UNIVERSITI TEKNOLOGI MARA

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MEC299

Effect of Different Water Flowrates and Air Velocity on a Cooling Tower

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Abstract

Mechanical draft cooling tower is a specialized type of heat exchanger that allows water and air to interact in order to reduce the temperature of hot water. Small amounts of water evaporate during this process, reducing the temperature of the water circulating throughout the cooling tower. The working fluid is important to the cooling tower where the air circulated through the cooling tower helps the process of evaporation of the working fluid affected by the mass flow rate of the working fluid and air velocity. The objective of this study is to identify the effect of different water flowrates and air velocity on a cooling tower. The experiment will be conducted with mass flow rate ranging of from 1 LPM (Litres Per Minute) to 5 LPM and speed of air velocity which is 30mmH_2O and 50mm H_2O. The type of working fluid also will be compared to see which working fluid has the highest cooling rate. The 10% coolant and water will be used as working fluid. The mass flow rate of the water that will flow through the tower is controlled by a valve. Dry and wet bulb temperature will be recorded to compare cooling effect between coolant 10% concentration and water. It is expected that low concentration coolant has better cooling rate compared to water and higher velocity. It also expected that the lower the water flowrate and the higher the air velocity the cooling tower will work better.

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1.0 Introduction

1.1 Background of Study

In this era of modernization, human use heat exchanger for daily life. There are many types of heat exchanger such as shell and tube heat exchangers, double pipe heats exchangers, plate heat exchanger and condensers, evaporators, and boilers (Ronquillo, 2022). Heat exchangers are devices that allow heat to be transferred from one medium to another. These media can be in the form of a gas, a liquid, or a combination of the two. To prevent mixing, the media may be separated by a solid wall or may be in direct contact. Heat exchangers increase a system's energy efficiency by moving heat from systems where it is not needed to systems where it is (Ipieca, 2014). Figure 1 show all the type of heat exchanger that used in life.

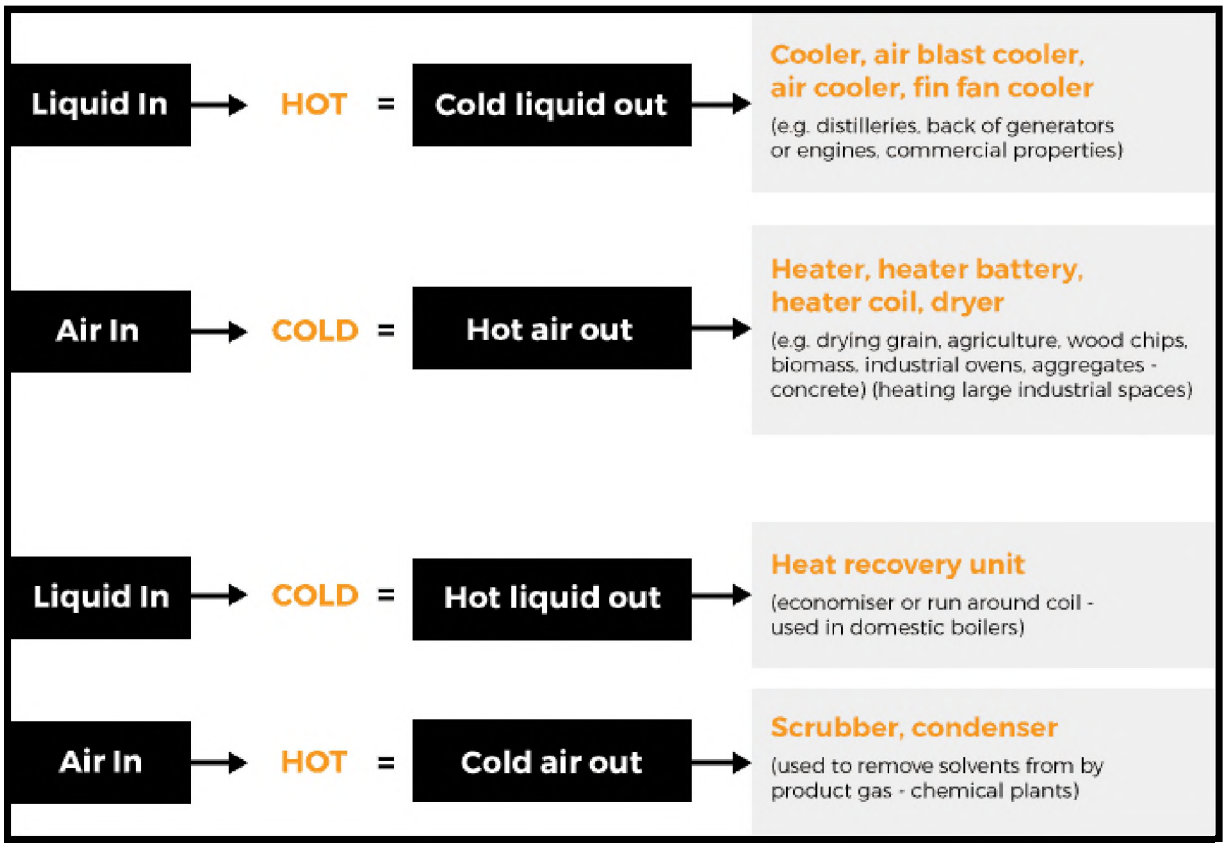

Figure 1 Type of heat exchanger (Ipieca, 2014)