

synTQ DFM

Dynamic Flow Modelling System

A practically applied material track and trace solution for mixed and plug flow continuous industrial processes.

Measure | Understand | Control | Improve

Optimal
Industrial Technologies



Image courtesy of L. B. Bohle

Dynamic Flow Modelling System

During the research and development stages of a continuous process, whether it is utilising Process Analytical Technology or not, the importance of product tracking may not be immediately apparent. You may even consider it to be a simple activity, perhaps not unlike a 'traditional' product movement tracking system.

However, it will become critical once the project is in the pilot or full manufacture stages. An effective track and trace system is necessary for tracking product for sampling, for rejection and for tracing starting lots to finished batches.

The complexities of this process should not be underestimated. synTQ DFM provides a straightforward and practical method of achieving track and trace, and its implementation can be further streamlined by our applications team.

Offline 'In Silico' Modeller

To track the product moving through your process with the best possible predictions, you need to create an offline model of the line 'in silico'. This model can be simple or complex. Typically, each unit operation or sub-section of a unit operation is modelled, but the modelling can be as granular or as coarse as required.

We appreciate the need to balance the costs associated with the amount of time spent on optimizing the prediction resolution against the amount of product ejected by an out-of-spec event and the granularity of final batch composition in relation to raw material lots. Our team has experience in implementing these systems and building unit operation flow algorithms, and will provide advice throughout the process.

Real-Time Track and Trace

synTQ DFM can be integrated into your control, automation, or PAT architecture and, in line with our policy at Optimal, it is system type and vendor agnostic. The inter-communications generally take the form of industry-standard OPC communications. synTQ DFM needs key live production data in order to perform the real-time track and trace functions. The interconnection requirements are dependent on your specific manufacturing line and the model that you have built – we can offer help and assistance in this regard.

With these systems in place, synTQ DFM can run alongside your process and predict the movement of product entities with a high degree of resolution. synTQ DFM tracks material for sampling and for rejection after an out-of-spec event, including the triggering events and allowances for forward and back-mixing. It will adjust the mass balance for the extraction of material from the line (for sampling and rejection), make allowances for dynamic line running variations and trace the starting raw material lots in the finished batches.

Potential applications for this technology include:

- Continuous powder and granule processing
- Continuous liquid processing
- Plug flow
- Mixed flow with forward and backward mixing
- GMP-compliant track and trace
- Tracking for sampling and rejection control
- Tracing for raw material lot to finished batch

Model Building Support

Translating theory into practice takes experience as well as knowledge. Should your team initially lack the skills necessary to implement a track and trace system in a time-efficient way, Optimal can assist you.

Modelling granularity and precision have a direct effect on the time taken to create and validate the models and on the amount of product rejected during an out-of-spec event. This will also influence the precision of product tracing. Our team will work with you to optimise the approach, to ensure the best quality and productivity results from the minimum of development effort.

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