

SCHEDULATER

Supporting Plant Operators in Scheduling Tasks by Visualizing Streaming Process Data and Model Predictions

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Background

Bio-based processes are dynamic, hard to model, and operators must continually monitor and adjust parameters to maintain efficient production. However, production systems seem to provide limited support for exploring different options in scheduling operations.

We introduce **Schedulater**: A tool that visualizes production data and predictions to help plant operators schedule their tasks. The tool visualizes streaming data from the production system and a predictive model based on first principles.

Tasks

We identified three tasks from inquiries with operators:

Discover current state: When operators arrive at a work shift, or when returning to the control room, they need to discover the current filter states.

Identify conflicts: The operators need to continuously monitor the filter states, and identify potential periods of overlapping filter cleaning states.

Explore alternatives: When identifying overlaps, the operators need to explore alternative schedules, and produce a schedule.

Design Goals

We set four design goals to support these tasks:

DG1: Provide a visual glanceable overview of the production state.

DG2: Emphasize filter overlaps to bring visual attention to potential problems.

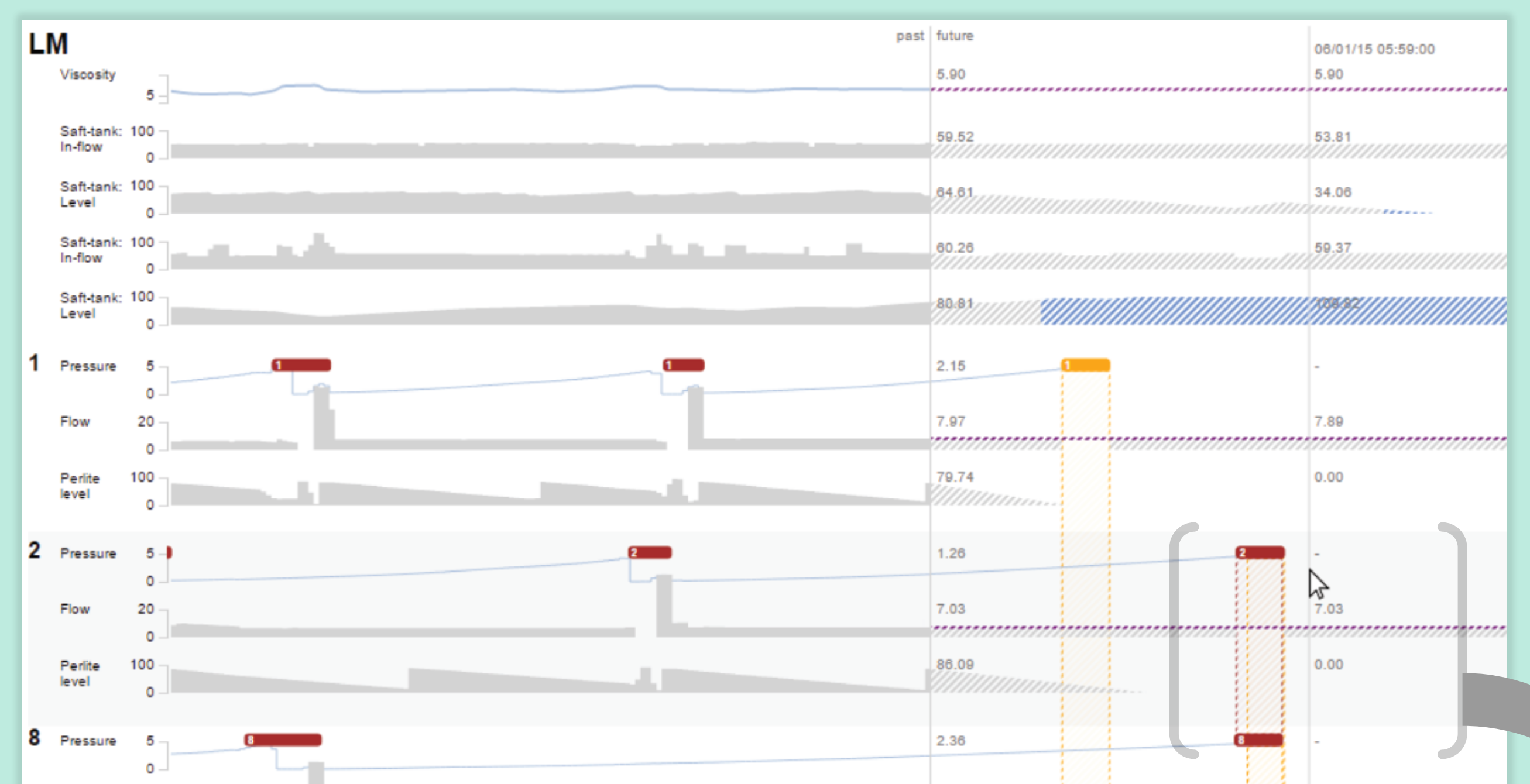
DG3: Use interaction to provide access to details about individual filters.

DG4: Use interaction to support exploration of alternative schedules.

Design



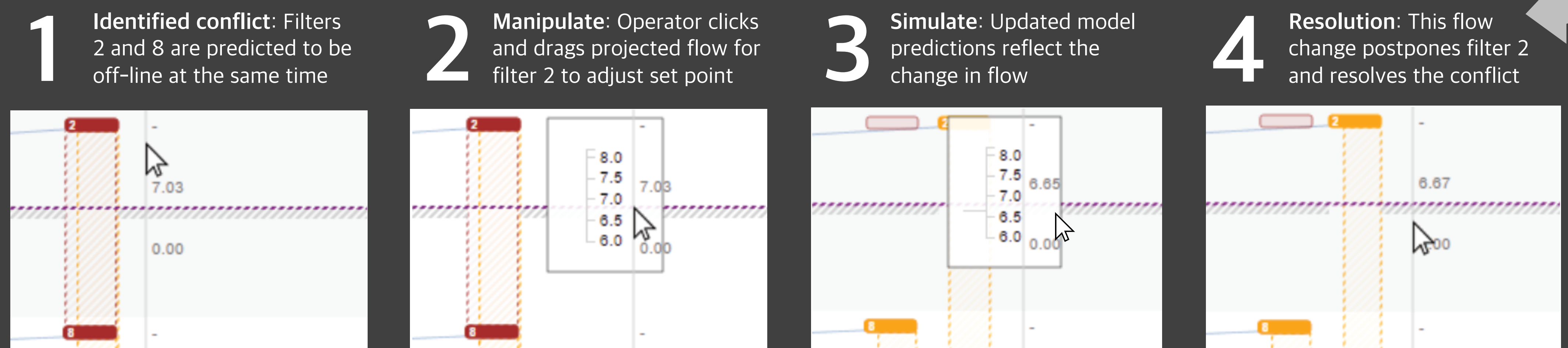
Schedulater provides **overview** of the recent 12 hours of production and predictions for the next 12 hours for three production lines: a graph of filtrate viscosity and bars for periods where filters are off-line for cleaning, including predicted future periods of cleaning.



User can expand production lines to show **details** about flow and levels of buffer tanks, and details (e.g., pressure and flow) for each filter in the line. Future projections of parameters can help discover potential problems.

A key use is to **resolve conflicts**: periods where multiple filters are likely to be taken off-line at the same time. Overlaps in filter state periods are emphasized by connecting areas.

Users can then manipulate predicted values and events for **simulating different operation schedules** in order to resolve conflicts.



Timeline

