

THE DESIGN OF A HEATER CONTROLLER FOR A THERMAL EVAPORATION SYSTEM

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ABSTRACT

A compatible heater system is vital for the successful operation of an evaporator for material fabrication process. This thesis describes the method of designing a heater system well suit for evaporation and deposition of amorphous silicon thin film. Several factors must be taken into consideration in the design of the heater to match the use. Analysis of the system before developing the actual heater system is Boat. Before this actual circuit is assemble, the simulation by using PSim and PSpice were conduct to get the parameters and the expected result in order to compare with the actual result by experiment. By designing the circuit, the resistances of the boat were obtain, and then the whole parameters were regarded to this value in order to get the expected value of current to used in heating system to evaporated process. The calculation of current supply for heater required at 0.295 A for the duration of 1 hour or 3600 s for evaporation of silicon to take place. An air-cored inductor has been used in this circuit to ripple less the wave-form of DC current. By using the Wheeler's formula, the suitable value of inductor at 1.1mH was used in the circuit design to filter or ripple less the wave form current from sinusoidal to constant increase. This is because, the constantly increase current are easy to control, difference to the sinusoidal current wave form.

Keywords: Bridge rectifier, Boat, coil design, current flowing, evaporator.

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CHAPTER 1

INTRODUCTION

1.1 Heating system

Electric heating is any process in which electrical energy is converted to heat. Common applications include heating of buildings, cooking, and industrial processes.

The heating element inside every electric heater is simply an electrical resistor, and works on the principle of Joule heating: an electric current through a resistor converts electrical energy into heat energy [1].

Advantages of electric heating methods over other forms include precision control of temperature and distribution of heat energy, combustion not used to develop heat, and the ability to attain temperatures not readily achievable with chemical combustion. Electric heat can be accurately applied at the precise point needed in a process, at high concentration of power per unit area or volume. Electric heating apparatus can be built in any required size and can be located anywhere within a plant. Electric heating processes are generally clean, quiet, and do not emit much by product heat to the surroundings. Electrical heating equipment has a high speed of response, lending it to rapid-cycling mass-production equipment.

The limitations and disadvantages of electric heating in industry include the higher cost of electrical energy compared to direct use of fuel, and the capital cost of both the electric heating apparatus itself and the infrastructure required to deliver large quantities of electrical energy to the point of use. This may be somewhat offset by efficiency gains in using less energy overall to achieve the same result.

Design of heating system starts with assessment of the temperature required, the amount of heat required, and the feasible modes of transferring heat energy. In addition to