

Maximizing Efficiency and Transparency in Batch Processing with Simulation-driven Predictive Decision Support

M. Mosebach, ¹C. Sonntag, D. Wolff

INOSIM Consulting GmbH, Joseph-von-Fraunhofer-Str. 20, 44227 Dortmund, Germany; tel. +49 172 4575203, e-mail: torsten.mosebach@inosim.com; ¹INOSIM Software GmbH, Parkring 73, 22949, Ammersbek, Germany; fax: +49 231 9700251.

Industrial batch production plants are complex systems, which often process multiple different products simultaneously using dynamic production recipes. Hundreds of single operations, a high degree in automation and dynamically changing boundary conditions prevent operational staff from reliable prediction of the mid- and long-term plant behavior. Thus, a lot of potential in production, resource and operator scheduling is lost.

To support plant operators and managers, the INOSIM Foresight environment has been developed to enable an accurate prediction of future plant behavior and an improved decision support. Core element of the INOSIM Foresight environment is application of the established INOSIM material flow simulation, which is already used for years for strategic decision support for years. The simulation gets initialized by the current state of the production plant and simulates the future plant operation and resource allocation. This prediction is currently planned for three different scenarios, which is meant for three different groups of users:

1. Operator level: Improved scheduling of operators, as the simulation records all predicted operator activities. Thus, operators can be at place at the right time for necessary and potentially time-critical actions. This prediction will be visualized to the operators as a list of upcoming actions like an airport's departure board.
2. Plant manager level: Prediction of conflicts in operation, which are created through unwanted delays in operation, which enable the plant manager to identify countermeasures to overcome these conflicts. Visualization is done by Gantt-chart and text-based reporting.
3. Maintenance manager level: Periods without operation can be predicted for the equipment, what enables beneficial in process maintenance to avoid or shorten long shut-down periods for maintenance.

To achieve this target two more components have been developed, which care for the data input from the plants control system and for the visualization of the simulation results. To achieve a proper data input into the INOSIM Foresight simulation the Foresight Data Integrator has been developed, which works as a flexible connector to different established OT systems (e.g. OSIsoft PI, Werum PasX) and can be quickly adapted to other data platforms as well. The other component needed for the visualization is the INOSIM BICON add-on, which is a flexible connector to current business intelligence solution (e.g. Tableau, MS Power BI) as well as to inhouse tools. Using these three components (OT data connector, INOSIM simulation environment, INOSIM BICON) a complete framework for the accurate prediction of plant operations can be implemented to batch processing



plant. This overall structure can be seen in Figure 1. Thus, an improved action and decision support for plant operators, plant managers and maintenance scheduling is achievable.

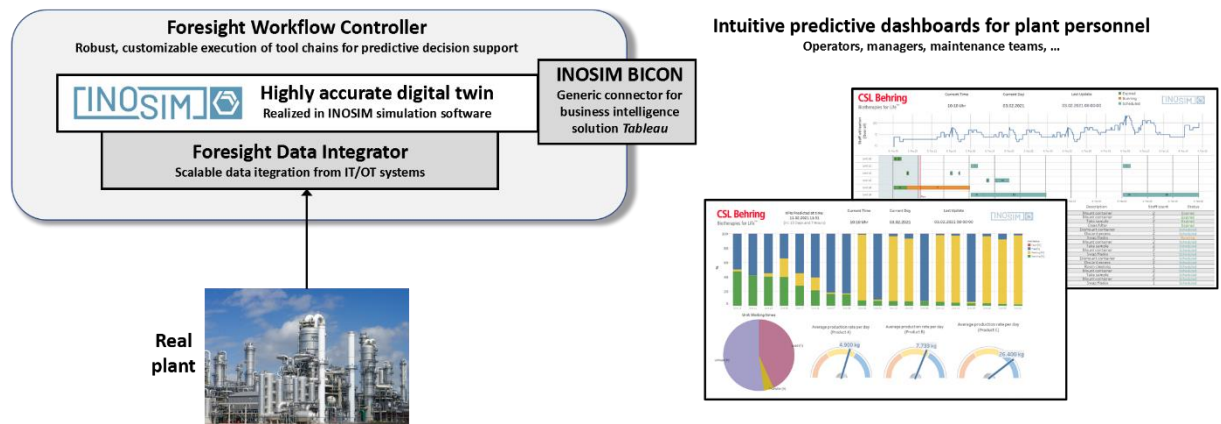


Figure 1: Overall structure of INOSIM Foresight system

Additionally, the effective life cycle of simulation models from prior strategic engineering processes gets extended to the operational phase of the plant. Thus, the model is constantly kept in the most actual state of the plant and can be used for newly upcoming strategic decision making in shortest time.

Within our talk we will highlight the customer driven motivation for the Foresight developments as well as the INOSIM Foresight technology and the used components. We will also share our experience from the different customer roll out projects and the successful application in plant operation.