



ALL INDUSTRY VERTICALS

Data Sources

- Process historian

Data Cleansing

- Before a mass balance can be performed, all inlet and outlet flow rates must be converted to consistent mass units. This unit conversion is easily accomplished in Seeq using the Formula tool and stream properties. Additional data cleansing, such as filtering of noisy signals, may also be applied, if necessary.

Reporting & Collaboration

- Results can be summarized in an organizer topic. An organizer topic can also be used as a dashboard for continuous monitoring of the mass balance

Challenge

Manufacturing sites have many process units, each with inlet and outlet streams. Many sites do not have insight into the mass balance of these process units. Performing a mass balance on these process units (or the overall plant) is critical for identifying a number of issues, including leaks, faulty sensors, meter calibration issues, process inefficiencies, and more. Unfortunately, the plants that do perform mass balances likely use a method that is difficult to maintain and does not update as new data is available for continuous monitoring.

Solution

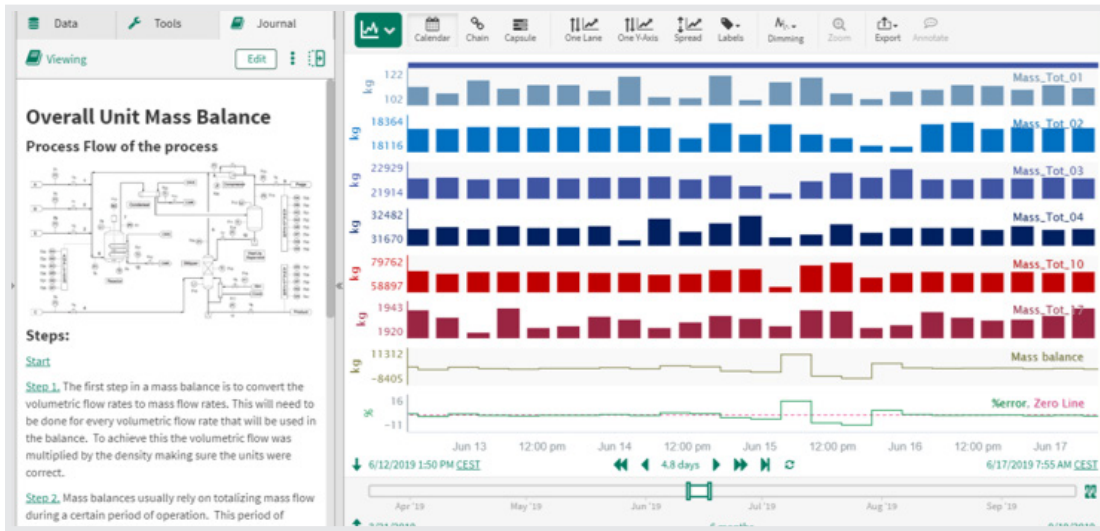
To ensure mass balance calculations are accurate, reliable, and up-to-speed, process manufacturing operations use Seeq to calculate and monitor their plants' mass balance. This mass balance can run continuously to track changes over time and identify discrepancies between inlet and outlet streams.

Results

The results of the mass balance (acceptable or unacceptable) provide key insights into the operation of the system. If the mass balance results are acceptable (in equals out), this confirms that the process does not have major leaks and that the flow sensors are operating correctly. If the mass balance results are not acceptable (in does not equal out), this may indicate several potential issues, such as a leak, a bottleneck in the process, faulty sensors, meter calibration issues, accumulation, or more.

Calculations & Conditions

- Formula: Convert flow rates to consistent mass units
- Periodic condition: Create a condition for how frequently the mass balance is calculated
- Signal from condition: Calculate totalized flow rates
- Formula: Calculate the difference between the total in and the total out
- Value Search or Deviation Search: Identify when the difference between in and out exceeds a certain value or percentage
- Scorecard: Visualize mass balance in table form



This picture is a screenshot of the workbench analysis, showing the totalized mass for the inlet and outlet streams in the top lanes, and then comparing the difference between these values in the bottom lane.

		9/18/2019	9/19/2019	9/20/2019	9/21/2019	9/22/2019	9/23/2019	9/24/2019
✎ ✕ ▾	Mass In	350020 kg	350720 kg	350410 kg	350577 kg	350791 kg	350641 kg	350423 kg
✎ ✕ ▲ ▾	Mass Out	351108 kg	345729 kg	356121 kg	352362 kg	353611 kg	352748 kg	351027 kg
✎ ✕ ▲ ▾	In - Out	-1088 kg	4991.2 kg	-5710 kg	-1786 kg	-2820 kg	-2107 kg	-603.8 kg
✎ ✕ ▲ ▾	Error	-0.31 %	1.4437 %	-1.603 %	-0.507 %	-0.797 %	-0.597 %	-0.172 %

This image shows scorecard summarizing the results of the mass balance. Coloring is used to indicate instances when the mass balance results were not acceptable.



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Solutions**

tridiagonal.com
info@tridiagonal.com

