CHAPTER I

INTRODUCTION

Industry and transportation of Thailand are growing; thus, the demand for petroleum feed and fuels are rising. To satisfy this demand, many oil refineries in Thailand (e.g., Bangchak, ESSO, and Thai Oil) plan to expand their capacities of the existing units; however, process limitations or capacity bottlenecks occur. In refinery, the main unit such as topping unit is usually considered for expanding of capacity or throughput. Topping unit consists of three sections; (1) a separation section which refers to all distillation columns, (2) heat exchanger network (HEN), and (3) a utility section. Bottlenecks of the topping unit usually occur in all sections because the expanding capacity overloads the existing equipment design. The separation section poses a serious problem (or difficult task) because the distillation column is the most complex unit comparing with other units (heat exchanger, heater, etc.) in sections 2 and 3. To solve column bottlenecks or to debottleneck, the column modification (tray modification or packings replacement) is required. Moreover, the HEN bottlenecks used to recover heat from hot streams (e.g., products, pumparound) to preheat cold streams (e.g., crude feeds) require the pinch analysis for redesign of the existing unit to handle the rising heat recovery. Other units such as coolers, heaters, and pumps are easy to debottleneck by adding new units.

For engineers, the debottlenecking is a very hard task that relies on many complex units, and requires much manpower and time. To overcome those problems, a process simulator -- an engineering tool -- is used to model processes on a computer. This thesis subject is a simulator application for capacity debottlenecking. Its case study is the topping unit in the plant No.2 of Bangchak Refinery. A simulator, PRO/II, is used for debottlenecking the capacity from 40 kilobarrels per day (KBD) to 50 and

60 KBD based on three crude feeds -- light, middle and heavy mixing crudes-- to handle refining of any crude feeds.

This work yields many benefits. A model so developed is very useful not only for debottlenecking crude capacity, but also for identifying malfunctions of equipment, finding the optimum operating conditions, and training engineers or operators. Moreover, it can lead to future studies in broader scopes such as simulating all processes in this plant or other refinery plants.