

# “EXPERIMENTAL STUDY ON INDUCTION HEATER FOR INDUSTRIAL GEAR & BEARING ASSEMBLY BASED ON EDDY CURRENT”

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## Abstract

To lessen the chance of wrong mounting, Induction Heater helped pioneer the usage of transportable Induction heater for bearing mounting utility. This Induction heater is more secure, extra efficient & person pleasant bearing Induction heater. The Induction heater has been designed to warm rolling bearings. However; different metallic paintings piece that shape a closed circuit also can be heated. Examples of suited paintings piece consist of bushing, decrease ring pulleys & gear. All bearing that suit over the Inductive coil & among the vertical help with the pinnacle yoke in location can be heated the use of the induction heater. Additionally a software program segment locked loop for induction heating utility is designed & carried out to show its flexibility & reliability. The modeling of a non-stop induction heating to let in excessive manufacturing with decreased area requirement & excessive strength commercial system running 24 hour in step with day.

**Keyword:** import heater, bearing, gear, flexibility, reliability, Microcontroller, work piece.

## Introduction

Induction heating is a method of heating electrically conductive material taking advantage of the heat produced by the eddy current generated in the material.[1] It has many advantages compared to other heating system. Such a quicker heating faster start up more energy saving & higher production rates. Since Michael Faraday discovered electromagnetic induction in 1831, this phenomenon has been widely studied in many applications as for example transformer & other magnetic design this basic electromagnetic phenomenon in.

## Methodology

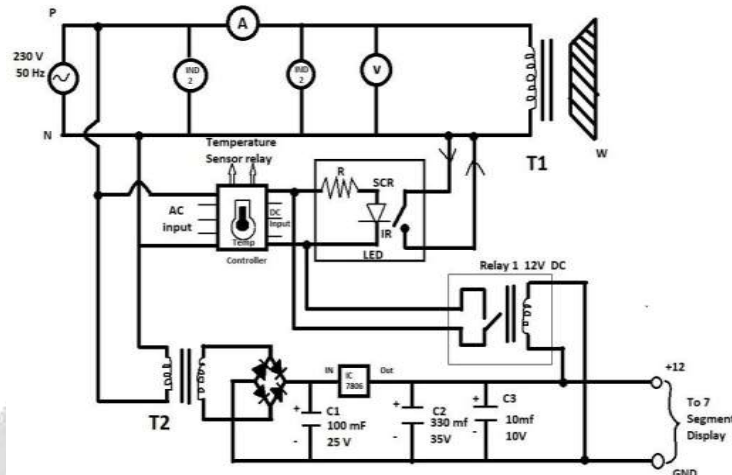
Microcontroller based Induction Heater Industrial Gear Bearing consist of following components – Temperature controller, digital timer, set reset start switches, relay 5v DC, display indicator, Temperature sensor, induction heater coil, SSR, connector strip, two pin, winding paper, transformer core Epoxy resin. The below given diagram of Induction Heater for gear & bearing assembly primary function of IH induction heater



## Prototype Model

### System Working

Microcontroller based Induction warming auto industry to contract fit cog wheels and rings. They are likewise utilized to fix trins truck and vehicles. OUR framework are utilized for recoil fitting errand on seaward stage and



are utilized to eliminate the goliath bearing and stuff , ring in the engine , wheel of vehicle and trucks in their bearing .

Regularly metals will extend in light of warming and contract while is cooling. This layered reaction to temperature change is known as warm development acceptance shrivel fitting is the place where we are this impact to one or the other fit or eliminate parts. A metal bearing is warmed to between 900C to 3600C. Which make it grow a take into account the addition or evacuation of other parts like as stuff from the shaft of vehicle .This enlistment warming have advantages of precision and speed, consistency. In the event that we set 1500C in the temperature control, after heat comes to at it wanted worth. It remove line supply and save from overheating another way is the computerized clock .There likewise we set time in minutes for the warming it give additionally dependable execution after reach at appropriate temperature of bearing it likewise break the stockpile .

The framework have the regulator , gadget , temperature regulator and computerized clock at whatever point any shortcoming condition happen it cut the power supply from framework give 100 percent safety to activity just as gear.

The high temperature is particularly important for precious metals .Induction heating efficiency is higher than the flame furnace with about 30-50% & higher than traditional electric resistance furnace with about 20%-30% & it has the advantages of convenient operation & long Service Life.

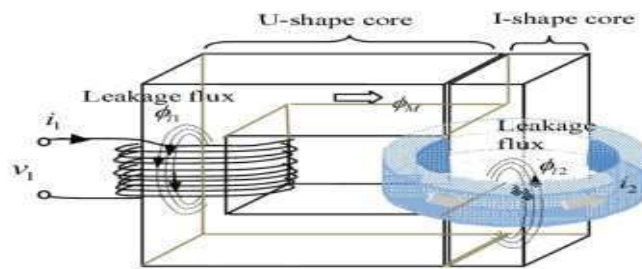
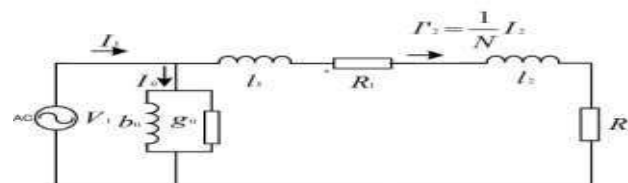


Fig. 1 Schematic diagram of the induction heating machine

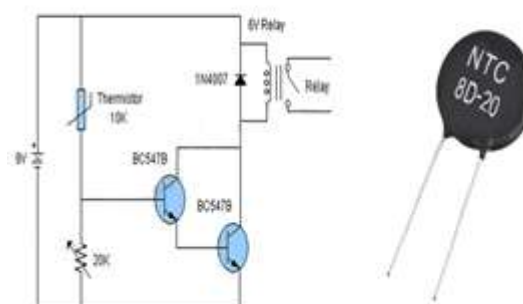


- $V_1$  : heating coil voltage(primary voltage)  
 $I_1$  : heating coil current(primary current)  
 $R_1$  : heating coil winding resistance  
 $L_1$  : heating coil leakage inductance  
 $N_1$  : turn of heating coil  
 $R_2$  : ring(secondary) resistance  
 $L_2$  : ring(secondary)leakage inductance

#### A. Temperature Sensor relay switch

Temperature sensor hand-off switches circuit. This is very much like a typical hotness or temperature sensor with a hand-off so at whatever point the circuit will get heat the hand-off will initiate thus will the heap or gadget associated with the hand-off. Any AC 110V or 220V or DC machine can be associated with the hand-off so you can work it naturally on the ideal temperature. The circuit is modest and basic it is utilizing just 5-6 parts. It is an ideal circuit for fledglings searching for a simple electronic venture or for the people who need a reasonable fix for their hotness detecting necessities. This circuit can be worked on a 9 volts battery, transformer, or a connector. We have associated two BC547B semiconductors as a Darlington pair. This expands the responsiveness and the increase of the circuit. To change the ideal degree of hotness at which you need your hand-off to enact we have utilized a 20K ohms variable resistors. An indoor regulator is the fundamental part as it is detecting the hotness. You want to interface it somewhat away from different parts in the circuit so the hotness doesn't get to them.

### Temperature Sensor Relay Switch



#### B. Transformer Core

The transformer works on the principle of Faraday's law of electromagnetic induction and mutual induction. There are usually two coils primary coil and secondary coil on the transformer core. The core laminations are joined in the form of strips. The two coils have high mutual inductance. When an alternating current passes

through the primary coil it creates a varying magnetic flux. As per faraday's law of electromagnetic induction, this change in magnetic flux induces an emf (electromotive force) in the secondary coil which is linked to the core having a primary coil. This is mutual induction.

Overall, a transformer carries the below operations:

1. Transfer of electrical energy from circuit to another
2. Transfer of electrical power through electromagnetic induction
3. Electric power transfer without any change in frequency
4. Two circuits are linked with mutual induction

### Result Analysis

SR . NO	CORE DIAMETER RANGE	TEMPERATURE CONTROLL	TEMPERATURE RISE TIME	MAXIMUM TEMPRATURE
1	0-100mm (.8-4inch)	to 200°C	40sec	00°C
2	0- 300mm (0.8-11.8inch)	to 250°C	40sec	00°C
3	0-400mm (.8-15.7inch)	to 250°C	40sec	00°C
4	0-600mm (.3-23.6inch)	to 250°C	45sec	00°C
5	0-800mm (.9-31inch)	to 260°C	60sec	10°C

### 8.2 Result :-

SR. NO	OPERATING FREQUENCY	APPLIED VOLTAGE	OPERATING CURRENT
1	50HZ	30V	A
2	50HZ	30V	A
3	50HZ	30V	A
4	50HZ	30V	A



## Conclusion

In this paper, the design and construction of the power system for the induction heating cooker based on resonant converter is presented. The control circuit is composed of error amplifier, time delay section, oscillator section, gate pulse section, oscillator section, gate pulse transformer and resonant tank circuit. The half-bridge series resonant converter and configuration is chosen.

The high temperature is particularly important for precious metals. Induction heating efficiency is higher than the flame furnace with about 30-50% & higher than traditional electric resistance furnace with about 20%-30% & it has the advantages of convenient operation & long Service Life.

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