OPTIMIZATION OF TURBINE BACK PRESSURE & INITIAL TEMPERATURE DIFFERENCE TO ACCOMMODATE THE PENALTY OF USING AIR COOLED CONDENSER

M Tech Dissertation
Submitted in
partial fulfillment of the requirements
for the degree of

MASTERS OF TECHNOLOGY

in
Thermal Engineering

by

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June 2017

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Abstract

One of the most significant systems which play a crucial role in power production is the cooling systems. Conventional power plants uses water as a cooling medium in condenser comes from river water or sea water. But water resource is limited throughout the world and some part of world facing water scarcity now a days. So, Air instead of water can be used as a cooling medium but overall efficiency compromised by 4 to 8%.

Various parameter which affect the performance of the Air-Cooled Condenser (ACC). The Parameter like fin spacing, number of row, fin height, tube pitch, turbine back pressure, Ambient Temperature, Exhaust steam flow rate, Ambient wind direction and speed, Air-cooled platform height location of the main building and terrain condition, hot air recirculation, fan speed etc. This work concentrates on the Turbine back pressure. Which is widely affect on the efficiency of the plant. It is found that the turbine back pressure (absolute pressure) increases with the increase of wind speed and the decrease of platform height.

In this work, the behavior of ACC system was study under the ambient condition. The ACC system was modeled in ANSYS software for simulation and showed the effect of ambient condition. Mostly in this paper study parameter like, ambient temperature, platform height and wind direction and fan performance under different blade pitch angle and fan speed were studied.

Later on calculation model for Backpressure of ACC have been modeled in MATLAB to see the effect of different ambient temperature and platform height. For optimization TAGUCHI method have been selected. Optimization have been successfully carried out for mainly two parameters, (I) The ambient temperature: which have highest quantitative effect on backpressure and hence on overall plat efficiency (II) platform height: A design parameter. 304 K ambient temperature and 33 m platform height is the optimized value among five level of parameters with the help of TAGUCHI method and hence concluded.