TNChE Asia 2024 Conference

" Decarbonization, AI and Digital Transformation for Sustainability in Process Industries "

Presenter's Biodata & Abstract

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Title of Presentation : **Improved Energy Efficiency by Systematic Model-Based Optimization – A Case Study for Petrochemical Process**

Presentation Abstract :

- Objective/Scope

The energy efficiency of a petrochemical process has significant impacts on the plant's profit margins and green-house gas emission. To improve the energy cost and hence reduce the CO2 emission, Samsung E&A Co., Ltd. (formerly Samsung Engineering Co., Ltd.) has been performing energy optimization studies for various processes, applying rigorous modeling (digital twin), sophisticated analytical methods and systematic engineering procedure developed/refined over the years. The model-based optimization method is introduced with case examples.

- Methods/Procedures/Conclusions

To improve the energy efficiency of petrochemical processes, rigorous and reliable model (digital twin) tuned to actual plant data is a key to successful study. The model should be representative of actual plant operation and have sufficient fidelity that could account for process interactions, ideally for the entire process and utility systems to be effective. The developed process model provides a consistent baseline and actual performance parameters such as distillation trays, compressor and turbine efficiencies. It also works as a powerful tool for 'actual' performance check since it is based on the 'actual' plant operation data, not based on the 'design' data which could be widely different from real operation. Various analytical methods such as network pinch analysis and column targeting combined with a systematic engineering analysis based on the rigorous model lead to cost-effective and practical solutions for energy reduction and process optimization.

- Results/Observations/Conclusions

The studies typically results in 5% ~ 10% reduction of unit specific energy with practical and economically viable modifications, even for a plant that has been perceived to be highly efficient. The systematic approach described is an effective and proven method that helps identify and develop energy optimization solutions.