



## Analysis of Light Bulb Temperature Control for Egg Incubator Design

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**Abstract:** This paper explained the analysis and findings of using light bulb as a thermal source for an incubator system. The inner dimension of the incubator is 26 cm (W) x 38 cm (L) x 26 cm (H). In the experiment, a temperature sensor that measures the inside temperature of the incubator used as a feedback signal. To run the experiments, number of light bulbs and its type were determined. There are three types of bulb used i.e. Incandescent Light (IL Bulb), Compact Fluorescent Lamp (CFL Bulb) and Light Emitting Diode (LED Bulb). Three fixtures are proposed for each bulb type, i.e. one-bulb fixture, two-bulb fixture and three-bulb fixture. Apart from that, three control modes were tested, i.e. Mode 1, Mode 2 and Mode 3. Mode 1 is ON-OFF bulb control. Mode 2 is ON-OFF bulb control, as well as ON-OFF ventilation fan control. Finally, Mode 3 is only ON bulb control and ON-OFF ventilation fans. The experimental results showed that, for the chosen incubator size, three-bulb fixture IL-type light bulb controlled with Mode 3 control gave shorter time to reach the set point then return to set point after overshoot.

**Keywords:** Temperature Control, Incubator, IL bulb type, CFL type, LED type

### 1. Introduction

Poultry farming is the process of raising and breeding domesticated birds such as chickens, ducks, turkeys and geese for the purpose of farming meat or eggs as our food. Some chickens are bred for egg production and can lay as frequent as they can. Besides breed factor, egg production capability of a chicken also depends highly on chicken age factor [1]. As an egg hatcher, all these need to be considered if you are breeding the flock using the natural way.

From the view point of a productive farmer, automatic hatcher machine or known as egg incubator is an option to increase their breeding productivity via artificial incubation. An incubator basically is an enclosed structure with a fan