REDESIGN HEATER HEAT EXCHANGER
PT. PETROKIMIA GRESIK USING THERMODYNAMICS
AND HEAT TRANSFER ANALYSIS

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Abstract
Heater heat exchanger is one of the most important equipment in phosphoric acid production. This equipment raises the temperature of phosphoric acid before entering evaporator and reduces the required energy. In this research, steam is used for the hot fluid and the cold fluid is phosphoric acid. Because of phosphoric acid is the raw material for fertilizer production and its demand grow rapidly, it is important to produce more phosphoric acid. To solve this problem, the company need to build a new factory to answer the availability of the material in the market. Higher mass flow rate on the same temperature and pressure is the required difference between the old and the new ones. So it will be needed to re-design the heater heat exchanger which is one of the equipment in the new factory.

The method used for redesigning process is based on thermodynamic and heat transfer analysis. The input used in accordance with the desired data and operation data from the old heater heat exchanger. The analysis is used to get the dimension of each zone on the heater heat exchanger.
The redesign results are the total length of heater heat exchanger of 8.414m, 2 tube passes, the number of tubes are 400, the inside shell diameter of 1.283 meters. The length of condensing zone is 7.583 meters. The length of sub-cooling zone is 0.831m with single baffle on the middle. Pressure drop on the shell side is 0.018bar and tube side is 0.266 bar. The maximum limit of pressure drop is 0.06 bar on the shell side and 0.35 bar on the tube side, so the design is still within the exposure limits.

Keywords: Redesign; Heat exchanger; Phosphoric acid; Heater heat exchanger; Pressure drop; LMTD; NTU