RINGKASAN

Muchamad Kholid Mawardi, Jurusan Teknik Elektro, Fakultas Teknik Universitas Brawijaya, Juni 2015, *Uji Performansi Kontroller PID terhadap Disturbance Tekanan pada Proses Distilasi Vakum Bioetanol*, Dosen Pembimbing: Goegoes Dwi N.dan Rahmadwati.

Bioetanol merupakan bahan bakar nabati yang digunakan sebagai pengganti bahan bakar fosil. Dalam penelitian ini dikembangkan pembuatan bioetanol dengan distilasi vakum. Awal dari penelitian ini adalah perancangan sistem kendali suhu pada proses distilasi vakum. Pengendalian dirancang agar suhu distilasi vakum bioetanol sesuai dengan setpoint yaitu suhu 62 °C dengan mengendalikan heater yang berisi cairan tetes tebu.

Pada penelitian kali ini dilakukan uji performansi pada proses distilasi vakum bioetanol.. Hasil pengujian terhadap keseluruhan sistem diperoleh *error steady state* sebesar 0.208 %. Proses perancangan kontroler PID menggunakan metode pertama Ziegler Nichols dan didapatkan parameter PID yaitu Kp= 6.3, Ki= 0.00393 dan Kd=2520.

Percobaan saat *Plant* diberikan kenaikan gangguan tekanan 0.1 atm sistem tidak mengalami perubahahan suhu sedangkan untuk kenaikan gangguan 0.2 dan 0.4 atm mengalami perubahan suhu dengan error 1.93 % dan 2.186 % dari setpoint. Plant membutuhkan *recovery time* 250 detik dan 380 detik.

Kata Kunci: Heater, Kontrol suhu, Kontroler PID, Uji Performansi.

SUMMARY

Muchamad Kholid Mawardi, Department of Electrical Engineering, Faculty of Engineering Brawijaya University, June 2015, PID Controller Performance Test against Disturbance Pressure on Vacuum Distillation Process Bioethanol, Supervisor: Goegoes Dwi N.and Rahmadwati.

Bioethanol is a biofuel that used as a substitute for fossil fuels. This research is developed in the manufacture of bioethanol with vacuum distillation. Early research is design of the temperature control system in a vacuum distillation process. In order to control the temperature of bioethanol vacuum distilation as setpoint 62 °C by controling the heater that contain of liquid molases.

In this research, performance of bioetanol vacuum distillation has been tested and the result is error steady state 0.208%. In the designing process of PID controller, Ziegler Nichols 1 method is used the parameter of controler are obtained such as Kp = 6.3, Ki = 0.00393 and Kd=2520.

During the experiment, the disturbance is given to the plant, with increasing pressure disturbance 0.1 atm, 0.2 atm and 0.4 atm respectively. the result, pressure disturbance 0.1 atm doesn't make a sense to the plant, however when 0.2 atm and 0.4 atm, the temperature of the system has been changed, the temperature becomes 1.93 % and 2.186 % from setpoint. the respect of the plant require a recovery time a round 250 seconds and 380 seconds.

Keywords: Heater, Temperature Control, PID Controler, Performance Test.