

# A Review: Study of Heat transfer in Fins

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**Abstract**— Extended surfaces are used to increase heat transfer rate and this study related to extended surfaces (fin) and heat transfer rate. This review summarizes the previous work on various shapes of fins. In this study, discuss heat transfer in different geometry of fins because the heat transfer rate depends on the changing of the fins materials, fins cross-section, fin profiles, air velocity etc. So this review helps to select the fins according their requirements.

**Key words:** Heat Transfer Rate, Rectangular Fin, Circular Fin, Trapezoidal Fin, Fin Material

## I. INTRODUCTION

In the technology where heat is generating under the process of work is a major problem. For reducing this problem, increasing heat transfer rate for cooling by using the extended surfaces. Where the heat transfer coefficient is very low there fins are used on the surfaces for increasing fin performance. The selection of fins is based on the thermal performance and cost. The selection of suitable fin geometry requires a compromise among the cost, weight, available space, pressure drop of heat transfer fluid and heat transfer characteristics of the extended surface.

## II. REVIEW OF PREVIOUS WORK

Many analysis performed in various profile of fins by numerical and experimental investigation have been carried out.

Chen z. et al. (1997), they have performed experiment in rectangular duct with array of drop shaped pin fin in cross flow of air and they investigate the convective heat transfer pressure loss after than the experimental results they shows the heat transfer of a rectangular duct with drop shaped pin fin is higher than circular pin fin.

Kushwaha and Kirar (2013) are used to various profiles of fins namely rectangular, trapezoidal and parabolic for enhancing heat transfer in electronic component. They simulate the problem in Ansys and compared for the maximum temperature in all three profiles is attained on the basis of Ansys analysis and trapezoidal shows the maximum total heat transfer rate as compared to other. Mirapalli and Kishore (2015), in this investigation they are comparing rectangular fin and triangular fin with varying length from 6cm to 14cm and varying temperature on the surface of the cylinder from 200° C to 600° C and determine the heat flow rate efficiency and effectiveness after the comparison they concluded that triangular fin is give the best heat dissipation when maximum material of fin is to be utilized for best heat dissipation.

Kumar and Bartaria (2013) they are analysis in CFD of an elliptical pin fin heat sink having different minor axis 1.5mm, 2mm and 2.5mm with different velocities 6.5 m/s, 9.5m/s and 12.5m/s for constant heat input and they conclude that 2mm minor axis elliptical pin fin having better

pressure drop and thermal resistance as compared to other 2.5mm and 1.5mm elliptical pin fin.

Wang F. and Zhang J. Z. (2012), they investigate the pressure drop and specific friction loss in fins by numerical and experimental. In this investigation they used different shaped pin fin (i.e. elliptical, drop shaped and circular) and they conclude that the drop shaped pin fin is more advantageous than circular and elliptical. Sharma et al. (2013) they analyze the result in CFD analysis of heat transfer and air flow, considering three geometries pin fin (i.e. circular, rectangular and drop shaped) and by the CFD analysis the result indicate the drop shaped pin fin give maximum heat transfer and give improve pressure drop than other fin.

Reddy Y.P. et al. (2015), they analyzed the fin performance for different materials in Ansys. In this investigation taken four different types of cylindrical pin fins i.e. aluminum solid bar, brass + aluminum composite bar, copper solid bar and copper + aluminum composite bar. For simulation analysis, a solid bar (aluminum and copper cylindrical pin fin) shows better heat transfer rate then composite bars cylindrical pin fin. After the comparison of solid bar performance the aluminum solid bar gives much better result than copper solid bar.

Allan H. and Agilan H. (2015), they investigate the performance of fin efficiency by using different materials of fins in pin fin apparatus. in this experiment they are using three types of material (i.e. brass, copper and aluminum) after the experiment they conclude that the copper has high heat transfer rate than brass and aluminum.

## III. CONCLUSION

Fin performance is depend upon the profile, materials, air velocity etc. but different profiles of fins then only those fins give good results which have a maximum surface area. In above study, firstly if taking three profiles of fins rectangular, circular and trapezoidal for same parameter the trapezoidal give better performance than other rectangular and circular pin fin. Secondly taking same profile of fin and change the fin material then the result will be change if taking three types of material brass, copper and aluminum then the copper has better performance.

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