

ABSTRACT

Heat treatment is a controlled heating and cooling process that aims to change the physical features and mechanical features of a material or metal according to the required purpose. The processes in heat treatment include heating, which requires a certain temperature and a certain period of time. To do this process requires an effective and efficient heating device i.e using a furnace. In the heating process, the furnace must have a temperature control system to streamline time and maintain a stable temperature as specified; Therefore, the design and implementation of the temperature control system in this research is carried out using PID control with PLC. This control system will regulate the heater by keeping the heater in an ideal condition. The method for finding PID parameter values that produce K_p , K_i , and K_d values is the auto tuning method on the PLC system, which gets the value of $K_p = 4.51$ $K_i = 14.82$ $K_d = 3.75$ at a setpoint of $300\text{ }^\circ\text{C}$. Based on the test results, the PID control system produces a system response, the rise time and settling time are slower than the proportional control but the control system manages to achieve steady state with a deviation or tolerance from the set point value of less than 2%. The proportional control system produces a faster rise time and settling time than the PID control but produces a steady state error with a value of more than 2%.

Keywords: *PLC, PID control, autotuning, furnace*