TrendMiner
BY SOFTWARE AG

Key Capabilities

Control Business Outcomes & Improve Operational Excellence With Self-service Industrial Analytics

White Paper

Contents

1 Introducing TrendMiner

Process manufacturing companies are continuously striving to optimize overall equipment effectiveness, performance and profitability, all while complying with applicable regulations. One of the best ways to accomplish that, however, is by turning your historical process data into actionable information - and that's where TrendMiner comes in.

TrendMiner is a high-performance self-service analytics platform for time series and context data analytics. With TrendMiner, process engineers and operators can easily search for trends and question their process data directly – without help from a data scientist.

With TrendMiner, process and asset experts can now:

- Solve previously unsolved questions, such as identifying the root causes of performance drops
- Verify hypothesis and prove them to be either true or false so they can be addressed or ruled out in the future
- Find new ways to improve performance because data provides new insights
- Use contextual information from 3rd party business applications to gain more awareness into operational performance
- Use actionable dashboards to monitor operational performance in real-time.

Key characteristics

VALUE OUT OF THE BOX

The out-of-the-box platform connects with your existing enterprise data infrastructure, enabling you to start analyzing your time series data almost instantly. Setup and integration is done through configuration rather than customization.

ROBUST, EASY TO USE

TrendMiner quickly searches for events of interest and correlations through large datasets containing thousands of tags. The user interface is designed to be as intuitive and self-service as possible, much like using Google.

FOCUS ON PROCESS EXPERTS

TrendMiner is built to cover the needs of the operational experts to improve production performance. They need fast and flexible solutions to provide answers right when the question is asked without data science expertise.

PLUG 'N PLAY

TrendMiner can be instantly downloaded and deployed and used immediately after installation. It fits seamlessly into your current IT landscape on top of a variety of historians, at a single site or across the globe.

ACCESS ANYWHERE

TrendMiner's user interface has been developed with modern design principles fully tailored for the process expert. We avoid a clutter of features within our state of the art HTML5 web interface, avoiding the need to install anything on desktops or laptops. Because of this, users from all over the word can benefit from each other's expertise.

HIGHLY SCALABLE

TrendMiner supports single node architectures ranging from a couple thousand tags to scaled-out architectures of 50M tags or more. It can be used to support single sites or globally operating business units with consolidation of dispersed historians, helping to optimize fleet performance.

FLEXIBLE DEPLOYMENT

We support deployment on premises in a customer management cloud environment (e.g. Azure) or as a full SaaS solution. Once the TrendMiner application is connected to your historian server(s), process engineers and operators can start using the product and collaborate in a globally-mixed IT environment.

INTEGRATE TO INNOVATE

Our integrations go both ways. You can unlock data silos within the platform and use the results in other applications via import-export techniques, our APIs, web hooks for workflow integration or webMethods for configuring integration with 3rd party business applications.

aspentech · OSIsoft. · YOKOGAWA · GE Digital · Honeywell · Wonderware by Schneider Electric

2 Start Your Analytics Journey

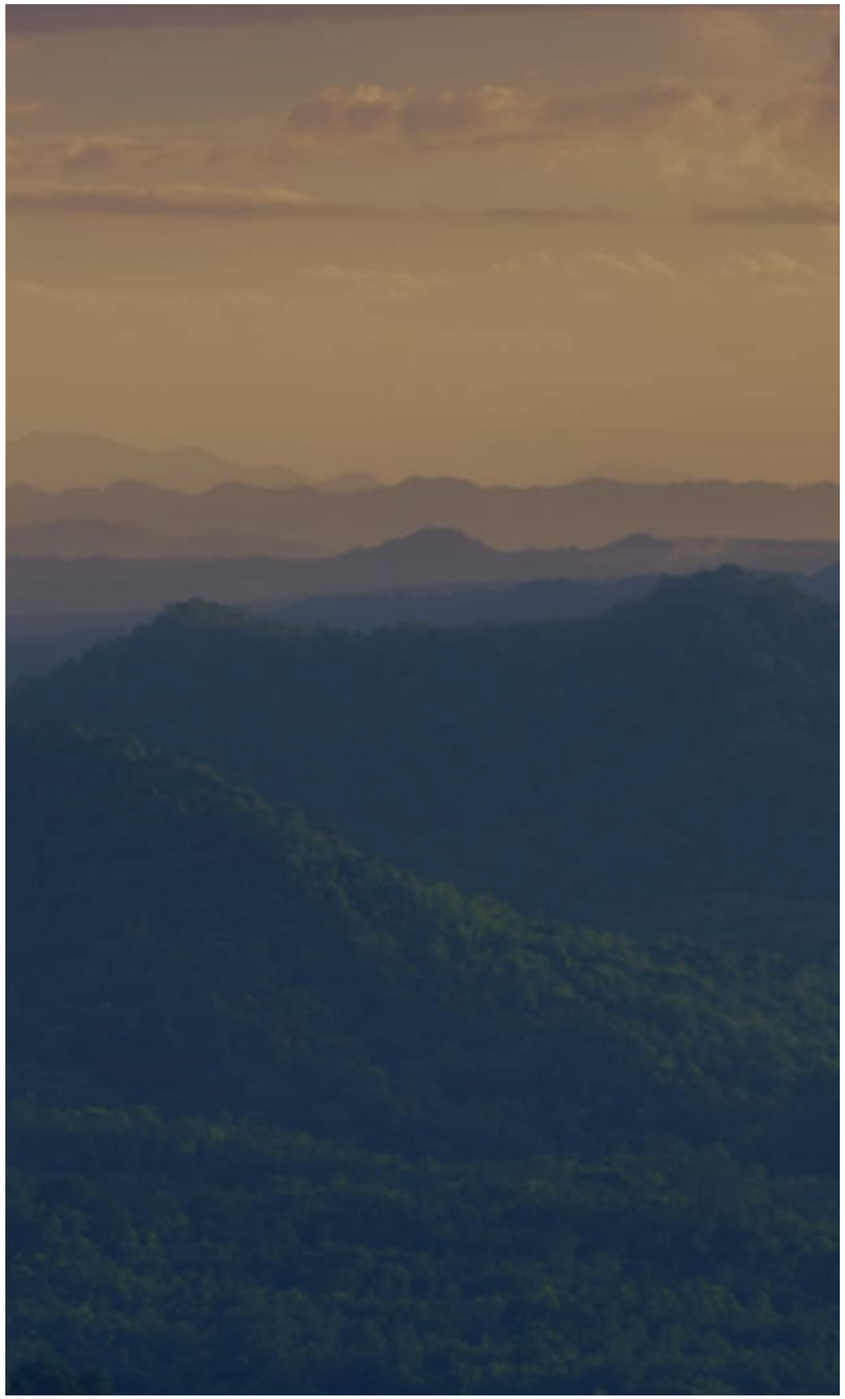
Process manufacturing companies have been gathering sensor generated time series data for many years. Data analytics is not new, but the way it can be done is.

Through pattern recognition and an easy user interface, every process expert can use data to make analytics-driven decisions and help control business outcomes. Process engineers without a data science background can easily analyze their data to answer questions such as:

- How is our production process performing?
- How often has this problem occurred?
- What is the root cause of this issue?
- Can I monitor deviations of good behavior?
- What is likely to happen next?
- Can I predict when maintenance is needed?

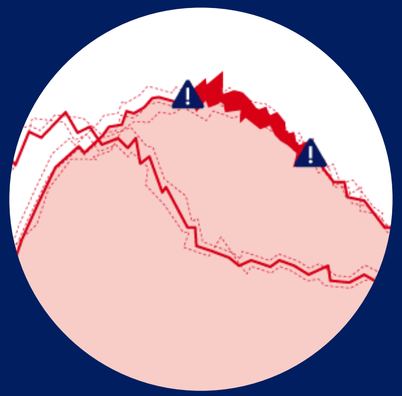
Additionally, contextual information residing in various sources (maintenance data, operator logs, etc.) can be used to enrich the time series data and to help you better understand operational performances . The contextual information can be analyzed separately to get deeper insights into your processes and assets.

Lastly, you can create analytics-driven dashboards with live data so that each stakeholder from “control room to board room” can control business outcomes.



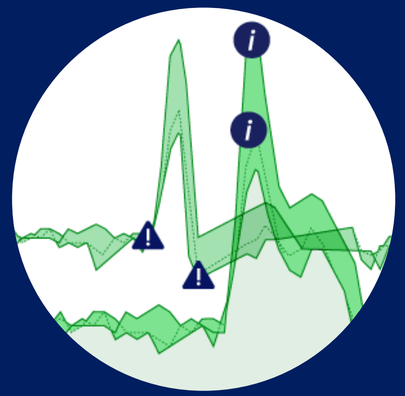
What you can do with Trendminer

Analyze



to find root causes fast
p.7

Monitor

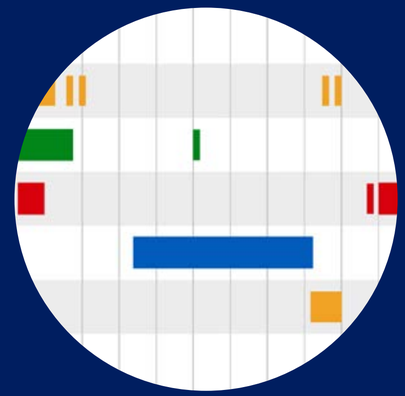


to get early warnings
p.12

Predict

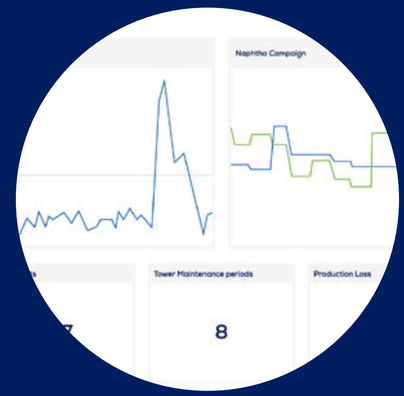
to understand what is likely to happen next
p.15

Contextualize

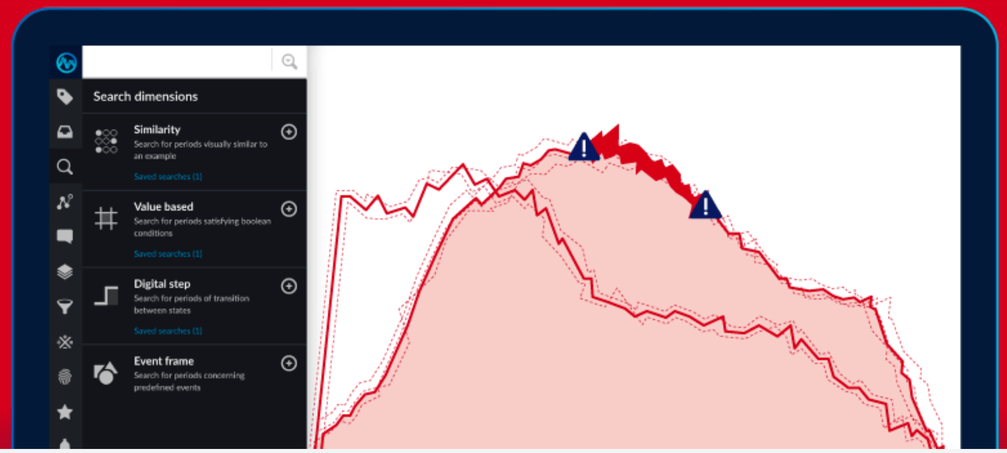


to continuously improve operational performance
p.18

Visualize



for operational story telling
p.22



3 Analyze
Find root causes, fast

When there is a process problem, you need answers fast. With a high-speed search engine, advanced filter options and patented pattern recognition technology, you get data-driven insights on process and asset performance of your production processes. Our self-service analytics platform is built to be fast and interactive on global scale.

Advanced search algorithms, combined with pattern recognition, proactively provide recommendations to uncover previously hidden correlations and identify causes of process issues. Speed up your root cause analysis and identify new areas for optimization. **With direct access to analytics insights, actionable information becomes available at all levels of the plant and process experts can help improve across all stages of the production process.**

Jan Meireleire
Engineering Manager at Ashland

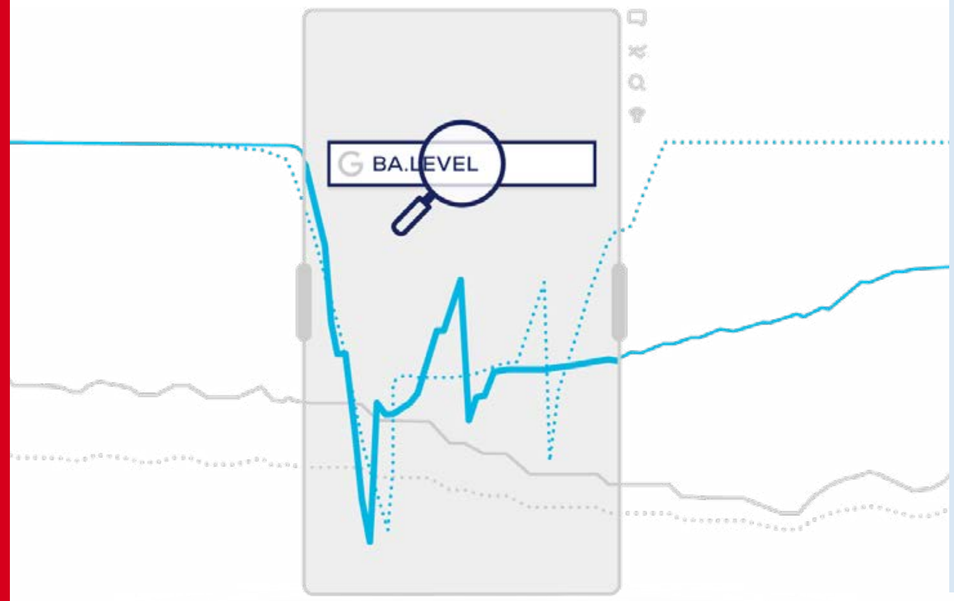
Analyzing influence factors on product quality and resulting actions finally increased the on-target production of GMP products at Ashland Doel from 70% to over 95%, an achievement for which the value is even clear without translating it into euros.

"We wouldn't be where we are today in overachieving our goals without TrendMiner."

Descriptive analytics: What has happened?

TrendMiner starts with a state-of-the-art trend viewer that provides process experts a graphical representation of the vast amount of historical time-series data captured in one or more historians.

A graphical interaction with the process data exceeds long listings of numbers in a spreadsheet. With the advanced filtering capabilities certain periods can be excluded or included to assess process performance and find specific issues.



GOOGLE LIKE SEARCH

Click and search for tags just like you would using a Google. While typing, TrendMiner auto fills best matching terms to speed up your analysis work. You can also leverage your asset framework structure to retrieve tags of interest in a hierarchical way. The time series data of the tag of interest is shown for visual inspection. Multiple tags can be visualized at the same time to see graphical correlations.

DATA VISUALIZATION MODES

For analyzing your time series data, TrendMiner offers various visualization modes. Besides the common time trend, you can also show the time series data of multiple tags in a stacked mode, optionally in groups per “swim lane”. For multi-variate analysis, TrendMiner offers the multi-scatter plot showing tag histograms and multiple histograms of each pair of the selected tags.

FAST FILTERING

TrendMiner makes it easy to exclude irrelevant time periods from your analysis. Time based filters are static filters applied to certain time periods. They can be created manually or on top of search results. You can also create criteria-based filters, which are dynamic filters based on certain criteria. The criteria-based filters are automatically applied to both historical and new/incoming data.

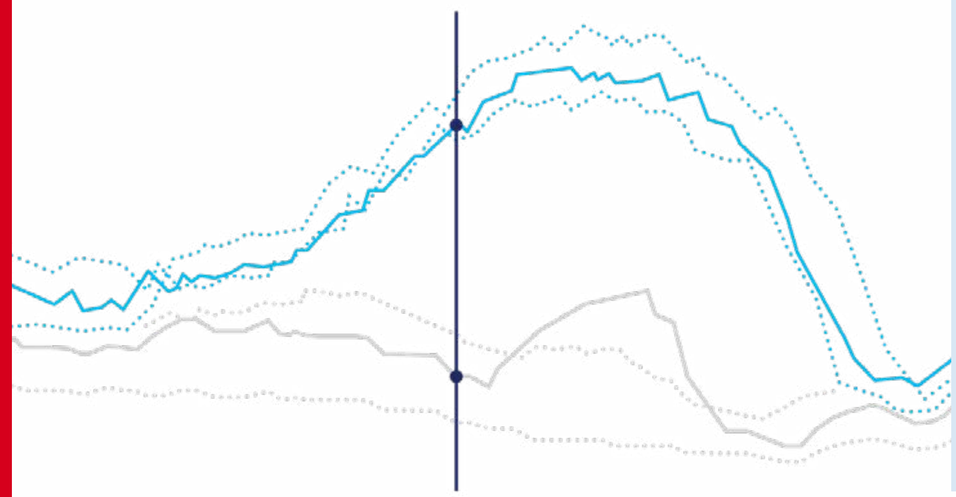
TAG BUILDER

TrendMiner allows you to create time series data through use of formulas on and aggregations of the time series patterns of tags. The results of these tags can be visualized just like any other tag. The tag builder can also be used for importing time-series data via a CSV file.

Discovery analytics: Did it happen before?

When incidents happen, the first question process experts ask is if it happened before. TrendMiner helps you answer this question by identifying similar historical behavior through patented pattern recognition. Pattern based search of time-series data tells you when similar behavior happened, how often and in what context.

Besides pattern based search, TrendMiner also provides value based search and the use of criteria and formulas to find periods of interest and matching operational process or asset behavior. This helps you answer the day-to-day search questions, related to oscillations, steps, boolean conditions, slopes, etc.



SIMILARITY SEARCH AND OTHER ADVANCED SEARCH OPTIONS

Similarity search enables you to find similar patterns in the past using patented pattern recognition technology. The most important part of the pattern can be emphasized with a graphical weighting factor to improve accuracy of the search results. Other search options you can use in TrendMiner are:

Digital Step
Is used for a switch or transition in process performance, for example in case of a grade change.

Value-based search
Certain criteria, numerical values or limits can be used to find anomalies in the time series data.

Area Search
By combining two tags, new pattern based insights can be created to detect anomalies to best operating zones.

Context Item Search
Automatically, manually or externally created context items can be used to search for similar annotations in the past.

Actions on Search Results

Sorting · Context · Exporting · Filters · Layers · Calculations

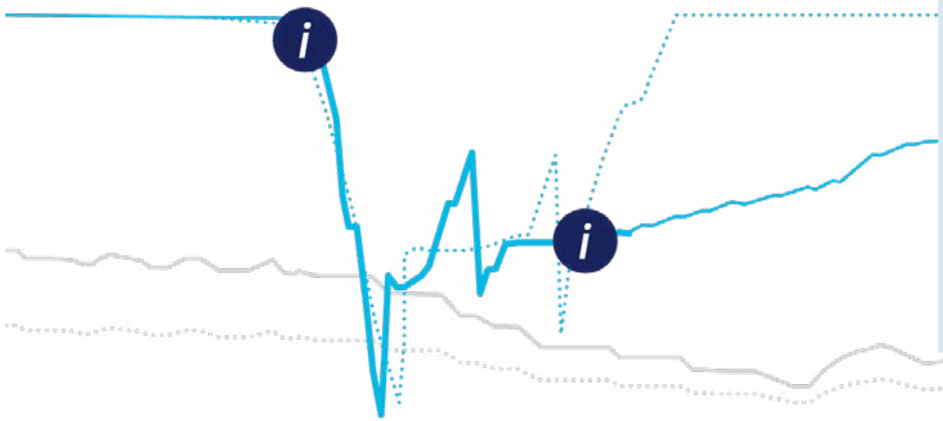
CROSS ASSET SEARCH

TrendMiner's Cross Asset Search allows you to search through similar assets based on pre-defined templates in your Asset Framework. Easily analyze data from parallel reactors or production lines, multiple pumps or heat exchangers of the same type and compare the data across your production plant or even multiple plants worldwide.

Diagnostic analytics: What was the root cause?

A range of unique features helps you find the root cause of deviating behaviors to help avoid them in the future. Easily compare good and bad stretches of data, or use our interactive influence factor to find hidden root causes.

Whether you are analyzing batch or continuous processes, TrendMiner helps you generate explanations and resolve anomalies fast.



LAYER COMPARE

TrendMiner instantly finds similar looking patterns over multiple years of process behavior. Periods of time can be easily overlaid to compare patterns and identify differences, and periods with similar patterns can be overlaid, enabling a better understanding of the historical performance of the process.

INFLUENCE FACTORS & TIME SHIFT

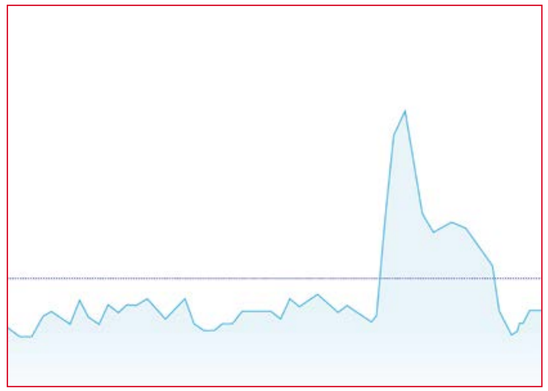
Influence factors help discover the root cause of process anomalies. In some cases, the influencing factor may lay hours upstream in the process. With the use of “automatic shift detection”, the most likely influence factor can be found – even if it took place long before the tag was impacted.

COMPARE TABLE

Compare layers (time periods) for discovering the values of tags that differ significantly per time period. It helps to compare statistical data distributions and evolutions to find performance anomalies. The value of each tag is shown per layer as columns in a resulting table, with the rows showing the values per tag in comparison to the reference layer.

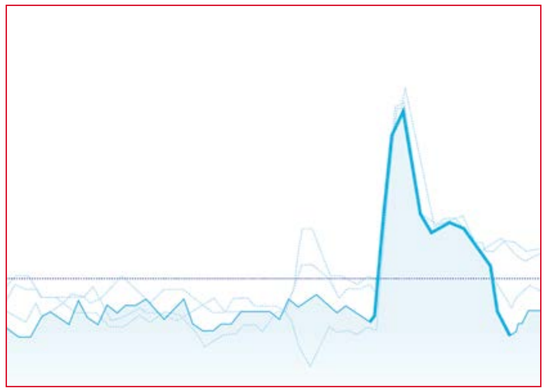
RECOMMENDATION ENGINE

The recommendation engine gives suggestions for correlations (and fingerprint deviations) based on selected time frame, tags and layers. It provides an almost instant analysis across all indexed tags, combining information from multiple similar situations to avoid spurious correlations. It helps detect early indicators of deviating behavior using automatic time shifts.



What has happened?

An operator may have reported a spike in the temperature in the night shift. The engineer can easily search for the tag of interest and use a visual search to find the reported spike. Another option is to use value-based search to find the situation where the temperature is above normal operation.



Did it happen before?

To figure out if the reported issue is a one-off or has happened before, the spike in the pattern can be given a weighing factor to make that part more important. With use of the similarity search, TrendMiner finds instantly all the periods with a similar pattern, sorted in percentage of matching pattern.

What was the root cause?

Now that it's clear the temperature spiked more than once, we want to know what caused it. TrendMiner's influence factors gives a table with likely root causes. The recommendation engine can also be used to find possible root causes. In both cases he expertise of the process engineer is needed to appoint the actual root cause and come up with a possible mitigation plan.

Customer Case

RCA of Quality swings

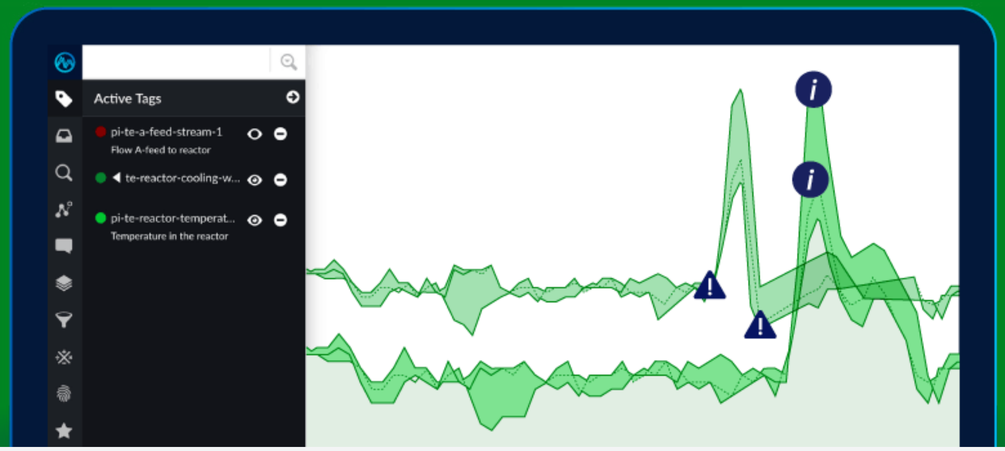
The continuous process in the column for producing acetone cyanohydrin was difficult to control and tended to swing between operating points. Trimming the control based on lab-analysis led to loss of energy and production.

The customer searched for months to get a good data model, using different tools and models, knowing there should be a correlation. TrendMiner's global search resulted in a set of influencing parameters. The multivariate model was created and validated in TrendMiner within hours.

An improvement of 1% yield increase and a reduction of energy consumption for the purification cycle resulted in savings up to € 2 million per year.

Practical Use Case

Root cause analysis (RCA) of a temperature spike



4 Monitor

Data never sleeps, neither does our software

Events that occur once will likely occur again. TrendMiner helps to prevent repeating production issues by guarding your live data like a watchdog. You can easily create your golden fingerprints based on historical data. The software monitors your processes 24/7 and sends notifications when patterns of interest are detected. Messages can be customized to prescribe the best response given the circumstances, allowing to take appropriate action before things go wrong.

With the ability to automatically annotate and label events, lessons from the past can be captured and shared. **Abnormal situations can be avoided and good behavior monitored, all based on expert knowledge and machine learning.**

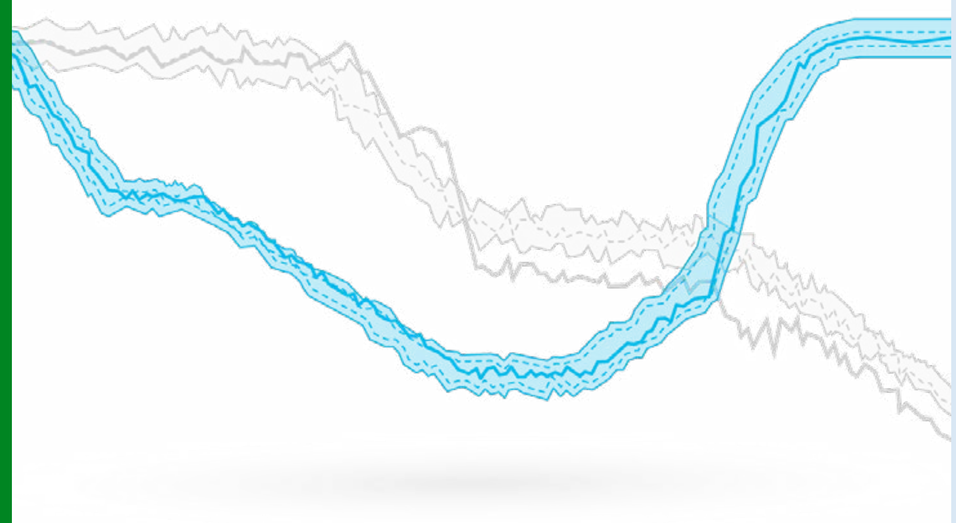
Michael Fry
President of Deepwater Subsea

With TrendMiner's self-service predictive analytics platform we can now monitor our customers equipment with a data analytics engine that allows us to determine the potential cause of a failure as it happens in real time.

"We no longer need a data scientist to look over the systems... We just let TrendMiner do it."

Guard Operational Behavior

TrendMiner helps prevent repeating production issues by guarding your live data like a watchdog. It monitors your processes 24/7 and sends you automatic notifications in the event of deviations, based on predefined fingerprints, process conditions or operating zones. These early warnings on process behavior help to improve plant output with optimal energy consumption and reduction of waste, while complying with safety, health and environmental regulations.



FINGERPRINTING

The search capabilities of TrendMiner can be used to find and overlay the optimal dynamic behavior, such as your best batches, transitions, start-ups, etc. With a click of a button, multiple periods representing the best performance can be combined into an envelope, or fingerprint. The fingerprint can be used for process monitoring purposes.

ALERTS & NOTIFICATIONS

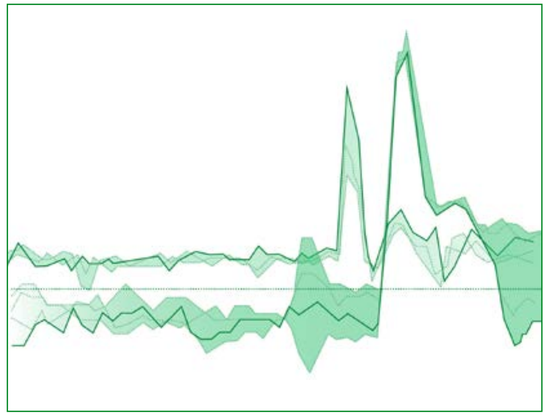
The fingerprints can be used to monitor your production process and send alerts or automatic notifications when patterns of interest are detected. We support various notification mechanisms, including an embedded inbox and email alerts, that can include suggested course of action. The notification can also trigger a Webhook, to fire a workflow in another business application, such as your maintenance management system.

BEST OPERATING ZONE

Besides fingerprints, scatter plot based “best operating zones” can be created with TrendMiner. The drawn best operating zone can be used in the same way as a fingerprint and deviations can be used for alarms and notifications. Best operating zone monitoring reduces unnecessary equipment stress, increases asset reliability and extends equipment lifetime.

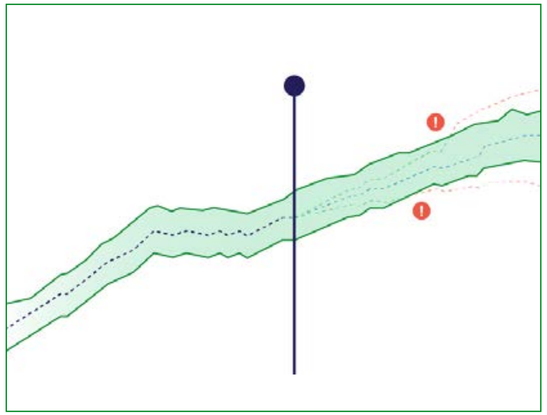
CAPTURE EVENTS OF INTEREST

Specific occurrences can be captured as events and labeled automatically, based on monitoring alerts for saved search patterns, fingerprints or rules. The captured events help to monitor how often these events happen or even to prevent these events and control overall production performance.



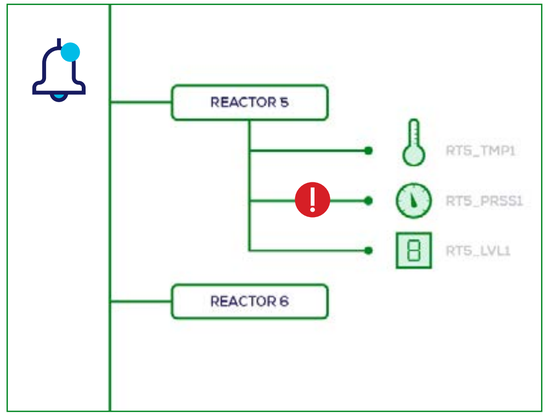
Fingerprint good operational behavior

Multiple periods of best process performance can be overlaid in TrendMiner and combined into a fingerprint. This can be done for multiple tags and various production situations, such as the startup of a continuous process or controlling the quality of a production batch.



Deploy early warning and create annotations

The fingerprints can be used for monitoring deviations or getting assurance the process was within spec. For both situations TrendMiner can capture the event and label them automatically. Based on found root causes (upstream) and use of the fingerprints, early warnings can be used to improve the control over the production process.



Warn operator with prescription

Early warnings and soft sensors can be used to capture events for future analysis and knowledge capturing, but also to warn operators. With previously analyzed situations, the captured events can trigger a notification to the control room, including a suggested cause of action to produce to specifications.

Customer Case

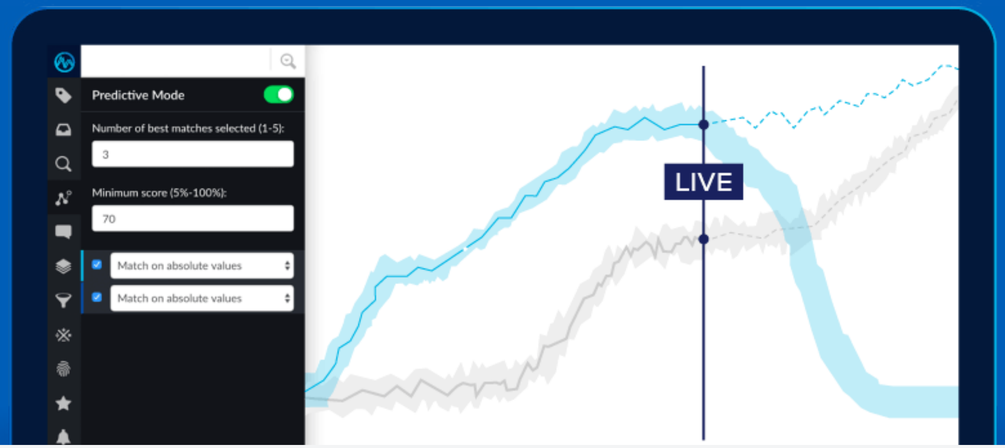
Reduce energy consumption for demineralizing water

In a reverse osmosis plant two redundant installations work next to each other. Whenever a flow of over 300 m3/h is needed (especially at low temperatures) both installations are running.

A dependency between the flow rate and the energy consumption was proven in TrendMiner with use of digital tags, layer compare, scatter plots and fingerprints.

As a result, the customer was able to achieve their goal of reducing their energy consumption. By optimizing the number of reverse osmosis units for a given flow, the team will save energy, reduce fines, and save costs.

Practical Use Case
Early warnings for operators



5 Predict
Anticipate future performance

Predictive analytics has traditionally been about defining the scope of prediction, collecting the data, developing and testing a data model, validating the outcomes and deploying the predictive model to the organization. **With TrendMiner almost all of these steps can be skipped.**

Predicting process behavior with TrendMiner does not require a data scientist. Your process and asset engineers can immediately apply their expertise to solve potential production issues before they occur. Process evolution can be used for early warnings, but can also be extended to the level of predictive maintenance. With the captured events and prescriptions from the engineers, the organization can receive appropriate instructions on what needs to be done or when to schedule the work.

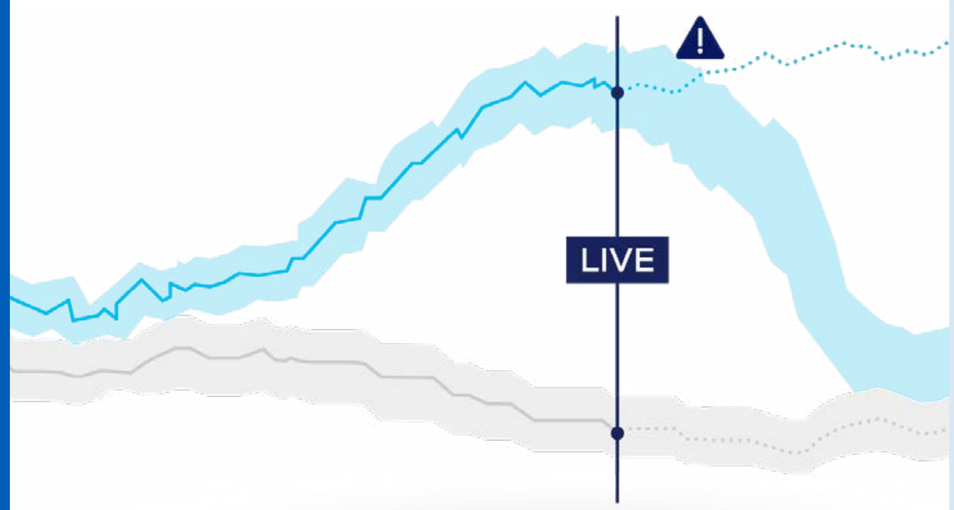
Gerd Decramer
Engineer at Sitech for OCI Nitrogen

"The data-driven discovery, monitoring and predictive capabilities of TrendMiner were a game changer in our constant quest for operational excellence."

Predictive analytics

The goal of predictive maintenance is to be able to perform maintenance at a time when it is not only the most cost-effective, but also when it will have the least impact on operations, and that requires a good understanding of the process performance.

Process and asset engineers are in the best position to analyze good and bad performance. This forms the basis to monitor performance, safeguard best operating zones and predict when maintenance is best scheduled.



MODEL-FREE PREDICTIVE MODE

Our interactive and model-free predictive mode is based on patent-pending technology and works in a fundamentally different way than classical model-based predictive technologies. The software calculates possible trajectories of the process and predicts future evolutions of key variables and process behaviors before they happen.

EARLY WARNINGS

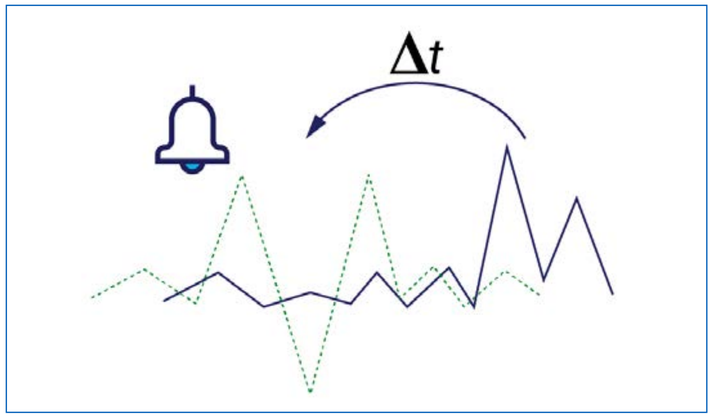
Users are presented with early indicators for anomalies of interest. These early warnings help to alert key stakeholders, either proactively or passively. Warning messages can include instructions about what to do given the situation predicted. This way the process can be proactively adjusted to avoid waste and ensure product quality.

INTERACTIVE SOFT SENSOR DESIGN

TrendMiner supports creating and deploying soft sensors using an interactive and step-by-step approach with access to all process data. Process and asset experts can build predictors for future performance without the need for a data science project.

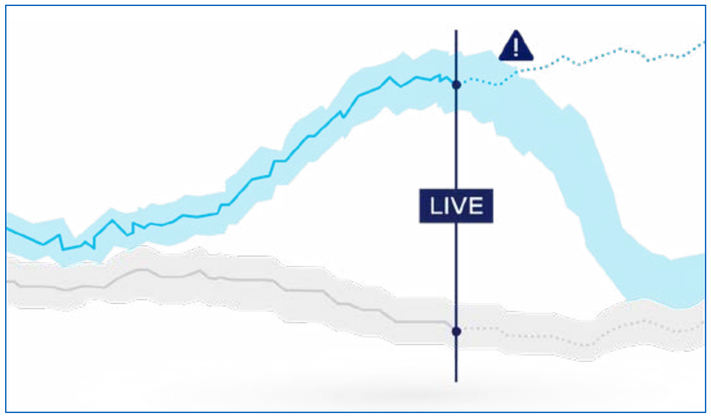
PREDICTIVE MAINTENANCE

Traditional predictive maintenance with use of data models is often time consuming and isolated from the subject matter experts. Therefore, it's just feasible for the most critical assets. By using the information hidden in time-series data every asset can be assessed for performance and predictive maintenance.



Event Based Prediction and logging

Besides calculating the possible trajectories of the process and predict future evolutions of key variables, TrendMiner can also be used to monitor degrading asset performance over time. For example in case of heat exchanger fouling. This is called event based prediction with use of sensor generated data.



Inform maintenance to plan work orders

When events are captured and stored in the database a notification can be send to the maintenance engineer. Optionally a workflow trigger can be send to the maintenance application used, for example SAP PM. With use of a web hook, the workflow for creating a maintenance workflow in SAP can be triggered with a first to-do item for the job planner.

Customer Case

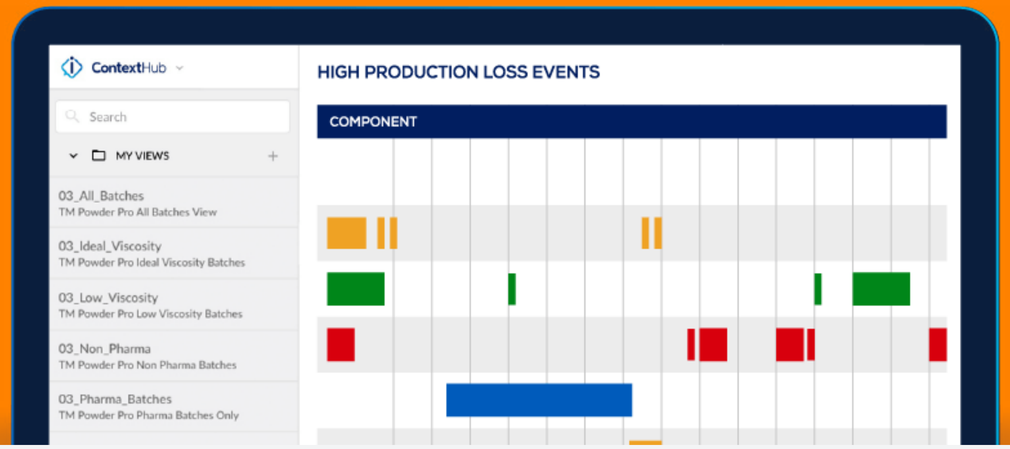
Predictive maintenance of a stripper in an alkylation unit

Within a continuous refinery process a catalyst is drained in a drum based on the level in a column. The time until it's full is dependent on the acid flow to the stripper column. Being able to predict when the drum is full would make it easier to plan maintenance.

By using TrendMiner's predictive mode, a rough prediction can be made of when the regeneration stripper drain drum will be full and maintenance is required. This saves maintenance costs as well as increases the reliability of the production process.

Practical Use Case

Predictive maintenance based on process data



6 Contextualize

Make better decisions, faster

All kinds of events may impact operational performance. Capturing and combining critical events with time series analytics will shed new light on your production process. This context helps you shift performance to the next gear. Illuminate your time-series data with context, to get a clear view on operational behavior.

Contextual information may reside in various data silos, such as your LIMS, MMS or OEE system. **Captured contextual information can be leveraged for data driven decisions in the control room and can be the starting point for continuously improving operational excellence through self-service analytics.**

Tim Timmermans
2nd Utilities Manager at Covestro

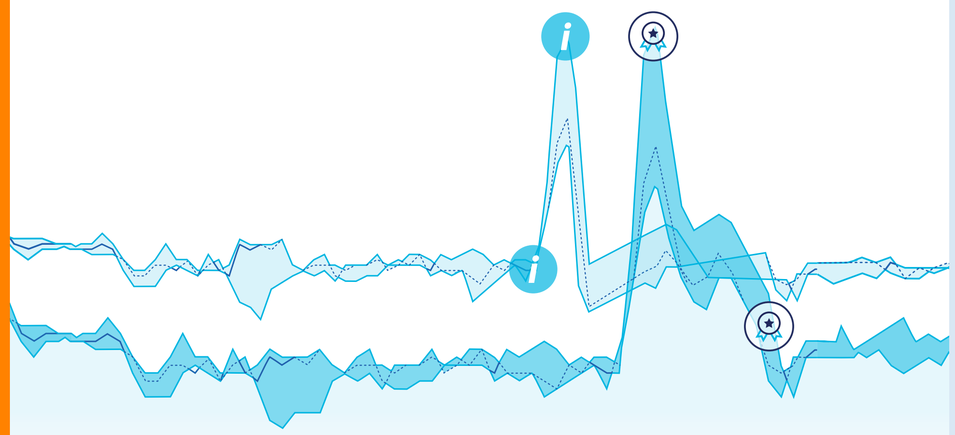
TrendMiner enables us to bring process information within our data by annotation. I believe that if we can maximize knowledge transfer, this brings us to innovation.

"Process data tells stories, all you need to do is capture them."

Smarter analytics to operate in the fast lane

Being able to search for context items gives users the power to actively utilize gathered context within the time-series data analysis itself.

Through saved views of contextual data users can visualize, filter or overlay time periods in the trend views. With this, context items become a rapid starting point for trend analysis, effectively speeding up root cause analysis and, if necessary, new fingerprints and monitors can be created for sending notifications to the control room who can then take appropriate action to ensure production to specification.



CAPTURE EVENTS

With use of fingerprints and monitors context items can be automatically captured, but events can also be entered manually. All context items help to speed up the search and filter actions in time-series trend data. The context items can be classified by type and each can have specific notifications for taking appropriate action.

GANTT VIEW OF CONTEXT

All contextual information has a start and end time which is used to represent the events in a sequence diagram or Gantt chart. Per asset, all related tags are grouped and vertically listed, while for each tag all context types are represented in a time-series fashion. This view gives a different starting point for operational performance analysis and provides new insights.

COMMENTING & COLLABORATION

Context items can have many properties, which can be viewed by opening the item. In the context item panel in the screen users can also add comments to start a discussion with other specialists in the organization and even attache files for further clarification or issue resolution instruction.

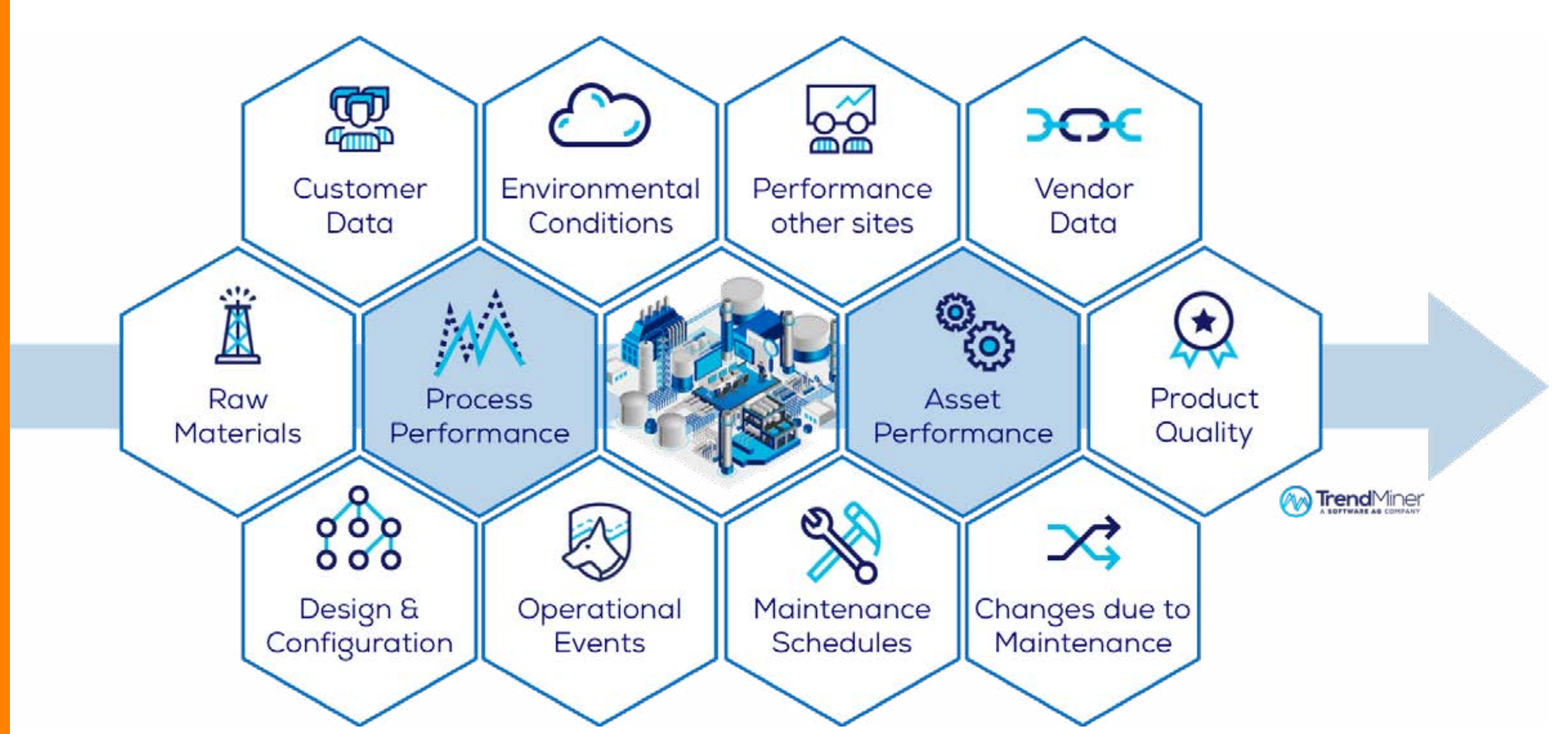
LIVE EVENT UPDATES

Through live monitoring of process performance, events will be generated automatically. The new events can directly be shown in the Gantt view or event listing tables. You can use this to have an operational view of the events happening with early warnings coming in near real-time.

Unlock data silos

As the digitization of organizations continues, more business-critical information sources are available but often remain in silos. TrendMiner's ContextHub brings all this information together in its self-service analytics platform, enabling true data-driven decisions for improving overall profitability.

Engineers can see which plant assets experience the most downtime by easily gathering available data and analyzing the worst performer, allowing decisions to be based on data and reducing the reliance on a best guess.

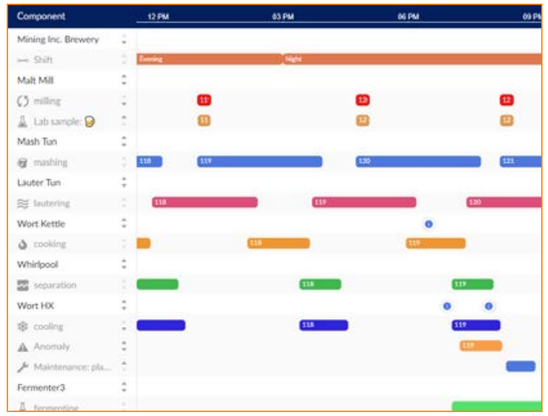


INTEGRATE TO INNOVATE

Contextual information may reside in many data sources. We natively integrate bidirectional with OSIsoft PI Event Frames. For other business applications like SAP for Plant Maintenance, Lab Information systems, OEE, batch, etc. systems we can use our APIs to integrate or Software AG's webMethods.io. Though web hooks the workflows across applications can be triggered.

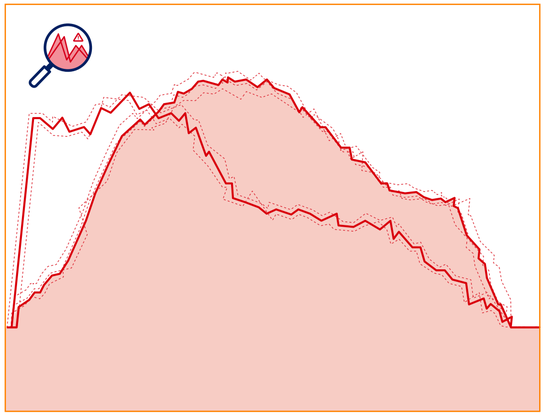
CONTEXT BY ASSET STRUCTURE

The manually created or imported asset structure (from OSIsoft AF, or other systems) can be used to get a clear understanding of the asset performance. With cross asset trend analysis and the context across business applications, deeper asset performance and comparison will help reduce maintenance costs and improve asset reliability.



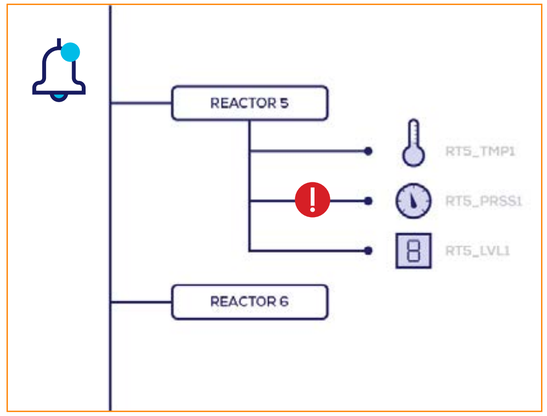
Bring all operational data together

Contextual process performance information may result from events captured through TrendMiner fingerprints, manual entry of events, or data residing in other 3rd party business applications. Using the asset structure in combination with all this data gives a new view on your operational performance. Now, the events can be used to start analyzing operational performance.



Analyze bad actors (quality, asset health, etc.)

Some event can trigger a notification, others are not severe enough but the event is logged in the system anyway. When the smaller events are occurring more frequent it may be the starting point for deeper analysis. Events with additional comments from controllers ending up in the in-box may also give cause for deeper analysis of the situation. Optionally assigned to a specialist on a remote site.



Optimize monitors & control the process

After analyzing the operational performance and finding root causes for the behavior, the best performance can be turned into a fingerprint. Once the process has been run again, the logging can be analyzed to see if the performance has become better or further investigation is needed. This helps to continuously improve performance with use of contextual operational data.

Customer Case

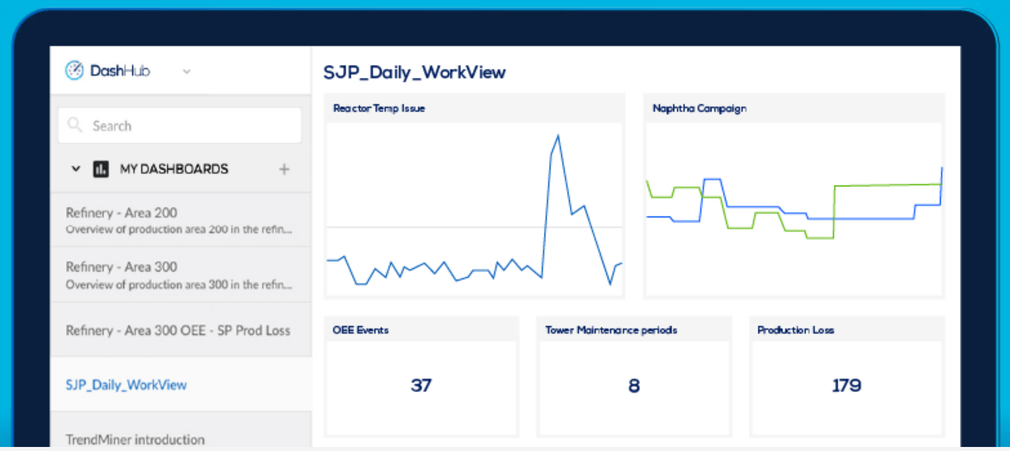
Brewery controlling stable beer bitterness

The operational performance of each part of the production line can be shown in a Gantt view based on the asset breakdown structure. This view can be extend with data from external systems, such as the lab data. The IBU value for bear bitterness is tied to the batch and through TrendMiner the engineers can immediately select the batch with an extra high bitterness value. Switching over to the trend data of the specific batch allows deeper analysis of the sensor generated time-series data.

After finding the root cause of the high bitterness of the specific batch, a monitor and early warning can be created, for notifying the control room when a similar situation occurs. The events will be captured again and can be used for shift meetings.

Practical Use Case

Create and use context to accelerate performance



7 Visualize
Analytics-driven Storytelling

Monitoring performance in the control room doesn't tell the full story. **Having an analytics-driven visualization of your operational KPIs helps you make educated decisions.**

Each stakeholder can use personal dashboards using specific trend or context views as KPIs and see which parts of the process requires extra attention or further analysis. They can be shared across the company and used to directly start investigating process anomalies, production losses or equipment inefficiencies, either via the context item listings or the dynamic trend view.

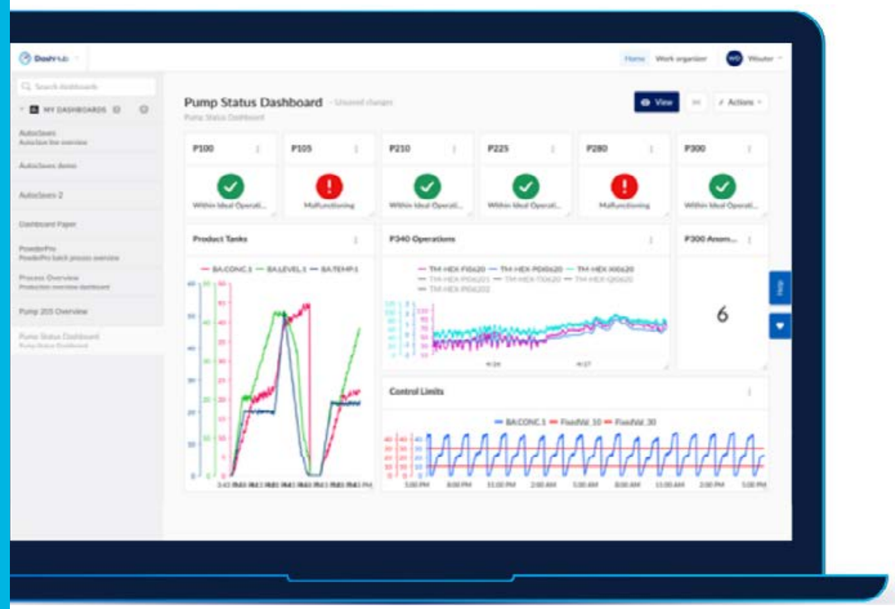
Bruno Steenssens
Operations Director at Eval Kuraray

"TrendMiner helps us to quickly collect the data we need to optimize our production process, with regard to cost, safety, quality and production volume."

Create your own production cockpit

Each stakeholder from "control room to boardroom" can have their own actionable Production Cockpit complete with dashboard, analytics suite and agile communications facilities. They can create and share a complete and live overview of the statuses and performances of their production process.

With TrendMiner's early warning capabilities, the Production Cockpit provides operators with the opportunity to act proactively and optimize operational performance before issues arise.



PERSONALIZED OPERATIONAL DASHBOARDS

Each operational stakeholder is interested in a different part of the production process and would benefit from personal dashboards to monitor performances. Trend views or context item listings created by engineers can be added so that everyone is empowered with actionable analytics-driven information, from the shop floor to boardroom.

ANALYTICS-DRIVEN DECISION MAKING

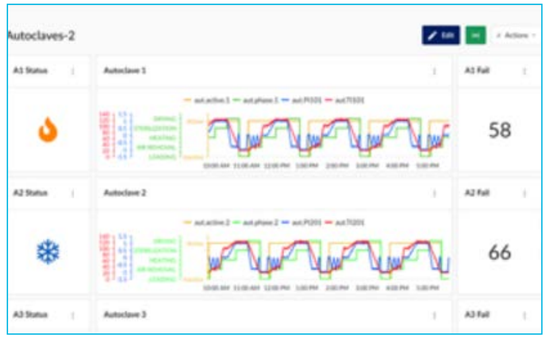
Today, business applications are converting data into actionable information. With many systems in place it becomes hard to know which information to focus on. With TrendMiner you can create dashboards based on advanced analytics work and (3rd party) contextual information. This helps individuals quickly make the right analytics-driven decisions.

DRILL DOWN INTO THE DATA TO INVESTIGATE

Each dashboard allows to drill deeper into the represented information. If the dashboard shows out of spec performance, you can directly start investigating what was different from good performance, finding root causes and take appropriate action. Optionally, you can add comments for others to take action.

SHIFT HANDOVER SUPPORT

TrendMiner dashboards help streamline the flow of information between shifts or from shift teams to engineers through live production views combined with historical performance. You can do this from the remotest factory with expertise located anywhere; increasing global collaboration for making informed decisions.



Process Performance Monitoring

The Production Cockpit helps monitor and analyze the live production process, compares its progress to historical production runs and displays diagnostics, quality status and predictions to production operators or management through individually designed dashboards.

Predictive Maintenance Dashboard

The visualization functionality can be used to create a predictive maintenance dashboard, where the good and bad performances of multiple assets can be shown. In combination with the predictive capabilities of Trendminer, the dashboards can be use to help assess when maintenance is required. It can also show when work orders are planned in the Maintenance Management system.

Shift Handover & Incident reporting

Dashboards help streamline the flow of information between shifts, from shift teams to engineers, and can provide live production views and historical analysis from the remotest factory to expertise located anywhere giving them the power to make informed decisions rapidly. No more guessing how an asset performed and direct access to the underlying data for further inspection of the performance.

Customer Case

Continuously reduce production losses in refinery

Sulfur recovery units are used to capture the sulfur, reduce emissions and ensure regulatory compliance. A monitor in the TrendMiner production cockpit shows that the non-converted Hydrogen Sulfide (H2S) is higher than expected, indicating a decrease in recovery rate. The issues are not immediately clear using the tags around the H2S analyzer. The TrendMiner recommender engine suggests a correlation between the temperature after the first clause unit upstream and the H2S analyzer value. An immediate call in order to bring the process and the recovery back is to check fluctuations in the sulfur flow and steam around the first clause unit and/or increase its inlet temperature.

Practical Use Case

Analytics-driven story-telling

8 Collaboration in a Global Organization

With TrendMiner, users can easily work together to solve process performance issues, share their work and make use of findings at other sites. Search settings and filters can be saved and shared with other process experts. Because it is web-based, users can do analysis anywhere in the world and react on automatically provided notifications.

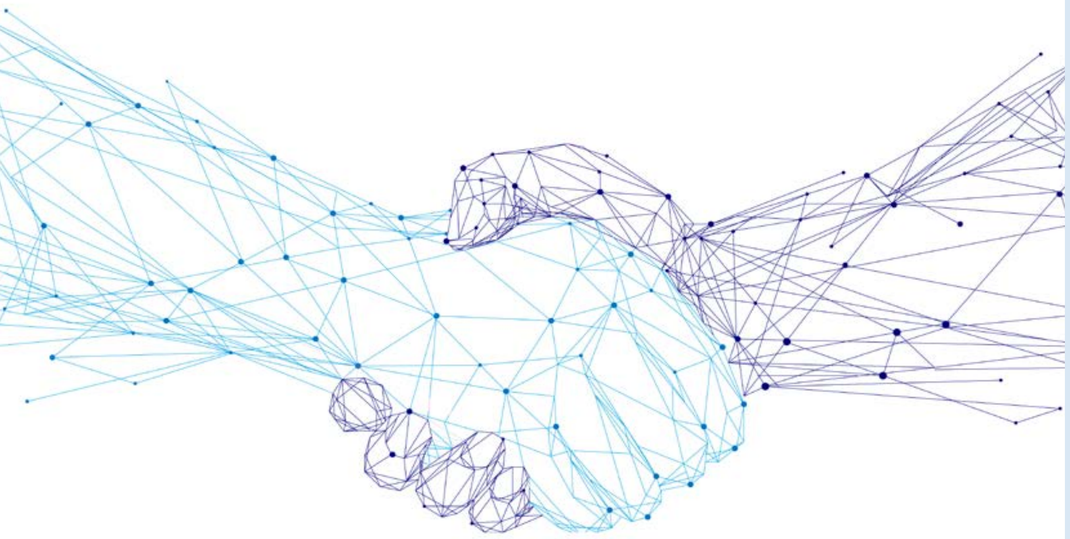
The analytics-driven operational dashboards streamline the flow of information between shifts, from shift teams to engineers and can provide live production views and historical analysis from the remotest factory to experts located anywhere; giving them the power to make informed decisions rapidly.

With commenting, reporting, import and export functionalities, tools to integrate business applications, collaboration across boundaries, across silos and across cultures becomes seamless.

Share & learn to accelerate performance

It's crucial to capture any type of event concerning the production processes, but it is just as critical that each team member is informed of such events in order to help increase performance outcomes, to mitigate the issues and to run an efficient and effective operation.

TrendMiner is designed to keep each team member constantly informed with the latest information concerning the production processes.



WORK ORGANIZATION

With TrendMiner, users can easily work together to solve process performance issues, share their work and make use of findings at other sites. Search settings and filters can be saved and shared with other process experts. Because it is web-based, users can do analysis anywhere in the world and react on automatically provided notifications.

WORK SHARING

Team members can easily collaborate using TrendMiner through various ways such as sharing

- views, dashboards and fingerprints in the work organizer
- comments on context items and request approvals
- approval of context items and add shareable attachments based on access permissions

REPORTING

TrendMiner provides various reporting options: embed a view in a report, print a relevant chart, create reports of notifications captured during production, trigger a shift handover report or download periodic loss accounting reports. All these options can be tailored to your organizational needs.

API'S, WEBHOOKS, IMPORT & EXPORT

TrendMiner is not an endpoint but a building block in your analytics landscape. TrendMiner provides data import and export facilities, APIs and OPC tools, that allow you to integrate with various business applications. In case needed you can import time-series data or after filtering in TrendMiner export to other tools.

About TrendMiner

Make better decisions, faster

SELF-SERVICE SOLUTIONS: BY ENGINEERS, FOR ENGINEERS

TrendMiner is a software company that provides self-service analytics for the process industry. Our software helps users analyze, monitor, predict and contextualize the causes of process performances. We put the power of the data into the hands of the people who understand what it means: the engineers. By giving engineers a self-service analytics solution, we help them contribute to overall plant profitability.

TrendMiner was created by engineers who saw the need for specialized analytics for the process industry. They developed a user-friendly software platform that meets the high demands of time-series industrial analytics - but is designed to be used by non-data scientists.

This software creates next-generation productivity by enabling to make analytics-driven decisions, faster. No more waiting for long implementation projects. No data scientist required to interpret the “black box” of analytics. Just instant, accurate insights and trustworthy answers to your day-to-day questions.

INDUSTRIAL ANALYTICS MADE EASY

We help companies to optimize their production processes, increase plant productivity and improve the effectiveness of the assets. We make it simple by giving actionable insights from analytics to the people who need answers: the engineers and operators in the plant.

With a self-service solution, our customers can find new ways to further optimize their production processes by harnessing the knowledge of their engineers and their historical process data.

We do this by providing analytics software based on advanced search technology built with pattern recognition and machine learning.

Our software easily connects with existing data sources and allows users to gain insights into their process data, monitor production and predict problems early on.

The business value TrendMiner brings

Increase resource efficiency

Self-service analytics will allow engineers to perform their tasks more efficiently, solve more production issues, implement improvements faster, while avoiding manual work or time consuming data exports. Consider the time savings, as well as what the saved time is used for.

Analyze process behavior

Impact analysis and hypothesis testing based on process data will lead to better conclusions and project justifications. Investments that would seem wise could be proven unprofitable based on data analysis. Process improvements that would not be executed previously might actually get implemented.

Find Root Causes Fast

Identifying root causes of process problems and solving them or setting up a monitor to prevent the issue from happening is a typical use case of self-service analytics for which the associated value is easy to calculate based on the impact of the problem.

Drive operational performance

Process and asset experts can look into process optimizations themselves without the need to build data models. Optimizing your production processes will lead to increased revenue, decreased costs or controlled quality to market demand, all directly transferable to monetized value.

Increase company-wide collaboration

Self-service analytics tools enable global collaboration while making problems more insightful, share work and add context to process data. Although the value to be assigned to this is very hard to calculate, it should not be underestimated as it supports a culture of continuous improvement.

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