Scientific Journal of Impact Factor (SJIF): 5.71

e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

Volume 5, Issue 04, April -2018

ANALYSIS ON TOTAL HEAT FLUX OF CIRCULAR FIN

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ABSTRACT - *Fin is widely used in the industry. The efficiency of component depends on the fin performance. This research paper is exposed the total heat flux analysis of brass fin. ANAYS fluent is used for analysis. Length of the fin is 0.125m. Diameter of the fin is 0.012m. Brass is selected as martial of the fin. Simulation is done in the natural convection. The result shows the temperature distribution and total heat flux through the circular brass fin for 360sec duration. ANSYS fluent analysis shows the performance chart of fin. Finally, Maximum Total heat flux is 23575 W/m^2 at 80.369 ^{o}C temperature.*

Keywords: *Total Heat flux, temperature, fin.*

I. INTRODUCTION

Application of fins are widely used in the power distribution sector (transformers), Automobile sector (engine cooling), Power Plant Sector, electric components, space industry etc [1]. The performance of these devices also depend on the fin. Pin fin is suitable for air cooled I C engines, Electrical Small Transfers etc [2]. Fin analysis can possible by the experiment and numerical technique in the past research [3]. ANSYS fluent is used for analysis of total heat flux through the fin.

II. SIMULATION OF CIRCULAR FIN

Simulation is performed by using ANASY fluent soft ware. 2.65 W Heat flow is applied to brass circular pin fin. Figure 1 shows the heat flow through the fin and convection coefficient chart. Air temperature was 29^{o}C. Diameter and length of fin is 0.012m & 0.125. Thermal Conductivity of fin is 110 W/mk. Simulation is done in the natural convection. Figure 2 shows the chart of convection coefficient respect to time. 8.762 W/m^2 ^{o}C convection coefficient is found for 360 sec from chart for simulation.

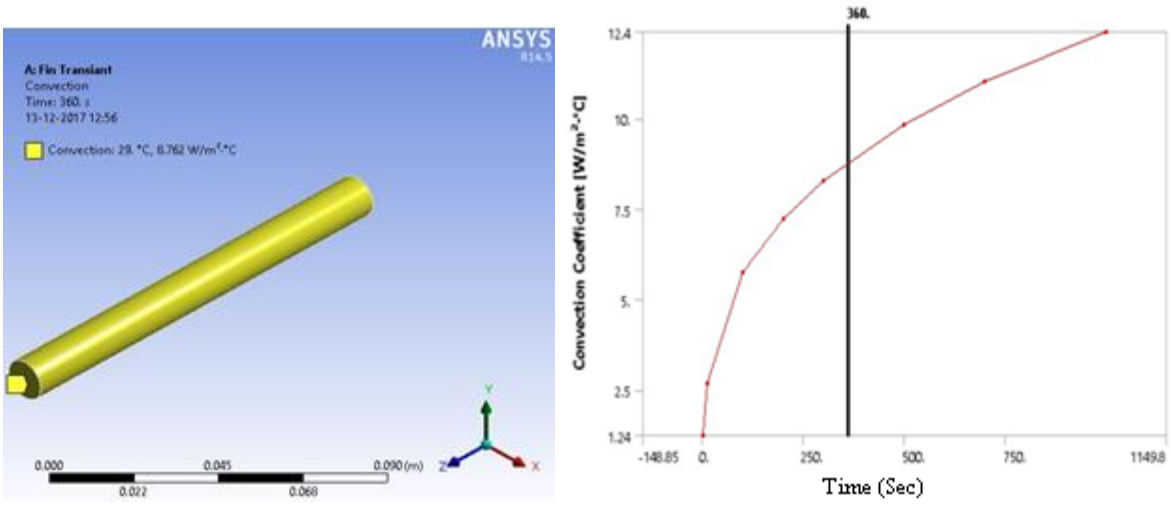

Figure 1 Heat flow through the fin and convection coefficient chart

III. TOTAL HEAT FLUX

Figure 2 shows the temperature distribution on the fin after passing 2.65 W heat flows for 360sec. Temperature is decreased from 0 m to 0.125m Maximum temperature is at 0 m where heat is supplied. Minimum temperature is at 0.125m..
Figure 3 shows the temperature distribution respected to length of fin.

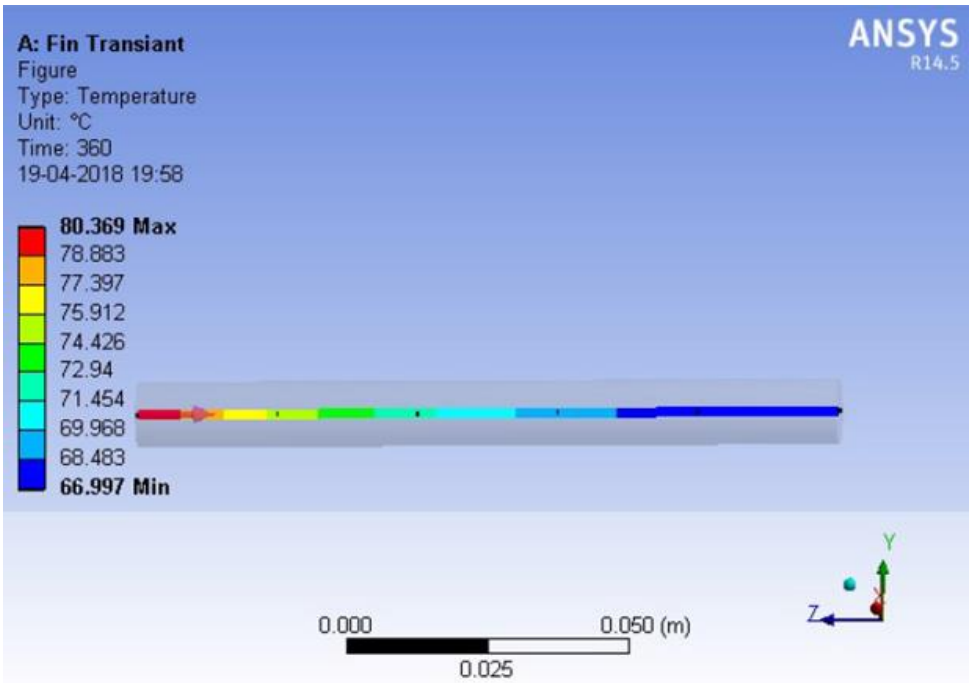

Figure 2 Temperature distribution respected to length of fin

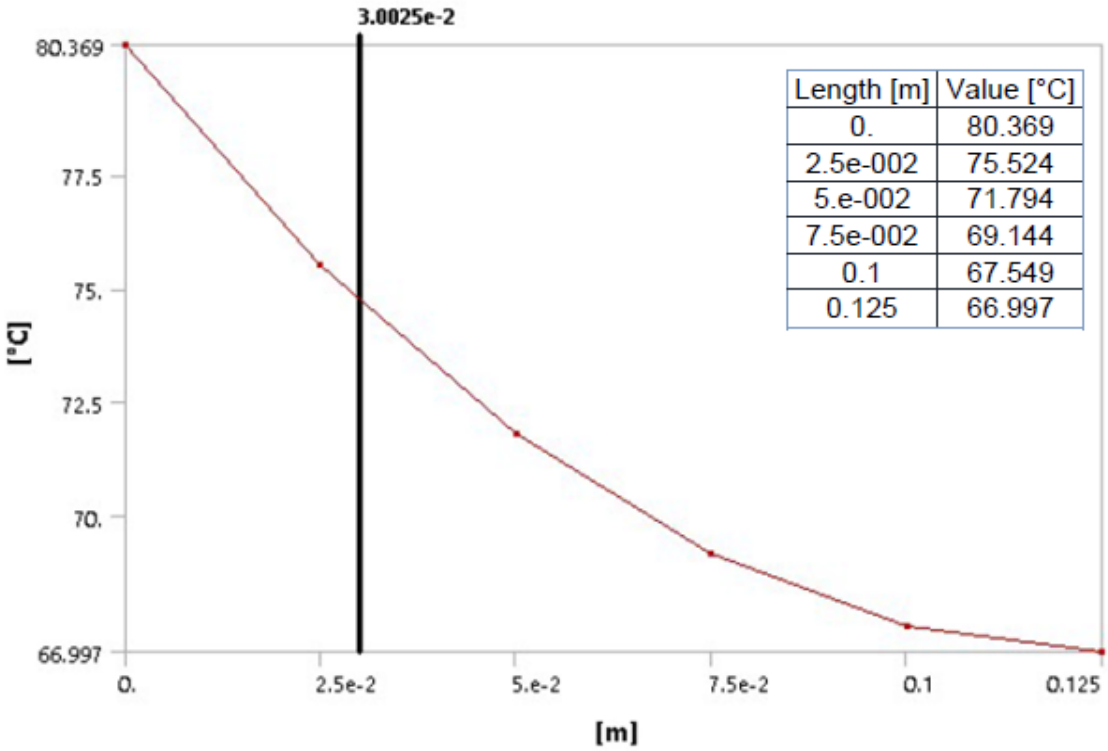

Figure 3 shows the temperature distribution respected to length of fin.

Total heat flux is a flow of energy per unit of area per unit of time. In SI its units are watts per square meter (W/m^2). It is a vector quantity. It has both a direction and a magnitude. Figure 4 shows the total heat flux through the fin. Maximum total heat flux is 23575 W/m^2 at 0 m. Minimum total heat flux is 378.61 W/m^2 at 0.125m. Figure 5 shows the total heat flux respected to length of fin.

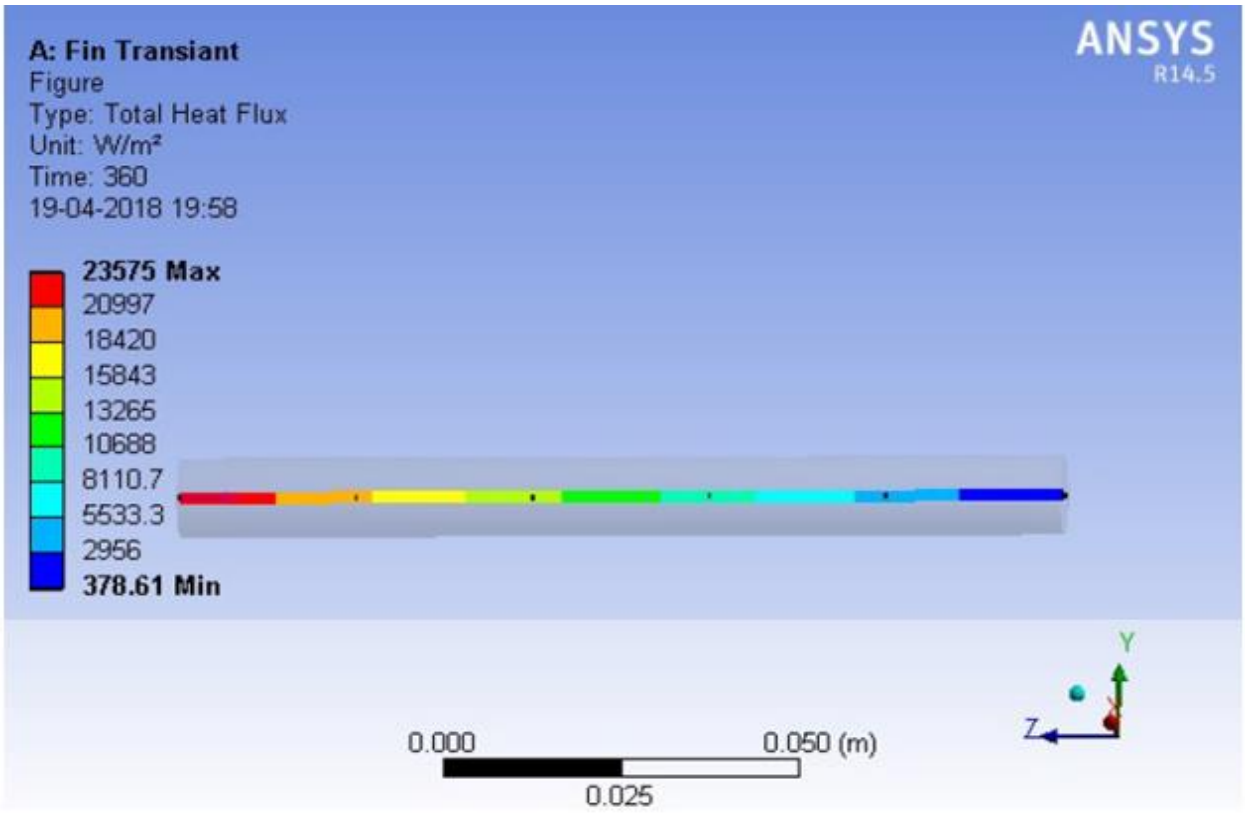

Figure 4 Total heat fluxes through the fin

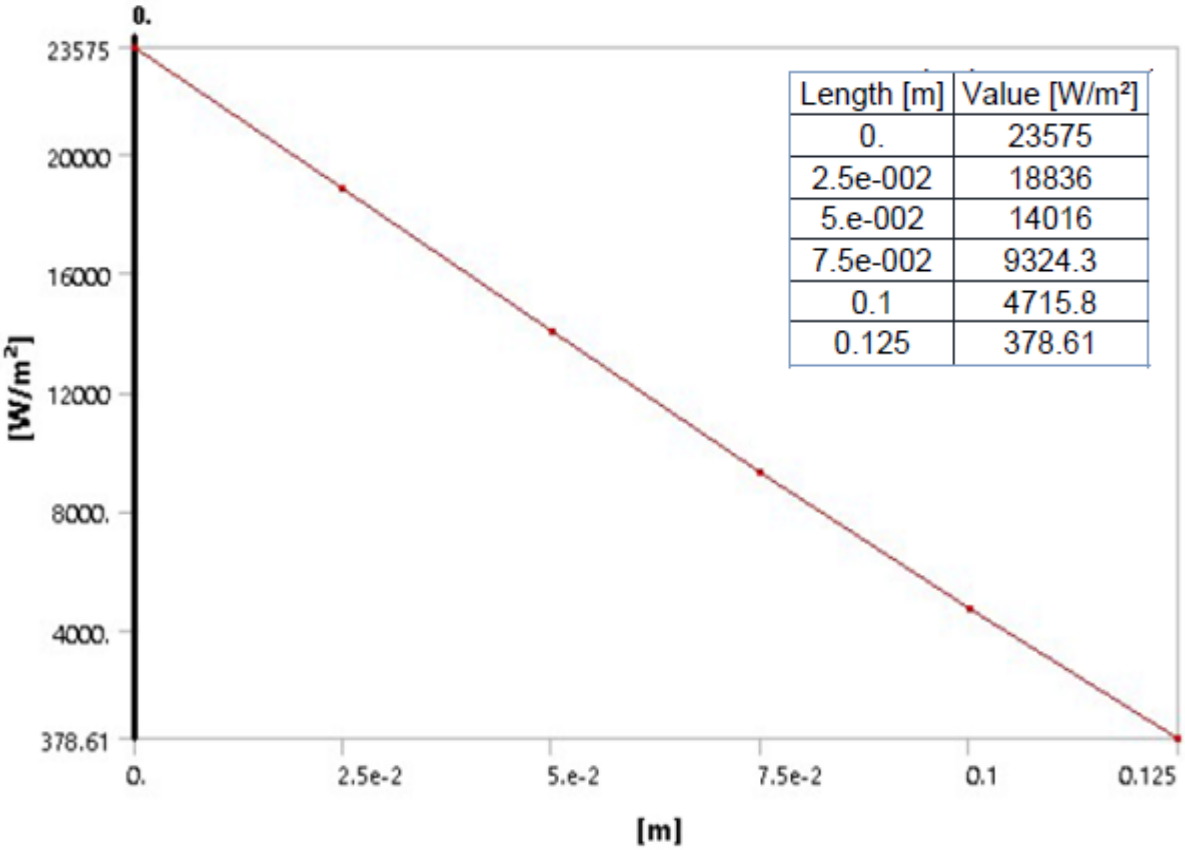

Figure 5 shows the total heat flux respected to length of fin.

IV. RESULT AND DISCUSSION

Table 1 show the total heat flux and temperature distribution on the fin after simulation. Results show that ANSYS simulation is found 23575 W/m^2 maximum total heat flux at 80.369 ^{o}C temperature. Also Total heat flux and temperature is reduced with respect to length.

Table 1 Result of total heat flux and temperature distribution

Length of fin [m]	Total heat flux [W/m^2]	Temperature [^{o}C]
0	23575	80.369
0.025	18836	75.524
0.050	14016	71.794
0.075	9324.3	69.144
0.1	4715.8	67.549
0.125	378.61	66.997

V. CONCLUSION

ANSYS simulation can be used for experiment. It can be guide us as a advanced tool for results. Simulation of brass fin in the natural convection is given total heat flux and temperature distribution.

VI . REFERANCES

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