

Surathep Nilnond 2010: Automatic Controller Performance Enhancement for Extractors in Biodiesel Production Process. Master of Engineering (Electrical Engineering), Major Field: Electrical Engineering, Department of Electrical Engineering. Thesis Advisor: Assistant Professor Peerayot Sanposh, D.Sc. 79 pages.

This research purposed to present about Automatic Controller Performance Enhancement for Extractors in Biodiesel Production Process by studying and finding out the suitable dynamic model of the Continuous Stirred Tank Reactor (CSTR) in Biodiesel production process. After that, we applied the Optimal Control Theory to calculate optimal energy, that was put into the system, for control heat energy which was used to stimulate the reaction in Biodiesel production process. Under the limited energy levels, we expect to use the least time to produce Biodiesel in the assigned concentrations and use Particle Swarm Optimization to compare controller's performance. Moreover, this research also experimented about the control through FieldPoint, and designed Human Machine Interface (HMI) for the Continuous Stirred Tank Reactor (CSTR) in Biodiesel production process.

From the results, Design controller using optimal control theory with input saturation and constrains with time and at final time ester concentration is  $2.104 \text{ mol/l}$  and temperature in biodiesel tank is  $333.15^\circ K$  can minimized for the lowest time and input power for production process.

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Thesis Advisor's signature