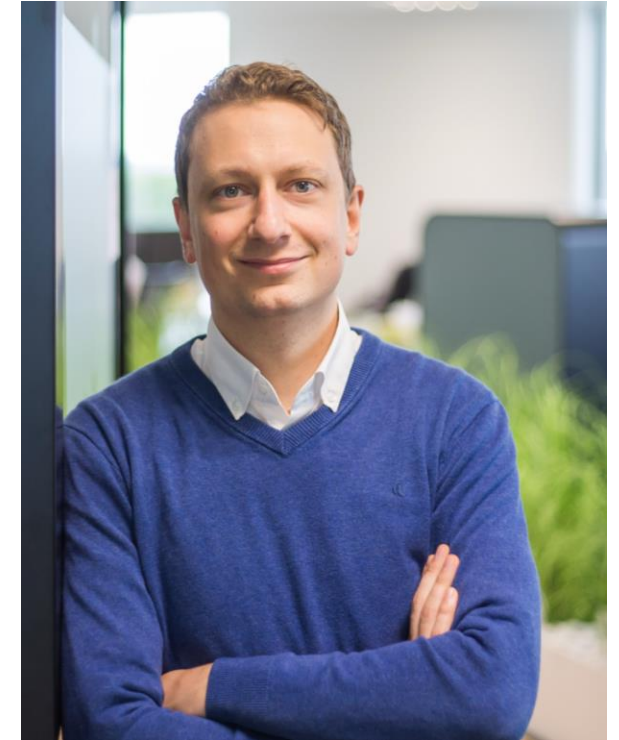
Recording and
Handout will be
provided!

Personal introduction

Wouter Daniels, Analytics Engineering Lead

- PhD Chemical Engineering
- 7 years at TrendMiner
- TrendMiner functional expert
- APIs, Python scripting, Automation

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Today's Goal

Show you what automated solutions can add to TrendMiner

Live demo of real use cases:

- Overall Equipment Effectiveness (OEE) reporting
- Batch Fingerprint Scoring (Golden Batch)
- Energy management

Overall Equipment Effectiveness (OEE) Reporting

OEE - Introduction

OEE – Overall Equipment Effectiveness (%)

Quality x Performance (speed) x Availability (no interruptions)

TEEP – Total Effective Equipment Performance (%)

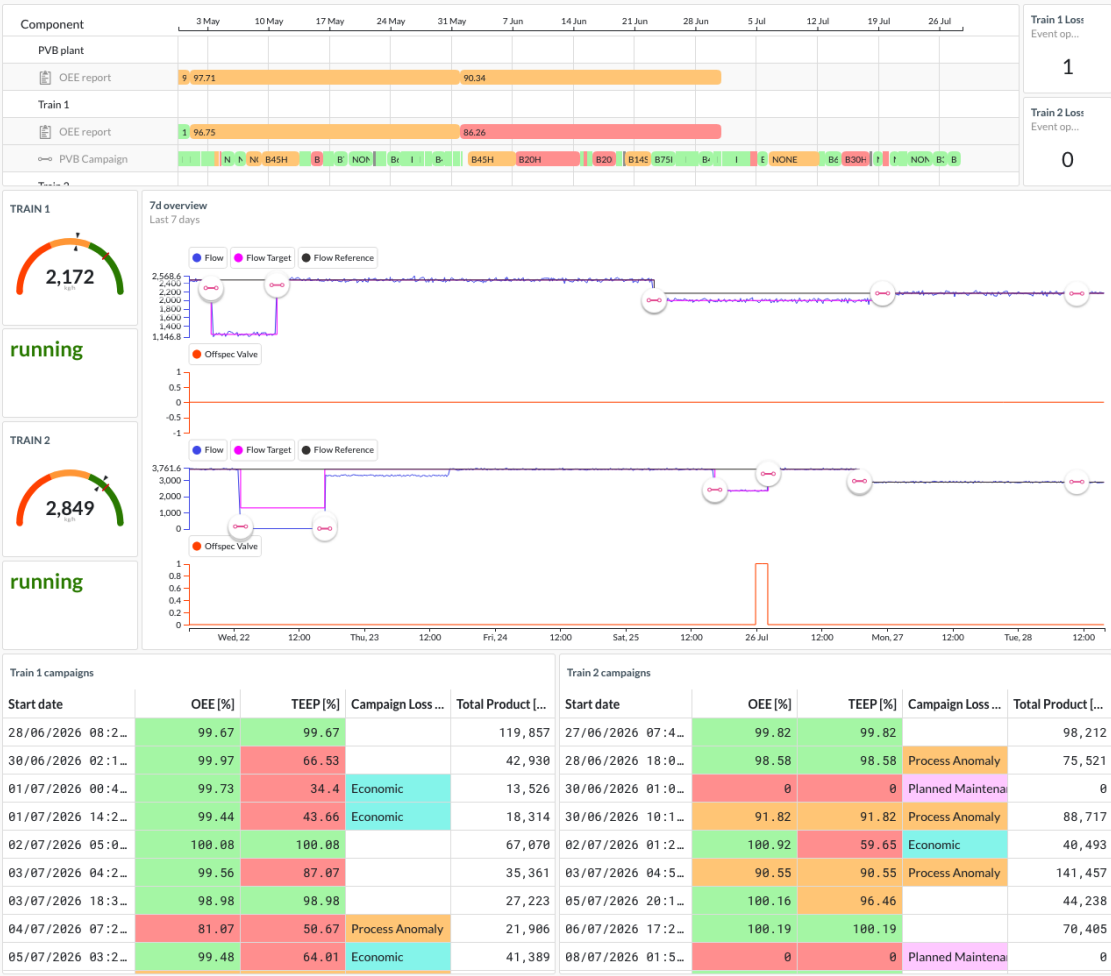
OEE x Loading rate

OEE - Calculation

- **Batch process:** time-based calculation
 - On-spec batches [*quality*]
 - Minimal batch length [*performance*]
 - Minimal wait between batches [*availability*]
- **Continuous process:** mass-based calculation
 - On-spec production [*quality*]
 - Reference/target production rate [*performance*]
 - No (unplanned) stops [*availability*]

Though standards exist (ISO 22400), exact implementation process-specific

OEE - Demo



Steps to solution building

Example: Overall Equipment Effectiveness (OEE)

Overview

1. **Structure** the process
2. **Enrich** the process structure
3. **Capture** process events
4. **Calculate** event metrics
5. **Review** events
6. **Aggregate** event metrics
7. **Report** on main KPIs



Scheduled execution

1. Structure the process

PVB plant
[← Back to overview](#)

Add a new node to the current level

Node name +

🏠 > PVB plant > Train 1

✓	Flow Flowrate rate measurement	PVB1_PROD_RATE_FLOW x	⬆ ⬇ ⬆
✓	Flow Reference Maximal reference flowrate depending on grade type	PVB1_PROD_RATE_REF x	⬆ ⬇ ⬆
✓	Flow Target Planned flowrate	PVB1_PROD_RATE_TARGET x	⬆ ⬇ ⬆
✓	Grade Product grade	PVB1_GRADE x	⬆ ⬇ ⬆
✓	Offspec Flow e.g. Level description	PVB1 Offspec Flow x	⬆ ⬇ ⬆
✓	Offspec Valve Offspec valve open state	PVB1_OFFSPEC_VALVE x	⬆ ⬇ ⬆
✓	State Polymerization train state	PVB1_TRAIN_STATE x	⬆ ⬇ ⬆

Map components to asset framework

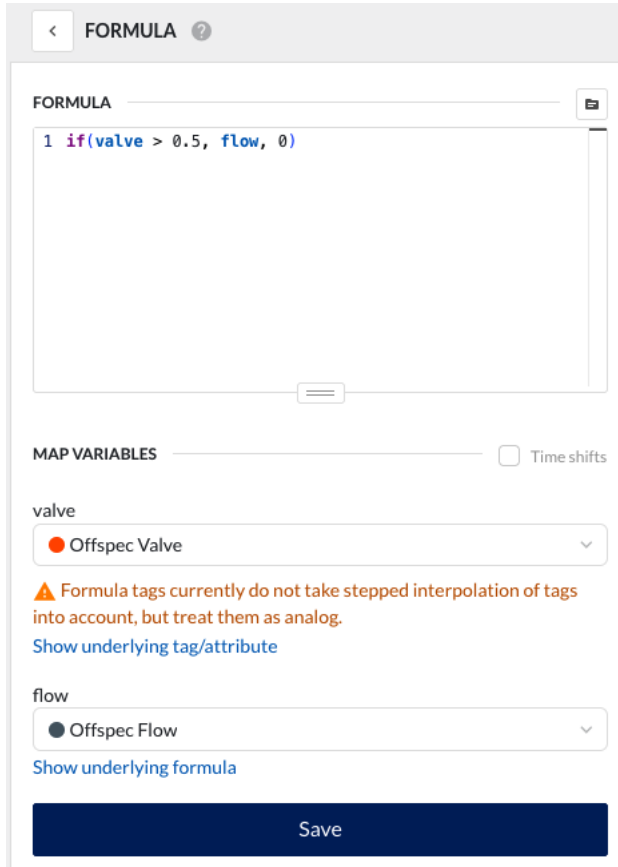
Consistency is key

Can be automated when tag names are consistent

Subsequent steps applied cross-asset

OEE example: Polymerization Train

2. Enrich the process structure



The screenshot shows the 'FORMULA' configuration window. At the top, there's a header with a back arrow and the title 'FORMULA'. Below this is a text area for the formula, containing the code: `1 if(valve > 0.5, flow, 0)`. Under the formula area is a 'MAP VARIABLES' section with a 'Time shifts' checkbox. Below that are two variable selection dropdowns: 'valve' (selected 'Offspec Valve') and 'flow' (selected 'Offspec Flow'). A warning message states: 'Formula tags currently do not take stepped interpolation of tags into account, but treat them as analog.' with a link 'Show underlying tag/attribute'. Another link 'Show underlying formula' is below the 'flow' dropdown. At the bottom is a large blue 'Save' button.

Additional setup required for the solution

Signals not directly available from datasource

Calculate targets based on historical analysis

OEE example: off-spec flowrate

3. Capture process events

< VALUE BASED SEARCH ?

● Flow Target

Constant

AND ▼

● Grade

Constant

AND ▼

● State

Constant

[+ Add condition](#)

MINIMUM DURATION ?

2m

SEARCH PERIOD

This reflects the time range specified in the chart's context period.

< 28/04/2026 16:00:07

> 28/07/2026 16:00:07

Search

Capture all relevant process events

Events define time intervals for KPI calculation

From TrendMiner Monitor

From external connection (PI Event Frames, ...)

OEE example: production campaigns

4. Calculate event metrics

OEE [%]	92.4
TEEP [%]	92.4
Total Product [kg]	273,937
Total Loss [kg]	22,534
Unplanned Loss [kg]	22,534
Planned loss [kg]	0
Availability Loss [kg]	0
Performance loss [kg]	22,534
Quality Loss [kg]	0
PVB grade	B45H
PVB State	running
Campaign Loss Code	Process Anomaly

Scheduled script to calculate KPIs

1. Retrieve unannotated events
2. Add calculations based on asset attributes
 - Aggregations on tags (avg, integral, ...)
 - Formulas on top of aggregations
 - TrendMiner methods (fingerprint score, ...)
 - Custom time series operations

Based on Python SDK

OEE example:

- Campaign data
- Loss quantities
- OEE & TEEP

5. Review events (optional)

Campaign Loss Code Optional

▼

Turnaround

Planned Maintenance

Unplanned Maintenance

Process Anomaly

Economic

External

Description Optional

Overfilling of downstream tank

Manual annotation pipeline where needed

Labeling that requires human review

Events requiring explicit acknowledgment

OEE example: loss reason

6. Aggregate event metrics

Start date ▼	Total Product [k...]	OEE [%]	TEEP [%]
01/06/2026 00:00:00	1542784	86.26	83.81
01/05/2026 00:00:00	1789942	96.75	89.2
01/04/2026 00:00:00	1691686	100.03	95.47
01/03/2026 00:00:00	1395759	85.74	78.21
01/02/2026 00:00:00	1050630	82.89	72.56
01/01/2026 00:00:00	1921267	84.49	79.55

Component	2026	Feb	Mar	Apr	May	Jun	Jul
PVB plant	★						
OEE report	★	86.65	86.8	91.42	97.55	97.71	90.34
Train 1	★						
OEE report	★	84.49	82.89	85.74	100.03	96.75	86.26
Train 2	★						
OEE report	★	89	90.74	96.66	95.13	98.7	94.51

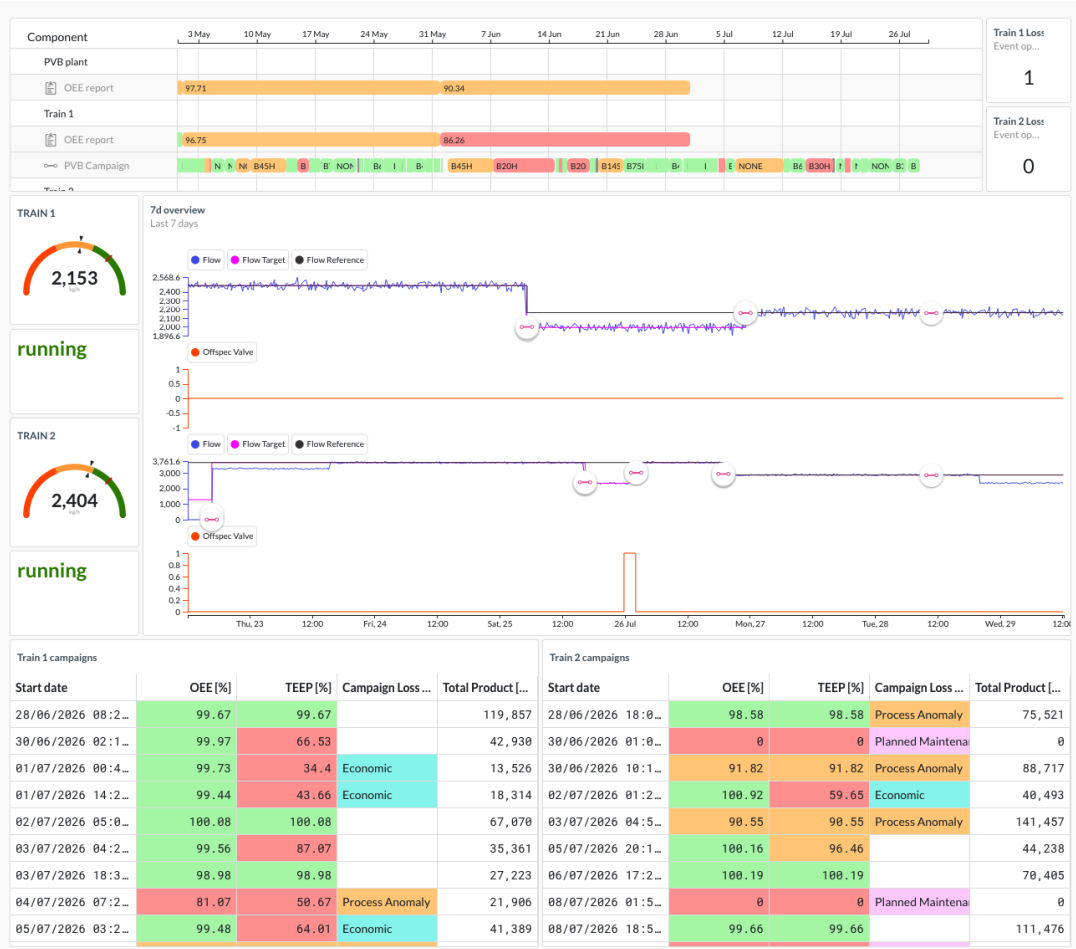
Summarize events for higher level overview

Aggregate events over reporting periods (yearly, monthly, weekly, daily)

Aggregate KPIs on higher level assets (e.g. overall plant KPIs)

OEE example: plant OEE report per month

7. Report on main KPIs



Build a suitable report structure

TrendMiner Dashboards

Email PDF report

PowerBI Dashboard (REST API)

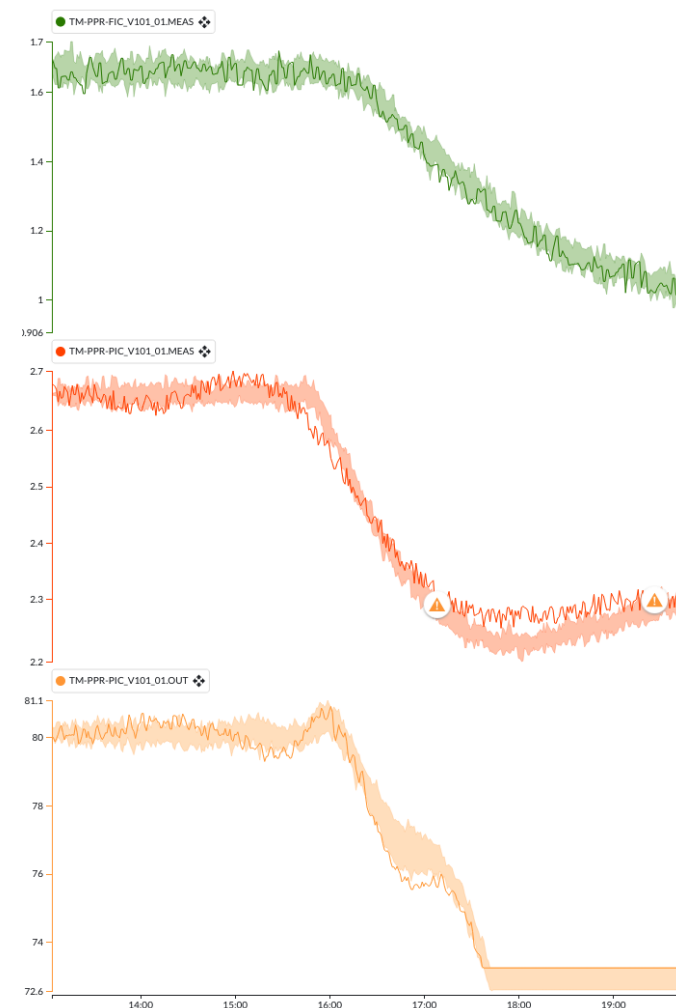
AI-generated report (MCP, REST API)

OEE example: summary dashboard

Batch Fingerprint Scoring

Batch Fingerprint Scoring – Introduction

- **Fingerprint:** optimal process value hulls
 - Dynamic profiles
 - Built from validated historic good behavior
 - Usually asset and product specific
- **Fingerprint score:** distance to good behavior
 - Low scores flag deviations from desired behavior
- Scoring **at scale** flags structural issues
 - Per asset (reactor/line)
 - Per product or product group
 - Per phase (if necessary)



Golden Batch Reporting – solution steps

1. Asset structure for the production lines
2. Fingerprint per line per product
 - Automatically generated from quality data
 - Manual sanity check
3. Capture all batch runs
4. Score each process variable to its hull
5. Add comments to significant deviations

☐	BP2_prod...	BP2_qual...	Start date	BP2_UTIL	BP2_TEMP	BP2_SPE...	BP2_PRE...
☐	ALPHA	10.6	01/01/2025 01...	98.6	98.7	98.2	97.9
☐	ALPHA	10.6	01/01/2025 02...	98.5	98.7	99.5	97.3
☐	BETA	8.9	01/01/2025 04...	97.4	97.0	95.2	98.3
☐	BETA	10.7	01/01/2025 05...	99.5	98.7	99.5	98.4
☐	BETA	9.5	01/01/2025 06...	98.7	98.8	98.3	98.7
☐	GAMMA	9.5	01/01/2025 08...	99.3	98.8	98.9	98.0
☐	GAMMA	9.5	01/01/2025 09...	99.6	99.1	99.9	98.7
☐	GAMMA	10.8	01/01/2025 10...	99.4	99.2	99.4	98.4
☐	GAMMA	10.3	01/01/2025 12...	98.9	98.9	98.3	98.6
☐	GAMMA	9.1	01/01/2025 13...	99.4	98.9	99.3	98.3
☐	GAMMA	9.1	01/01/2025 14...	98.9	98.7	99.3	98.5
☐	DELTA	10.8	01/01/2025 16...	97.8	96.1	97.0	95.1
☐	KAPPA	10.0	01/01/2025 17...	99.5	98.9	99.2	98.4
☐	KAPPA	10.7	01/01/2025 18...	98.7	98.6	99.5	98.4
☐	KAPPA	10.7	01/01/2025 20...	99.5	99.3	99.3	98.2
☐	KAPPA	10.1	01/01/2025 21...	99.5	98.9	99.6	97.9
☐	ALPHA	10.1	01/01/2025 22...	99.4	98.6	99.7	97.7
☐	ALPHA	10.0	02/01/2025 00...	99.4	98.3	98.9	98.3
☐	ALPHA	9.7	02/01/2025 01...	99.3	98.7	99.5	98.2
☐	ALPHA	10.0	02/01/2025 03...	99.3	98.7	99.2	97.9
☐	BETA	10.9	02/01/2025 04...	98.9	98.4	99.2	98.7
☐	BETA	10.0	02/01/2025 05...	98.6	98.0	98.9	97.3
☐	BETA	9.4	02/01/2025 07...	99.6	98.8	99.6	98.4
☐	GAMMA	10.0	02/01/2025 08...	99.6	99.2	99.8	97.3
☐	GAMMA	7.5	02/01/2025 09...	99.5	99.5	98.9	87.0
☐	GAMMA	7.5	02/01/2025 11...	97.7	99.0	97.2	85.8

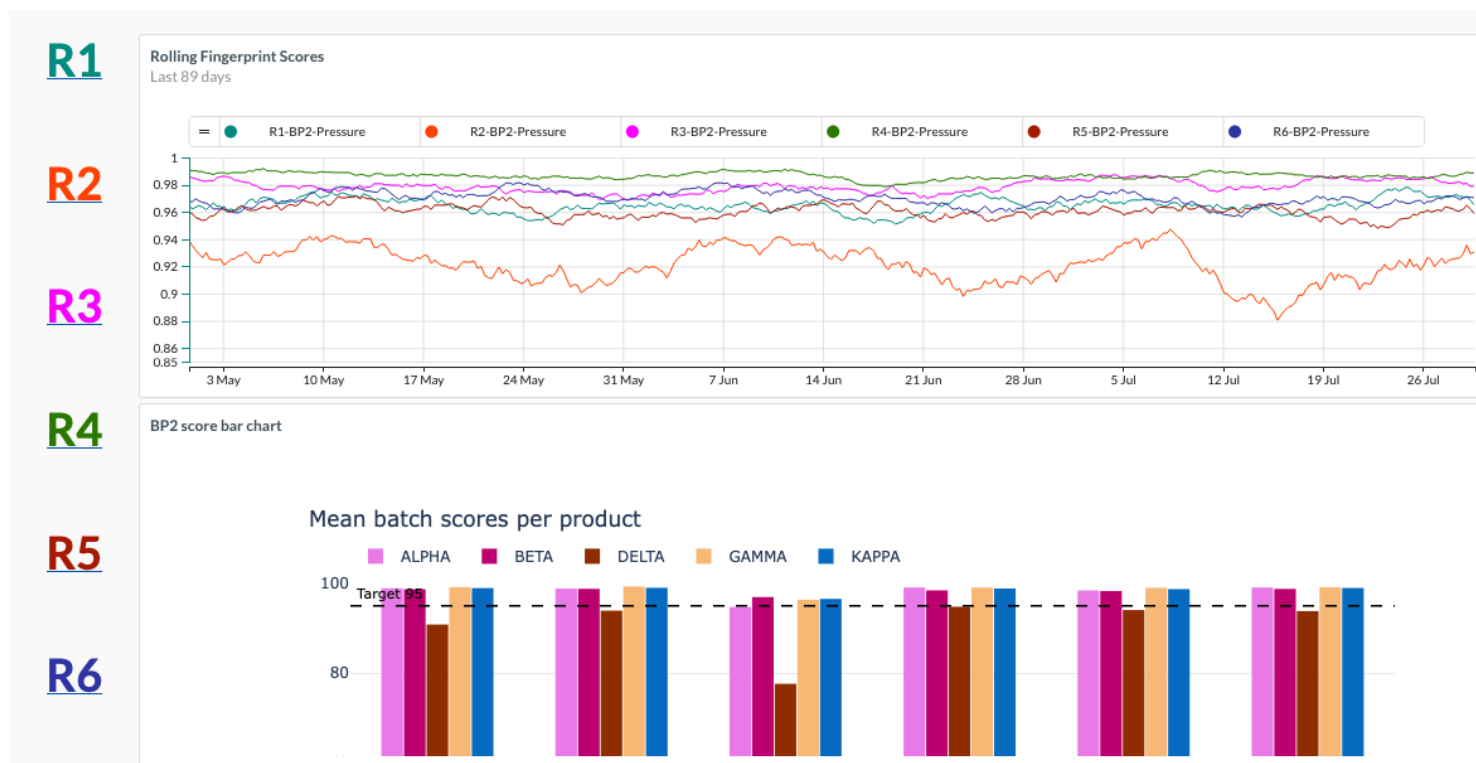
Golden Batch Reporting – solution steps

6. Aggregate to higher level

- Line performance
- Product performance
- ...

7. Overview dashboard

- Should allow drilling down

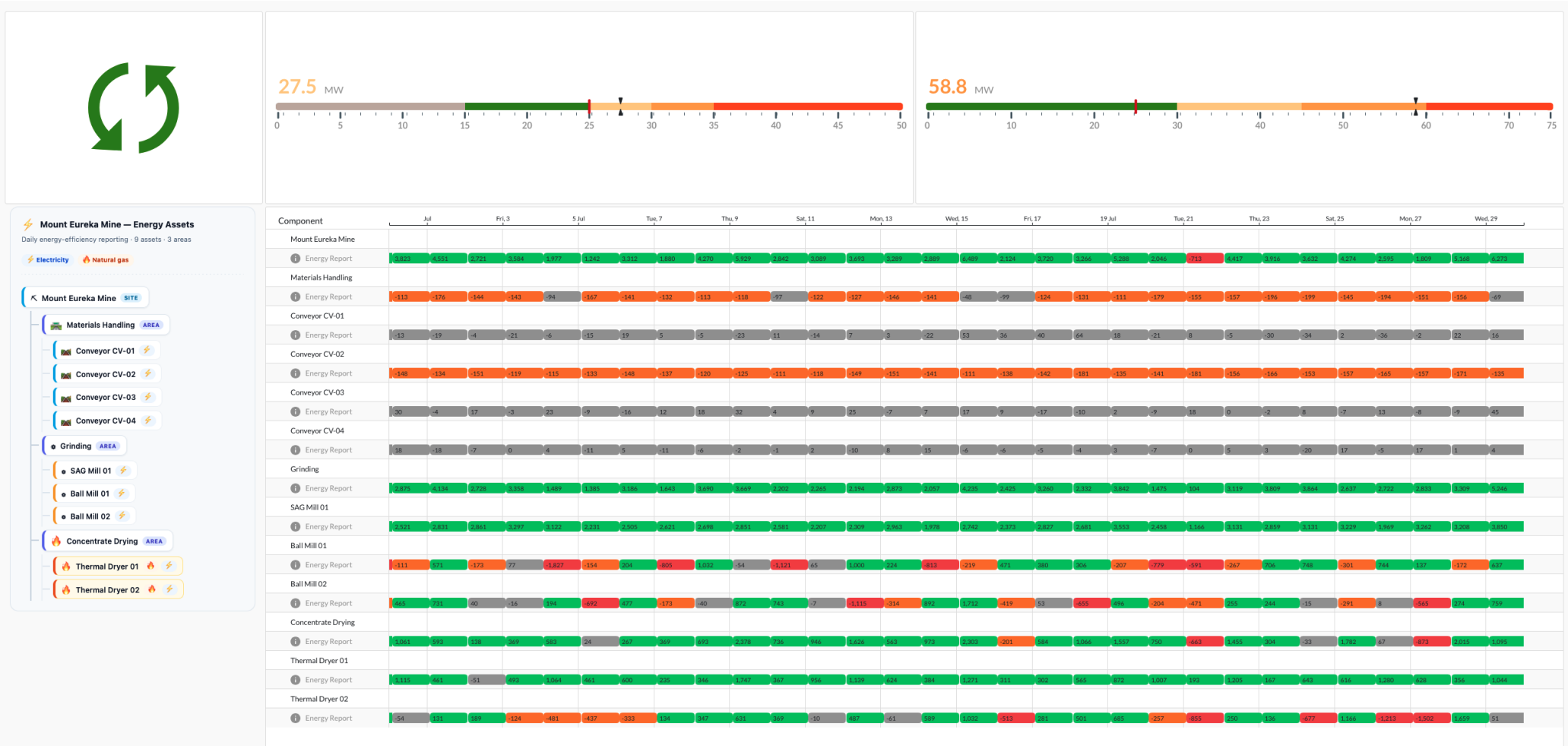


Energy Management

Energy Management – overview

- Build an actionable overview of energy usage efficiency
 - Serves as a starting point for reducing energy waste
 - Go from high level overview to individual assets
- Energy efficiency strongly asset specific
 - Different energy input: electric (HV, MV, LV), natural gas, steam (HP, MP, LP), ...
 - Different outputs
- Standardize to compare and aggregate asset types
 - Set energy efficiency targets
 - Provide a price per kWh for every energy type
 - Every asset will have monetary losses or gains
 - Focus on largest losses

Energy Management - Demo



Next steps

Getting started with solutions

Need a solution built in TrendMiner?

Want to enable your team or yourself to build your own solution in TrendMiner?

Reach out to your Customer Success Manager!

(or to wouter.daniels@trendminer.com)

Learn how to build solutions – TrendLab 2026

Advanced Level Training

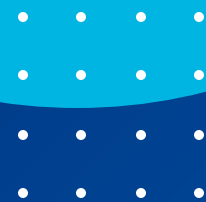
Build your own asset health dashboard

Learn all about tooling, development and deployment of solutions

Eindhoven, NL : Sept 23 & 24

Houston, USA : Oct 7 & 8

<https://community.trendminer.com/p/trendlab>



**Thank you for your
attention**

