

The aim of our work is to enhance the overall performance of an industrial plant, the fact that can be achieved by reducing the energy consumption and augmenting the safety of the plant. In the work we have considered a petrochemical plant where the distillation columns are considered as the major part since 40% of the energy consumed in a petrochemical plant is allocated in the distillation column. To improve the energy saving we deal with two methods the first is the use of design modification and the second is a new strategy based on artificial intelligent (fuzzy logic approach). To enhance the safety in the considered plant we propose the application of an integration frame between HAZOP and SIL studies for a fired heater the equipment that is considered as the main source of explosions in any petrochemical plant since in the fired heater the crude is heated to reach a high degrees of temperature in order simplify the product separation in the distillation column. Many recommendations and results are included in thesis