CHAPTER 1

INTRODUCTION

1.1 Background

Though less widely used than tubular exchangers, plate heat exchangers have characteristics that make them the system of choice in certain applications. A plate exchanger becomes attractive when some expensive material of construction is required. A plate unit may also be cheaper when heat must be transferred among three or more fluids. Fig. 1 compares capital costs of plate and tubular exchangers[1].

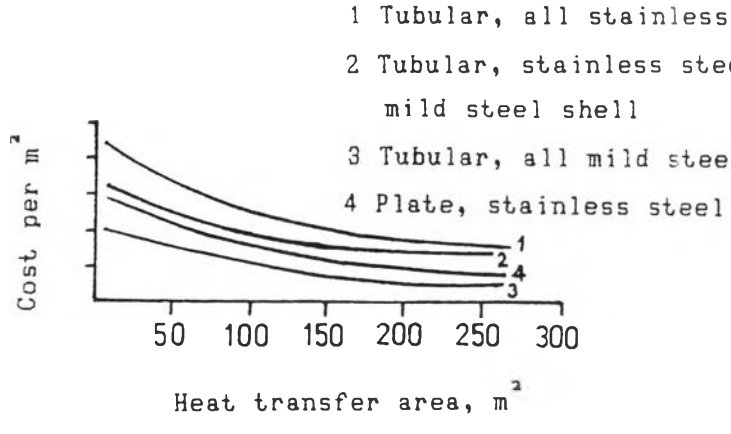

Figure 1 For same material, plate exchanger costs less.

The continuous search for greater economy and efficiency has led to the development of many different types of heat exchangers, other than the popular shell and tube. One of the most successful is the plate and frame heat exchanger, originally introduced in the 1930's to meet the hygienic demands of the dairy

industry[2].

The principal advantage of plate and frame heat exchangers is the accessibility of the heat-exchanger surface. The follower may be rolled back along the frame, and the plates separated for inspection and cleaning. It is well suited for general purpose liquid/liquid duties in turbulent flow. It is for such applications that the majority of plate heat exchangers are supplied in the chemical and allied industries.

The list of successful plate heat exchanger installations within the chemical industry is virtually endless, but it can be said thatplate exchangers are often chosen with as high efficiencies are desired, subject of course to the pressure and temperature limits that the basic design imposes.

True flexibility is unique to the plate heat exchanger both in initial design and after installation. In the intial design, the basic size, geometry, total number and arrangement of standard plates can normally be selected to precisely fit the required duty. An existing plate heat exchanger can very easily be extended or modified to suit an increased or changed duty.

1.2 Objectives

The objectives of the present study are

1. Carry out experiments to find the heat transfer coefficient of a plate heat exchanger.

2. Find a suitable generalized heat transfer correlation for a plate heat exchanger.

3. Develop a computer program to aid in the design of the plate heat exchanger.

1.3 Scope

The tasks to be undertaken in this research are as follows.

1. Carry out experiments to find the heat transfer coefficient for liquid/liquid heat exchange between the following pairs of liquids:

   1.1 water/water.

   1.2 water/syrup.

   1.3 syrub/syrup.

   1.4 water/glycerine.

   1.5 glycerine/glycerine.

2. Find a generalized heat transfer correlation based on the experimental data for the above plate heat exchanger.

3. Develop a computer program to aid in the design of the plate heat exchanger. The program is to be written in TURBO BASIC and implemented on a 16-bit personal computer.