CHAPTER III
EXPERIMENTAL

3.1 Softwares

- Microsoft Excel Spreadsheet.
- Retrofit Potential Program
- Mathematical Programming Software (GAMS).
- Commercial Process Simulation Software (PROII).

3.2 Experimental Procedures

3.2.1 Studying Retrofit Method

The first step is to study the process of crude distillation, pinch technology and various retrofit methods.

3.2.2 Doing Data Preparation of the Base Case (Multiple Crude Types)

The second step is to prepare the data for simulating of heat exchanger network (HEN) of case study. The data compose of properties of light, medium and heavy crude oil and operating condition of the crude distillation unit such as true boiling point, supply temperature, target temperature.

3.2.3 Simulating the Base Case (Multiple Type Crude) by PROII

The third step is to simulate the process of the base cases (multiple type crude) by PROII. This step provides the utility consumption of base case.

3.2.4 Doing Pinch Analysis Using the Retrofit Potential Program

The forth step is using the retrofit potential program to determine the optimum ΔT_{min} of each type of crude.

3.2.5 Doing the Retrofit of the Base Case (Multiple Crude Types) Using GAMS with n-Stage Model of Grossmann

The fifth step is to do the retrofit design for HEN of the base case by using GAMS with the n-stage model developed by Grossmann with using ΔT_{min} from previous step and other retrofit constraints.

3.2.6 Simulating the Retrofit Designs by Simulation Software (PRO II)

The sixth step of this methodology is to perform the utility consumption of multiple crudes and to validate the retrofit design from optimization model gives the practical energy saving that match the design target in term of their improvements in the performance criteria. This step uses simulation software (PRO II) for validation.

3.2.7 Doing the Relocation of the Retrofit Designs

This step is to do the relocation of the existing heat exchanger to fit with the retrofit design. Relocation concept is to relocate the base-case exchangers to the new location of the retrofit, with small area added or removed.

3.2.8 Doing the Cost Calculation to Determine the Maximum NPV

The eighth step is to calculate the net present value (NPV) of each retrofit design to find the best heat exchanger network which gives the maximum NPV.