DESIGN OF CONTROL SYSTEM AND OPTIMIZATION AIR TO FUEL RATIO FOR BOILER AT PT. PETROKIMIA GRESIK BASED ON ARTIFICIAL NEURAL NETWORK AND GENETIC ALGORITHM

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Abstract
Ratio control is a control system that used to maintain the composition of process. For boiler combustion process need an air and fuel with precise composition and rasio to optimize the combustion process. The combustion optimum value can be define from the output parameter. That is the oxygen content from the combustion waste air. Since the combustion process is a complex and non linear process unit, then we can model the process by using neural network with multi layer perceptron structure. The model structure is non linear auto regressive with external input(NARX). Levenberg-Marquadt algorithm is used to determine the weight of neural network. That has a result of RSME about $3.4 \times 10^{-3}$ after modelling the process. The air to fuel ratio can be determined by using genetics algoritm for about 8.3227 :1. Ratio control system is designed after with direct invers control method based on neural network. From the simulation, can be assumed that direct invers control based on neural network has a good response.the ratio control is following setpoin after 2 minutes (set poin 6000) with maximum overshoot 2.23 %. After 0.9 minutes (setpoin 9000) with maximum overshoot 0.73 %. after 1 minutes(set poin 5000) with maximum overshoot 1.78 %. After 1 minutes (set poin 7000) with maximum overshoot 0.62 %.

Keyword: combustion process, ratio control, neural network, genetic algorithm