

**Master 2016**

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**Development of a Test Bench for Heat Aging.**

***ABSTRACT - Masterthesis***

This study was performed with two main goals in mind. The first goal was to develop hardware for air heating system with sufficient efficiency for the heat aging testing process. The second goal was to design a suitable controller for the whole system based on the test bench design.

Initially, the required hot air mass flow rate was calculated. Based on this value, the hardware was selected and the heater system was developed. Several designs were implemented in system development to increase the efficiency of the system.

Controller design has been done categorized into several sections such as process model development, finding a suitable controller design and tuning method, enhance the controller performance and design analysis of improved controller methods. Traditional PI controller was designed for the control system. PI controller was tuned by various tuning methods and the auto tuning method of Siemens PLC was found to be the most suitable method. Performance of PI controller enhanced by adding feedforward controller and the design was verified in real time process. Model predictive controller was designed for the system and the performance of the controller was analyzed in the simulated response. A simple tuning method for decoupling controller design was developed. The implementation of decoupled PID controller into the real time process demonstrated that this tuning method and the design is quite effective ensuring improved performance of the heater system.