Bristol-Myers Squibb: Using real-time multivariate analytics to optimize batch processes

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Industry - Pharmaceuticals

Challenge

- Batch data latency and lack of data context hobble real-time processing

Solution

- Deployed AVEVA™ PI System™ to collect, contextualize and deliver trustworthy, ready-to-consume data to facilitate multivariate analytics

Result

- Increased product quality, optimized process performance, and empowered operators with real-time fault detection

AVEVA

For a pharmaceutical company, product quality is vital to deliver life-saving medicines. These companies face increased pressure to ensure low-cost, faster-to-market products while still maintaining compliance, superior quality, and good manufacturing practices (GMP). To successfully thread this needle, one such pharmaceutical company, Bristol-Myers Squibb, adopted a data-driven approach. In its search for the "golden batch"—a repeatable process that consistently yields an optimal batch—the company decided to digitize its drug development and manufacturing process and create a single source of truth for its operations data. This data management platform enabled Bristol-Myers Squibb to optimize process performance, reduce product variation, and identify crucial process events.

> "All of this was built with out-of-the-box tools in the asset framework of AVEVA PI System."
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> -
> **Matthew Morrow,**
> IT Business Partner, Bristol-Myers Squibb

## Using multivariate process analysis to gain insight into batch process

Multivariate data analysis (MVDA) is an advanced analytical approach that identifies all the influencing variables and underlying patterns in a data set.

Importantly, MVDA also finds correlations between variables and how they impact each other. This kind of analysis is essential to understanding and interpreting complex process behaviors at a manufacturing site and optimizing process performance as part of process design.

"Rather than having 12 highly correlated independent variables, you can get it down to two or three," said Matthew Morrow, an IT Business Partner at Bristol-Myers Squibb. "Therefore, you get better meaning from your data by focusing on fewer signals for your process."

This means that if a plant is using MVDA to analyze its manufacturing data, the operator no longer needs to look at individual trends and alarms on multiple HMI screens. Mission-critical information is automatically aggregated on a single screen, which greatly reduces operator overload and increases insight into the process.

Bristol-Myers Squibb began using MVDA that leveraged historical and real-time data from AVEVA PI System. Partnering with Seeq and Sartorius, it used historical data from AVEVA PI System to identify batch start and end times through capsules and to retrieve data formatted to match the requirements of SIMCA, a solution provided by Sartorius. The data was then imported into SIMCA to build offline models.
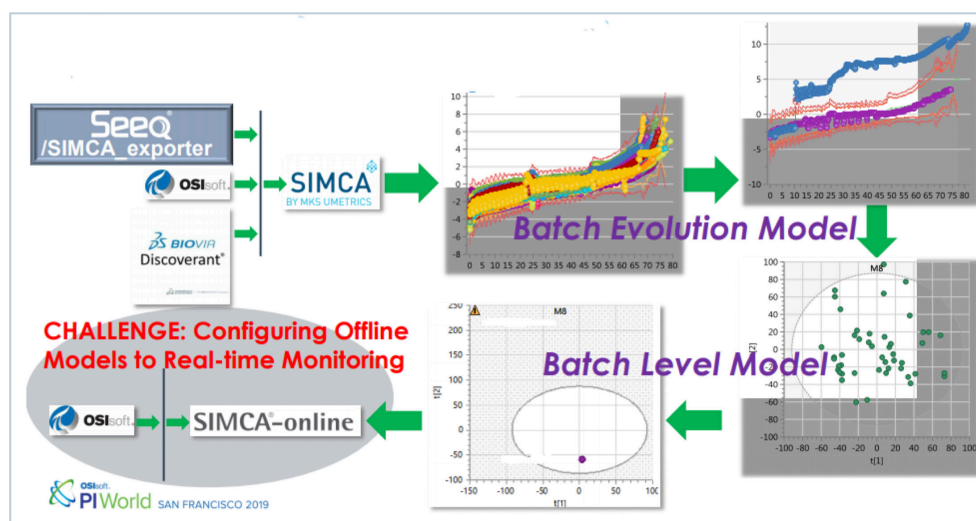
Multivariate data analysis and batch evolution modeling enables Bristol-Myers Squibb to gain real-time insight into its batch processes.

Putting data in context

Bristol-Myers Squibb used AVEVA PI System as a data infrastructure to gather, contextualize, and prepare data for further analysis in SIMCA-online, which enables multivariate monitoring and analysis based on correlation.

Bristol-Myers Squibb faced challenges transitioning from its static offline models in SIMCA—which used historical data—to dynamic, real-time process monitoring in SIMCA-online. SIMCA-online requires real-time batch data to accurately track batch progress against the model.

However, the batch structure in SIMCA-online and the asset framework in AVEVA PI System were not aligned. SIMCA-online did not facilitate all aspects of AVEVA PI System's asset framework and event frames. The engineering team managed to work around these challenges, creating a real-time batch context by utilizing the AVEVA PI System's asset analytics. SIMCA-online was then able to parse this real-time context, which resolved batch data latency issues.

The results are in

Bristol-Myers Squibb is already seeing the benefits of its real-time MVDA solution. It has already optimized the biologics process in a number of instances. Based on the many business benefits of the system, Bristol-Myers Squibb plans to include additional biologics process stages, new equipment and pharmaceutical products, as well as other biologics sites to its multivariate modeling method underpinned by AVEVA PI System's data contextualization.

Watch the full presentation

References:

Morrow, Matthew and Zhang, Bing. "It's the DATA, Stupid! How PI Asset Analytics Rescued Our Real-time Multivariate Process Monitoring" resources.osisoft.com/presentations.