TrendMiner
A SOFTWARE AG COMPANY

Achieve a 12%+ Batch Cycle Time Reduction for Sugar Crystallization

INDUSTRY
Food & Beverages

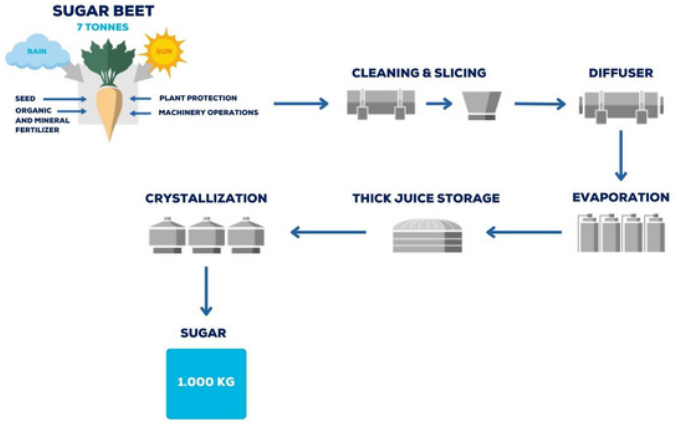
PROCESS TYPE
Batch

TYPE OF ANALYTICS
Diagnostics

KEY OBJECTIVE
Determine the Ideal Batch Cycle Time

BACKGROUND

In the sweet world of sugar production, the heart of the operation beats within the crystallization vessels. The journey to crystalized sugar starts by cutting sugar beets and soaking them in hot water inside the diffusion towers. Next, vacuum and heating processes remove most of the water. This results in a syrup. Finally, the crystals form when the syrup is cooled again and returned to normal pressure.



CHALLENGE

Maintaining a uniform duration in vessels is important for the production of the crystals. It prevents issues such as sieve blockages and the need for additional steam consumption. The correct duration, along with other agitation requirements, is also important to ensure consistent product quality.

Over time, engineers noticed that product quality began to decline and batch cycle time began to increase. They needed to find the root cause of the problem to improve both the quality and efficiency of crystal production.

GOAL

- Determine the reason for poor product quality in the crystallization vessels.
- Monitor for anomalies in the agitation and stirring cycles.
- Find the ideal batch cycle time to produce the best quality sugar.

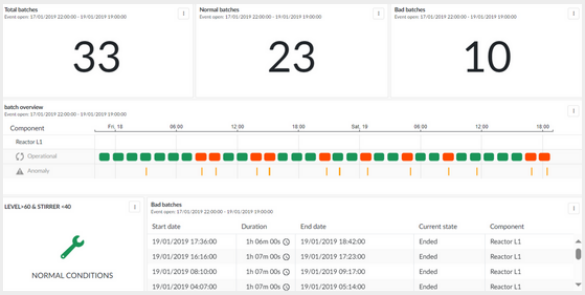
Challenges

Engineers had to overlap different batch profiles to assess the differences and potential root causes.

Approach

- Perform a value-based search to identify periods when the reactors in the vessels ran for longer than the ideal batch cycle time.
- Create a Gantt view of the agitation anomalies and color-code the longer batches to easily distinguish them from shorter batches.
- Place a live monitor tile on a dashboard to continuously track product quality through production.
- Analyze the different behaviors in each vessel to find an ideal batch.

RESULTS



- Using TrendMiner, engineers were able to find a way to distinguish between efficient batches – those that lasted less than 1 hour, 5 minutes – and less efficient batches that were longer.
- This allowed them to see that most of the quality issues happened during the 14 similar events found during the past month.
- They then were able to perform live monitoring of the stirrer speed when it fell out of range, especially when the speed fell below 60% at the pivotal production point (40 liters).
- Finally, engineers were able to pinpoint the lack of consistency during the process in the different reactors and the exact moment when the difference is made during the process.

Value

Engineers were able to minimize steam consumption, prevent sieve clogging, and realize a potential 12% reduction in batch cycle time.

TRENDMINER FEATURES USED

DATA VISUALIZATION MODE

TrendMiner offers various visualization modes for analyzing time-series data. Multiple tags can be shown in a stacked mode for specific time sequences or can be grouped together in a "swim lane." For multivariate analysis, it offers a multi-scatterplot that shows tag histograms and multiple histograms of each pair of the selected tags.

VALUE-BASED SEARCH

TrendMiner allows for an easy click and search for tags, just like using Google. While typing, our software fills best matching terms to speed up the analysis search. Value Based Search is used to quickly find anomalies in the time series data by analyzing criteria, numerical values, and limits.

LAYER COMPARE

Periods of time can be easily overlaid to compare patterns and understand how they are different. TrendMiner instantly finds similar looking patterns over multiple years of process behavior. Periods with a similar pattern can be overlaid to allow for a better understanding of the historical performance of the process.

GANTT VIEW OF CONTEXTUAL DATA

All contextual information has a start and end time that is used to represent the events in a sequence diagram or Gantt chart. Per asset, all related tags are grouped and vertically listed, and for each tag, all context types are represented in a time-series fashion.

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Call our global head office at +32 11 2638 30

info@trendminer.com
www.trendminer.com

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