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Coupling design of interunit heat integration in an industrial crude distillation plant using pinch analysis

Chengtian Cui and Jinsheng Sun

School of Chemical Engineering and Technology, Tianjin University, China

This study reports ideas raising from an optimization proposal of lumping heat exchanger network of three separate industrial crude distillation units (CDUs) in a northern China bitumen enterprise, with pinch analysis priorly performed on their efficiently-operated preheat trains (PHTs). The end of the work finds further potential progress still in hope of achievement through interunit coupling, although each individual PHT was approaching maximum energy recovery. Simulative trials reveal an extra 9.58% diminishment of energy consumption when using interunit optimization upon innerunit improvements. A necessary economic evaluation verifies that energy cost minimization will recover the investment within a reasonable payback period. This case study illuminated an innovative thought train—finding better-matched heat sources-sinks in exchange of the least physical revamping in an extended-energy system. This way of thinking allows numerous similar refineries, especially in China, to improve their way of using energy.

Biography

Chengtian Cui is a PhD candidate under the supervision of prof. Jinsheng Sun at Tianjin University. He received a B. Eng. in the College of Chemical Engineering from China University of Petroleum (East China) in 2014. He has been interested in process system engineering and petroleum refining engineering. His research interest also covers industrial waste heat recovery, energy efficient distillation operations, and chemical process intensification.

ctcui@tju.edu.cn