Abstract

The changes of energy prices in recent years, as well as the necessity to curb carbon dioxide emissions, have speed-up the need for approaches that are increasing energy efficiency in the processing industry including food and beverage, chemical, petrochemical, refinery, coal reprocessing etc. Nevertheless, the implementation of retrofit projects takes long period from the analysis to final installation and operation. This situation is typical for the factories that are the part of big holdings and the decision-making system limits the retrofit period.

Process Integration approach is one of key instruments for reduction of heat, power, water and resource in reprocessing industry. Recent developments show that heat exchangers networks (HEN) improvement saves up to 40% of primary energy resources and it is connected with economic grounded solutions and investment efficiency. The use of Pinch Point approach allows finding the optimal temperature difference for HEN but usually the solution is founded for steady state. This fact makes completed retrofit different from optimum obtained during analysis. This means that the investment efficiency is decreased because of energy prices are changed, especially last time when hydrocarbon market is changed due to influence of renewables and other factors.

Present work delivers the methodology Time Super Targeting (TST) for optimum solution of HEN in dynamic when energy prices are changed. Optimum solution can be found for time slice when the retrofit is completed taking into account the decision making period of enterprises. Sensitivity analysis of finished solution for HEN retrofit was performed and flexibility of changes are analysed. Several representative case studies were developed for different industries to show methodology results application.

The results of this work can be used for analysis of reactor, separation, utility systems to
update the Process Integration methodologies as well as for Total Site Integration.

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