NUMERICAL ANALYSIS OF DIFFERENT FIN STRUCTURES USED IN AIR-COOLED CONDENSER TO ENHNACE HEAT TRANSFER COEFFICIENT

M Tech Dissertation

by

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ABSTRACT

Significant amount of power production comes from thermal power plant and in thermal power plant mostly water-cooled condenser is used which consumes significant amount of water and due to limited fresh water availability particularly in water stress countries, application of air cooled condensers (ACCs) growing rapidly but plant with ACC suffers a penalty of 5-6% drop in efficiency. The objective of the study is to investigate the performance of fin structures used in Air Cooled Condenser based on the parameters effecting the thermal performance such as heat transfer coefficient, pressure drop and heat flux using 3D numerical simulations. The annular-finned tubes have been considered for current study which is of the most common type. Four different fin structures were modelled viz. (a)radial fin, (b)helical fin, (c)serrated fin and (d)enhanced fin structure. The percentage increase in wall heat transfer coefficient for enhanced fin, serrated fin and helical fin was found out to be 46%, 33% and 15% respectively compared to radial fin. Heat flux for enhanced fin, serrated fin, helical fin and radial fin was obtained as 5096.68 W/m2, 4806.62 W/m2, 2865.10 W/m2 and 2800.91 W/m2 respectively. The percentage pressure drop for enhanced fin, serrated fin and helical fin was found out to be 22%, 39% and 12% respectively compared to radial fin.