HIGH-FIDELITY COMPUTATIONAL ASSESSMENT OF THE PERFORMANCE OF AIR COOLED CONDENSER FAN GRID WITH DIFFUSER ORIFICE PLATE

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by

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Abstract

Economic and environmental restrictions have resulted in an increase in the installation of air-cooled condensers (ACCs) in thermoelectric power plants located in arid regions. Air cooled condensers overcome one of the main issues facing the construction of Thermal power plants by replacing water with air as the medium for cooling of the steam turbine waste heat. Forced flow air-cooled heat exchangers (ACHEs) as found in the petrochemical, process and power industries use fans arranged in single or multiple fan rows to force air over finned tube bundles. Any flow disturbances or distortions experienced at the inlets of these fans tend to reduce the effectiveness of the ACHE. Air-cooled heat exchangers (ACHEs) which utilize large arrays of axial fans, commonly suffer from inlet flow losses related to off axis flow into the fans. Forced draught air-cooled heat exchangers (ACHEs) are often arranged into banks consisting of multiple rows of fan-heat exchanger combinations. Fans on the outer edge of the banks are subject to severe crossflow conditions as the air is swept past route to fans located deeper within the banks. The cross-flow conditions give rise to increased inlet flow losses. The losses which are occurs in Axial fans are ‘Secondary loss’. The various losses are identified and a numerical example is given that clearly illustrates the significance of so-called "secondary losses" in a practical air-cooled condenser unit. It is shown that the sum of the "secondary losses" may be of the same order as that of the heat exchanger bundles under normal flow conditions. This report shows various impacts on uses of ACC as dry cool condenser. Also the factors affecting on the performance of the ACC like wind effect, platform height, axial fan performance are discussed.