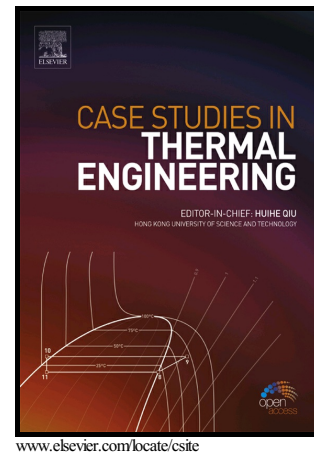


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Ali Manizadeh, Ashkan Entezari, Rouhollah Ahmadi



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The Energy and Economic Target Optimization of a Naphtha Production Unit by Implementing Energy Pinch Technology

Ali Manizadeh, Ashkan Entezari, Rouhollah Ahmadi*

School of New Technologies, Iran University of Science & Technology, I. R of Iran

* *Corresponding author*

Narmak, Tehran, 1684613114, Islamic Republic of Iran

phone: +98 21 7322 5815, fax: +98 21 7724 0380

E-mail address: ahmadi@iust.ac.ir

ABSTRACT

In this paper, energy pinch analysis is implemented on the Naphtha Production Unit as an operating process plant. It endeavors to approach the current system to the maximum energy recovery (MER) design by providing several scenarios in the heat exchangers network. Furthermore, the economic analysis considering the initial investment and operating costs of the system was conducted in each scenarios to achieve a cost-effective system. The results obtained just from the pinch analysis optimization technique, indicate that reducing the heating and cooling loads do not reduce the total costs. Therefore, two objective optimization of minimization of the levelized cost of product (LCOP) as well as maximization of the overall energy performance of the system are concerned to find out the optimal scenario of the energy network layout. Here, retrofit of the maximum energy recovery design is performed to represent the energetical and economical optimal layout.

Keywords: Pinch analysis, Maximum energy recovery, Levelized cost of energy, Energy optimization

1. Introduction

Reduction of energy consumption and consequently decreasing of the environmental pollution has been gained a great attention in all energy sectors. Optimization of energy systems is one of the major promising solution concerned by researchers. In this regard, many organizations with high energy consumption such as heavy industries, petrochemical industries, refineries, and power plants are decided to manage and reduce energy consumption as much as possible [1]. Energy pinch technique is one of the influential methods that its feasibility on reducing of energy consumption has been confirmed. This technique is developed in 1970s, and Linnhoff was one of the firsts person used the energy pinch analysis techniques [2]. Linnhoff and Turner [3] achieved 30% energy saving for an existing process by utilizing pinch technique optimization. Brown [4] shows that this technique can be widely employed in many types of the engineering process. In addition to the maximization of energy

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