European Network for Business and
Industrial Statistics

Contribution ID: **50**   Type: **not specified**

Structural Equation Modeling of Coupled Twin-Distillation Columns

Monday, 17 May 2021 10:00 (20 minutes)

We describe a case study for modeling manufacturing data from a chemical process. The goal of the research was to identify optimal settings for the controllable factors in the manufacturing process, such that quality of the product was kept high while minimizing costs. We used structural equation modeling (SEM) to fit multivariate time series models that captured the complexity of the multivariate associations between the numerous process variables. Using the model-implied covariance matrix from SEM, we then created a prediction profiler that enabled estimation of optimal settings for controllable factors. Results were validated by domain experts and by comparing predictions against those of a thermodynamic model. After successful validation, the SEM and profiler results were tested in the chemical plant with positive outcomes; the optimized predicted settings pointed in the correct direction for optimizing quality and cost. We conclude by outlining the challenges in modeling these data with methodology that is often used in social and behavioral sciences, rather than in engineering.

Primary authors: Dr CASTRO-SCHILO, Laura (SAS Institute);   Dr GOTWALT, Chris (SAS Institute);   Dr SCHAFHEUTLE, Markus (Schafheutle Consulting)

Presenters: Dr CASTRO-SCHILO, Laura (SAS Institute);   Dr GOTWALT, Chris (SAS Institute);   Dr SCHAFHEUTLE, Markus (Schafheutle Consulting)

Session Classification: Sensitivity/design optimization

Track Classification: Data Science in Process Industries