

CHAPTER III PROCEDURE

3.1 Soft-wares

1. GAMs (General Algebraic Modeling System)
2. Microsoft Excel
3. SIMSCI(Pro II)

3.2 Methodology

3.2.1 Retrofit without Relocation Design of HEN

Step 1: Prepare the data for the case study.

Step 2: Input the data such as inlet and outlet temperature, flow rate, heat capacity and number of intervals of each streams into the retrofit model.

Step 3: Run GAMs model of retrofit without relocation.

Step 4: Interpret in the result from GAMs and generate heat exchanger network.

Step 5: Analyze heat exchanger network.

In this subject the methodology of model needs to be improved following correct equation. In some steps, the program needs to be fixed. The same base case is run again by changing the feed and fixed and area costs. The results of retrofit design HEN will be compare together with the other results. The relationship between energy consumption, structure and investment cost are determined.

3.2.2 Retrofit with Relocation Design of HEN

Step 1: Prepare the data of base case for relocation model.

Step 2: Input the data such as inlet and outlet temperature, flow rate, heat capacity and number of intervals of each streams into the model.

Step 3: Run GAMs model of retrofit without relocation.

Step 4: Interpret in the result from GAMs and generate heat exchanger network.

Step 5: Analyze heat exchanger network.

In this subject the methodology of model needs to be improved following correct equation. In some steps, the program needs to be fixed. By using the same base case but change the feed and fixed cost and area cost. The results of relocation design of HEN will be compared together with the other results. The relationship between energy consumption, structure and investment cost are determined.

3.2.3 Test /run Refinery Retrofit with/without Relocation Model with Pump Around Equation (Kitisak 2005)for One Crude Type

Step 1: Input the data of the existing refinery.

Step 2: Run GAMs model (retrofit with /with out relocation).

Step 3: Compare the result of both models (retrofit with /with out relocation).

In this subject the results of both retrofit models will be analyzed and compared to each other.

3.2.4 Find the Best Network (one crude unit) of Grassroots Design for Handling many type of crude

Step 1: Design new heat exchanger network by using GAMs model for multi types of crude: light, intermediate and heavy crude.

Step 2: Using ProII to simulate all heat exchanger networks with all types of crude.

Step 3: Determine the utility consumption from each case study.

Step 4: Analyze data when consider the ratio of crude types which used in three scenarios as shown in Table 3.1.

Table 3.1 Ratio of crude types for grassroots design

	Ratio of time to run		
	light	intermediate	heavy
Scenario 1	30	30	40
Scenario 2	10	80	10
Scenario 3	05	05	90

Step 5: In this subject models need to be tested/run for many types of crude and the result with SIMSCI (Pro II). To find possible heat exchanger network for varies types of crude.

3.2.5 Find the Best Network (one crude unit) of Retrofit Design for Handling Many Type of Crude

Step 1: Design retrofit networks from existing heat exchanger network HEN1 from 3.2.4. By using GAMS model for multi types of crude: light, intermediate and heavy crude.

Step 2: Using ProII to simulate all heat exchanger networks with all type s of crude.

Step 3: Determine the utility consumption from each case study.

Step 4:Analyze data when consider the ratio of crude types which used in three scenarios as shown in Table 3.2.

Table 3.2 Ratio of crude types for retrofit design

	Ratio of time to run		
	light	intermediate	heavy
Scenario 1	30	30	40
Scenario 2	80	10	10
Scenario 3	05	05	90

Step 5: In this subject models need to be tested/run for many types of crude and the result with SIMSCI (Pro II). To find possible heat exchanger network for varies types of crude.