CHAPTER III

EXPERIMENTAL

3.1 Software

    3.1.1 Microsoft Excel Spreadsheet

    3.1.2 Mathematical Programming Software (GAMS)

    3.1.3 Visual Basic for Application (VBA)

3.2 Experimental Procedures

    3.2.1 Doing Data Extraction from the Case Study

        The first step is to prepare the data for doing retrofit of heat exchanger network (HEN) in crude distillation unit. The data compose of stream properties and thermal condition of each stream such as supply temperature, target temperature, heat capacity, and enthalpy change.

    3.2.2 Develop Grassroots and Retrofit Potential Program

        In this work, a grassroots and a retrofit potential program was developed using visual basic for application (VBA) of pinch technology which is automatically find the optimum point in targeting step. Moreover, the program can automatically generate problem table, composite curves, grand composite curve, streams diagram, area calculation region, return on investment, net present value, capital energy trade-off, and payback curve. The grassroots and retrofit potential program allows user to easily change the objective function which consent to optimize a variety of cost function. Moreover, these programs allow the user to quickly and easily change parameters that would allow the evaluation of a numerous scenarios.

3.2.3 Applied the Retrofit Potential Program to the Real Refinery Plant or Case Study

A retrofit potential program will be applied to two specific retrofit situations. The first is a problem adapted from Ciric and Floudas (1989) and will be named Example 1. The second problem is adapted from Barbaro et. al (2005) and will be named Example 2. The results for Example 1 and Example 2 presented in the Discussion section.

3.2.4 Studying the Retrofit of CDU Using MILP Procedure

The forth step is to study the retrofit design for HEN of crude distillation unit by using the MILP model developed by Barbaro et al. (2005) Indeed, this model is developed from the grassroots model that is the basic structure of the grassroots model is conserved and additional sets of constraints are included to consider the network modifications.

3.2.5 Compare the Ability of the Retrofit Model of HENs and Evaluate the Most Effective and Useful Methodology for CDU

The fifth step is to evaluate the most effective and useful methodology for crude distillation unit.