

Study Of Numerical Analysis Of Pin Fin Heat Transfer In Radiators Using COMSOL Multiphysics®

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Abstract

The project deals with the study of alternative designs and configuration of radiator fins and tubes in order to have a comparative data analysis on the basis of efficiency. As we know radiators are heat exchangers used to transfer thermal energy from one medium to another for the purpose of cooling and heating, also the majority of radiators are constructed to function in automobiles, buildings and electronics. In this project we have focused on locomotive engine. The fins are the main component in the radiators to cool the hot fluid. Generally, the fins are placed with a zigzag triangular structure or rectangular fins are stacked over the tubes of radiators. We have analysed the effect of variation over the diameter of tubes in the radiators over the velocity and temperature variation leading to change in the efficiency similarly we have studied and analysed the variance on temperature and efficiency while the arrangement of rectangular fins are changed with increasing the pitch of fins and associating additional fins of rectangular and circular dimensions. The expected outcomes of the simulations is to have a systematic hike the efficiency value with increased tube dimension of radiator similarly to have a change in the surface temperature pattern with greater effectiveness with dual circular fin cum plane finned radiator due as compared to dual additional plane fins attached to plane finned radiator due to velocity of outflow of air would be smoother without much of turbulence in circular fins than in squared.

The study can be a basis of further research on additional minor fins in plane finned radiators in automobiles to enhance efficiency and increased mileage.