



CHAPTER I INTRODUCTION

The reason that oil or natural gas prices have been continually increasing every day is because of high energy consumptions in process industries. If energy consumption can be successfully reduced, the money which customers have to pay will be saved and also large amount of energy in this world will have been reserved longer. Especially in some countries with energy crisis, they have to import energy from other countries . Therefore, they need to save energy for using in domestic as much as possible. As a results, there are various techniques being developed to solve energy consumption problems ,pinch technology is one technique which is very widely useful .The advantage of pinch technology is to be able to integrate processes to obtain energy saving opportunities. Process integration technique is very important to enhance energy efficiency of industrial and build network of each process to get very few impact to environment.

The beginning works in pinch technology addressed energy targets and the existence of the pinch. Applications to industrial projects resulted in significant energy saving. The latest work incorporates capital cost targets as well as energy targets, and has led to even greater energy savings. The cradle for pinch technology came from heat-exchanger-network design. However, the scope has been extended to combined heat and power system, separation schemes, integrated distillation column, and general process design. The result is a totally general process-engineering tool that has been successfully applied commercially to continuous and batch process in industries as diverse as petroleum, general chemical, petrochemicals, pulp and paper, food and diary, whisky and brewing, cement, steel, pharmaceuticals and fibers.

Pinch technology has one point which clearly separates process into heat sink and heat source, so called “pinch point”. The process pinch point refers to the energy optimum point in the process design , the temperature level above this point acts as heat sink, and the one below acts as heat source based on rigorous thermodynamic principles, Normally , there are many cold and hot streams exchanging heat. Therefore, after performing pinch analysis, the alternative design of heat exchanger

network will be obtained. One constraint needs to be considered is the possibility to exchange between two streams because if two streams which are very appropriate to match is located very far apart or can not be done by any reasons, we must not do it.

Pinch analysis, actually can be done by hand calculation, however, computer technology is developed so there are many simulation programs available to do pinch analysis. One essential software element is process simulation software, the output from which can be used to check sensor-based data such as flow rates, pressure, temperature, and concentrations. Aspen Engineering Suite (AES) and Simsci software will be selected to use in this research since this program is practically used in many companies

This research will be done for retrofitting the heat exchanger network to obtain the best design which posses high degree of energy recovery. This research will be done by separating into three parts. The first part is process modeling and simulation by Aspen Plus. The second part is the heat exchanger network retrofit. The last part is the process heat integration. Actual data will be used from the gas separation plant unit 1(GSP1) of PTT Public Company Limited.

GSP1 is the plant which can separate three kinds of hydrocarbons, methane, ethane, and propane from natural gas. GSP1 consists of three types of distillation column (demethanizer, deethanizer, and depropanizer) as shown in Figure 1.

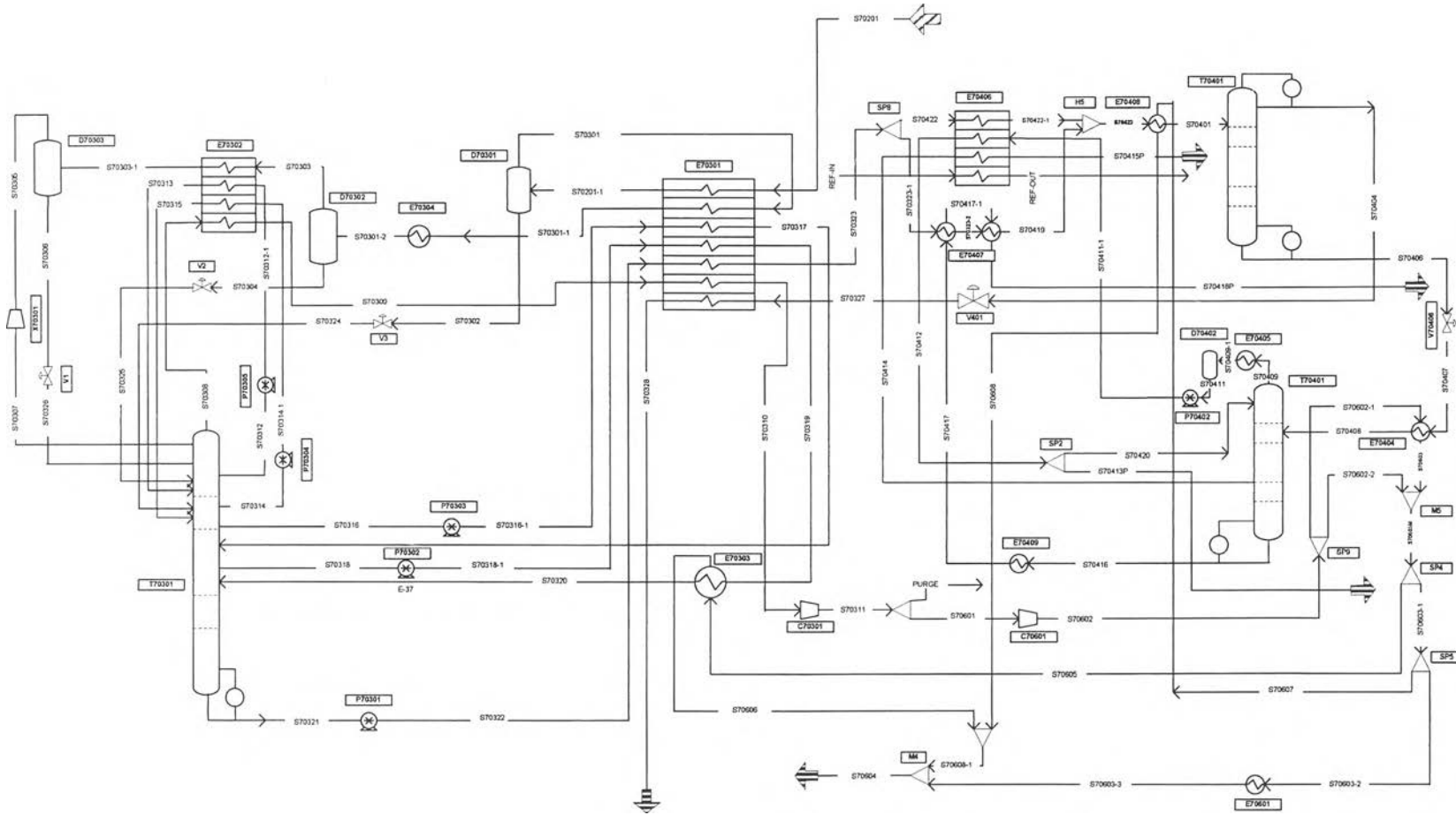


Figure 1.1 Gas separation plant 1.