

# Experimental Analysis of Aluminum Rod of Heat Transfer Rate with Changing Dimension Size and Shape

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**Abstract**— Aluminum material mostly use in automobile and air craft system. In IC engine aluminum is base component as heat transfer and cool engine. In This experimental base analysis aluminum study with changing area of metal rod and study heat transfer rate of aluminum rod with changing machine parameter like speed and depth of cut of material during machining. Here we can find tapered angle of jib which is very effective for heat transfer rate.

**Key words:** Aluminum Rod, Heat Transfer Rate

## I. INTRODUCTION

Aluminum material use mostly in heat transfer rate as fins in engine system. The Aluminum is a chemical element with symbol Al and atomic number 13. It is a silvery-white, soft, nonmagnetic, ductile metal in the boron group. By mass, aluminum makes up about 8% of the Earth's crust; it is the third most abundant element after oxygen and silicon and the most abundant metal in the crust, though it is less common in the mantle below. Aluminum is remarkable for its low density and its ability to resist corrosion through the phenomenon of passivation. Aluminum and its alloys are vital to the aerospace industry and important in transportation and building industries, such as building facades and window frames. Aluminum material use in transportation like automobiles, aircraft, truck, marine vessel etc, Food and beverage container, in construction like window, sliding, roofing, Street light poles etc. The effect of a material upon heat transfer rates is often expressed in terms of a number known as the thermal conductivity. Thermal conductivity values are numerical values that are determined by experiment. The higher that the value is for a particular material, the more rapidly that heat will be transferred through that material. Materials with relatively high thermal conductivities are referred to as thermal conductors.

## II. PROBLEM STATEMENT

Heat transfer is a branch of engineering science which seeks to determine the rate of energy transfer between bodies as a result of temperature differences. The concept of rate is the basic difference between heat transfer and thermodynamics. Thermodynamics deals with systems in equilibrium and is concerned with the amount of heat required to change a system from one state to another. The basis of this study applies the heat transfer process. Heat transfer can be categorized into three main processes which are the conduction, convection and radiation of heat. explains the energy transfer between surfaces and with different type of medium involved during the heating process The analysis of heat transfer is important due to it applications within the daily usage and including the large scale implementations.

Aluminum Fins are used In Automotive, radiator is the base component of the engine cooling system. In This Experiment aluminum rod use for heat transfer rate for cooling system mostly and study heat transfer rate with changing cross section and size and shape. In this experiment find relation between surface finish and heat transfer rate of aluminum rod. Surface finish depended on machine parameter such as speed and depth of cut so in this experiment change speed and depth of cut and find relation between speed and surface finish with respect to heat transfer rate. In this experimental analysis length of job and diameter is constant but varying parameter is Tapered and machining parameter.

## III. EXPERIMENTAL SET UP

Tapered aluminum rod manufacture by CNC machine under changing various parameters like speed and depth of cut. Then after on end of aluminum rod inserted in furnace up to some specific heat after to reach specific temperature rod take out from furnace and observed temperature on sensor means thermocouple choose specific length of rod and observe temperature variation on metallic rod. Very time change tapered angle and find effective method which is best for heat transfer.

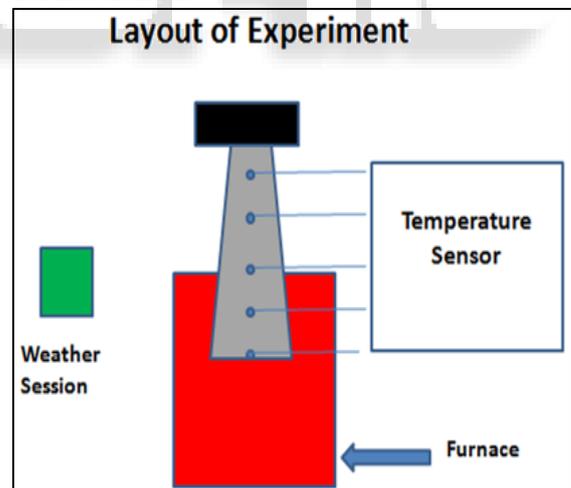


Fig. 1: Experimental Set up

Thermocouples are used for temperature measurement. Thermocouples are based on the principle that when two dissimilar metals are joined, a predictable voltage will be generated that relates to the difference in temperature between the measuring junction and reference junction. Surface finish measurement instrument is Talysurf in which measured Ra and Rz value. CNC Machine are used for machining as per programming we can varying speed and depth of cut parameter and observed surface finish with changing speed and depth of cut and then after observed heat transfer rate of aluminum rod.

#### IV. SUMMARY

This Experiment will find tapered angle which is give beat heat transfer rate so we can use this tapered angle for engine system. Through investigation observe relation between surface finish and heat transfer rate with machine parameter such as speed and depth of cut.

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