TrendMiner
A SOFTWARE AG COMPANY

INDUSTRY
Chemical

PROCESS TYPE
Continuous Processing

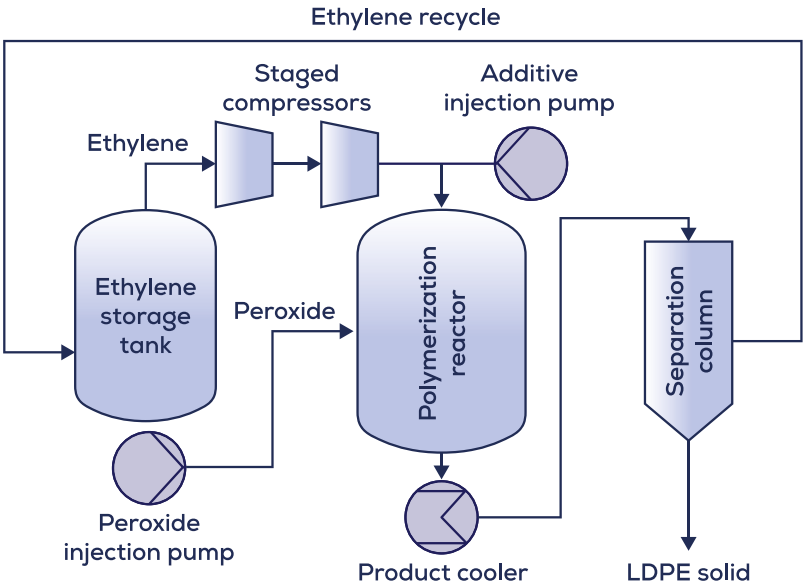
ANALYTICS TYPE
Predictive Analytics

KEY OBJECTIVE
Create Energy Models

Developing Energy Balance Models for Condition-Based Monitoring

BACKGROUND

This European chemical plant produces 17 bar steam in an aftercooler. The steam is consumed at various points on the production lines. The plant includes multiple chambers for production. As a rule, the production of 17 bar steam in these chambers is not sufficient to cover the total demand. Even if the chambers are operating simultaneously, additional steam must be imported from the network. The demand for 17 bar increases abruptly to keep the chambers in a start-up condition if one or both chambers is out of service.



CHALLENGE

Engineers wanted to know when 17 bar steam consumption exceeded production in the aftercooler. However, they did not have a method to determine the normal steam consumption so they would know when consumption deviated from expectations. Process experts had been using spreadsheets to determine when 17 bar steam consumption might increase, but they could not create models using this method. Knowing when steam consumption was excessive would allow process experts to intervene in time to prevent a possible shutdown.

SOLUTION

Engineers decided to create linear energy models that could be used to set up soft sensors to monitor for periods when 17 bar steam consumption was excessive. Engineers could use those soft sensors to design alerts that would notify key stakeholders of the excessive consumption.

Approach

- Calculate steam balance as a new formula summarizing the average steam consumption.
- Prepare and clean data for analysis.
- Identify normal steam consumption.
- Create soft sensors to monitor for consumption deviations.
- Set up email alerts to key stakeholders when consumption does not match the model.

RESULT

- Engineers could see when 17 bar steam consumption was excessive.
- Using TrendMiner, process experts were able to build the model quickly and easily and iterate findings until they could find a permanent solution.
- The software designed sub-models with high predictive power that also identified local weaknesses in the data.
- When excessive 17 bar steam consumption occurred, TrendMiner sent notifications to process experts that allowed them to intervene in time.

TRENDMINER FEATURES USED

DATA VISUALIZATION MODES

TrendMiner offers various visualization modes for analyzing time series data. Besides the common time trend, time series data of 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, our software offers a multi-scatterplot that shows tag histograms and multiple histograms of each pair of the selected tags.

FAST FILTERING

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

TAG BUILDER

TrendMiner's tag builder allows the creation of time series data with formulas and aggregations of the tags. The results of these tags can be visualized just like any other tag. The tag builder also can be used for importing time series data via a CSV file.

INFLUENCE FACTORS & TIME SHIFT

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

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