

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The purpose of this work is to provide the optimization for HEN retrofit of crude preheat train processing multiple types of crude with light, medium and heavy crude oil feeds for a period of 100, 150 and 100 days per year, respectively for a project life time of 5 years and interest rate of 10 %. This work used the retrofit potential program which was developed using visual basic for application (VBA) of pinch technology which is automatically find the optimum point of ΔT_{\min} (HRAT) in targeting step. The potential retrofit program allows user to easily change the objective function with consent to optimize a variety of cost function. Then a mixed integer linear programming (MILP) model with the stage model by Yee and Grossman was used to design the structure of HEN. The MILP model also presents a good level of flexibility that opens room for decision making by the users. This is advantageous for the retrofit application because industrial retrofit problems are numerous and discrete. Another advantage of the MILP is the ability to manipulate the objective function.

Because the value of the optimum ΔT_{\min} (HRAT) was determined prior to the design of the retrofit process, the whole subsequent methodology depends on the accuracy of the assumption that the optimum value was valid enough to produce the most economical solution. Therefore the possibility that the global optimum ΔT_{\min} value is the same for the final retrofit design is quite low.

From three alternative retrofit design which are based on light crude, medium crude and heavy crude, respectively, the retrofitted HEN of medium crude with multiple crude feed gives 35% total utility saving and maximum NPV of 11,005,420 \$.