CHAPTER I

INTRODUCTION

Industrial plants require high efficiency of control systems for controlling process because they want to increase profits and reduce losses in the process. There are many controller types in the world, for example, conventional and advanced control systems.

First, a conventional or proportional integral derivative (PID) controller is used for the automatic control of process units in plants. This controller type uses three parameters for adjusting the process. There are proportional, integral, and derivative gains. The PID control system is easy to use in the process.

Another controller, a cascade control system, uses two controllers, primary (master) and secondary (slave) controllers. A primary controller manipulates the set point of a secondary controller as if it were the final control element. Reasons for using cascade controller are:

- Allowing faster secondary controller to eliminate disturbances in the secondary loop;
- Allowing secondary controller to handle non-linear valve and other final control element problems;
- Allowing operator to directly control the secondary loop during certain modes of operation (such as startup);

The disadvantages of a cascade controller are measurement cost of secondary variable (assuming it is not measured for other reasons) and the additional complexity.

The last control system is the advanced controller, called a dynamic matrix control (DMC) which is a mathematical model of the process that is used to predict future process behaviors. Using this predictive model the controller is able to calculate the optimum movement set of a process actuator, a piece of equipment moving when given a signal, which minimizes the error between the actual and desired process behaviors subject to actuator and process constraints. The inherent strength of DMC is the ability to account for process interactions and process

constraints, thereby reducing process variability and driving the process closer to its limits.

Nowadays, most industrial plants have DMC systems for controlling complex process units in the plant, like the distillation column. DMC is applied for increasing the control potential by predicting process behavior in the future and adjusting variables which can be manipulated. In this way, the stability of the system will increase.

This thesis focuses on developing the DMC system and comparing it to conventional control systems. The study and development of the control system will be applied to the dynamic binary distillation column of a depropanizer.