

Optimization of data-based inferential sensor for vacuum distillation unit(VDU) of lube base oil plant

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VDU is the process for lube base oil plant which separates the unconverted oil(UCO) by the physical properties, kinematic viscosity(KV100), and distillation(D5%, D95%). So those properties are measured in the commercial plant for monitoring and control, but it is hard to establish the online monitoring system due to the time-consuming and low reliable measurement. As a breakthrough, this work developed the time series data-driven model for the prediction of quality variables from the process variables, inlet UCO physical properties, and operating conditions of VDU. Based on these models, optimization of operating conditions to satisfy the setpoint of controlled variables was implemented. To develop the model, a tremendous dataset of about 8 years of the VDU process was collected. And it was preprocessed to remove the outliers and noise using a simple time-series ARIMA model. The inferential sensor for KV100 and D5%, D95% of each distillate are designed using a recurrent neural network. As a result, the MAE of KV100 for test sets records under 0.05 cst and the MAE of D5%, D95% records under 2°C which are improved over the as-is method of the commercial plant.