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Review on Design and Development of Mist Cooling For Closed Room

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Abstract: However, it is difficult to quantitatively analyze temperature and humidity distribution in spray environment owed to uncertainty of outdoor environment. Based on the moist air theory combined with the heat and mass transfer model of droplets. This study established the year analytical model to analyze tea effect of spray cooling one tea environment temperature and humidity. The developed model can be used to calculate the temperature drop and humidity increase rates under different conditions. This study offers critical analysis of the environment parameters that influence the cooling effect and the cost of the cooling system spray.This paper provides a comparative study of the energy efficiency of a conventional ventilating and air-conditioning (VAC) system with three configurations. This system was used to cool an experimental room in an office building in more control scenarios realised by adopting different cooled water temperatures and chillers cooling systems. In this purpose, an air–water mist cooled system for an air-cooled chillers' proposed. Depending on the components, the analysed VAC system has the following configurations air handling unit (AHU) and fan-coil units (FCUs), air handling unit (AHU), heat recovery unit (HRU) and fan-coil units (FCUs). How the thermal properties of the entering to condense air and the performance of the air-cooled chillers varied under different operating schemas with water mist pre cooling.

Keywords: climate change; energy efficiency; hot and dry climate; Chillers system; Electricity consumption.

I. Introduction

In the past, people built their houses according to their real needs and in harmony with the environment. With change in life style and increase in standards of living, typology of the building has changed. Many architects no longer bother to design buildings that take into account the climatic constraints and focus more of their attention on aesthetic aspects. Present day architecture in the country blindly follows western architecture and has slowly lost contact with environment. Moreover, with technological progress, Electrical and mechanical engineers claim to provide comfort in any type of building by providing "practical solutions", which always incorporate high energy-consuming technologies. People live in houses that waste energy, and use inefficient lighting, heating and cooling .systems and appliances. Refrigeration systems with evaporative coolers have been applied for years. For the evaporative coolers, ambient air is drawn or blown through a porous surface wetted with a film of water. The air stream is cooled by the evaporation of water, and its DBT drops to approach its wet bulb temperature (WBT), and evaporative cooling is an effective low-energy cooling techniques .With a reduction of the temperature of the entering condenser air, the condensing temperature will drop, which results in the decrease of the compressor power of air-cooled chillers, and the COP of the system could improve by an amount of 0.034–0.067 for each degree Celsius of pre-cooling provided. However, additional fan power is required for overcoming the air flow resistance of the evaporative cooler, which trades off the reduction of compressor power partly. The use of evaporative-cooling systems are however dependent on climatic conditions and hence the successful use of an evaporative cooler achieved at one particular climatic condition cannot be guaranteed at another location with a different climatic condition. As a result, the feasibility of evaporative cooling should be determined specifically for each individual location and climate condition. Performance of direct evaporative cooling in hot arid climates have however been widely studied, This study goes onto conclude that much larger reductions in roof temperature were obtained when water vapour deficit in the ambient air was high as compared to under low water deficit conditions where evaporative cooling reduced air temperature impacts. There are many studies on the impact of climate change on the energy use of the building sector. Other quantitative analyses on the climate change impacts on the cooling and heating energy demands and building

energy. According to a study on future heat stress by the time series method, the trade-off between the heating and cooling demand was highlighted and its relationship with the building energy use was identified.

1.1 Literature review:

There are various setups for Conventional air conditioning systems out these setups few setups were discussed Experimental and numerical investigations of the energy efficiency of conventional air conditioning systems in cooling mode and comfort assurance in office buildings. Study of the energy efficiency of a conventional ventilating andair- conditioning (VAC) system with three configurations. This system was used to cool an experimental room in an office building in more control scenarios realised by adopting different cooled water temperatures and chillers cooling systems. The aim of this study has been to define the VAC system configuration for office buildings with the lowest energy consumption without compromising indoor comfort[1].Performance evaluation of misting fans in hot and humid climate. Today sometimes we experience a hot and humid climate throughout the year. This in turn results in heavy reliance on mechanical systems especially air-conditioning to achieve thermal comfort. Analysis of objective and subjective data showed that the misting fan was able to significantly reduce the dry-bulb temperature and thermal sensation votes. This research project estimated the difference in thermal comfort levels provided by the misting fan system as well as the possible increase in biological pollutants due to the increase in relative humidity brought about by the generation of mists [2].Study of mist-cooling for semi-enclosed spaces in Osaka, Japan. The balance between cooling and undesirable wetting requires careful control and placement of misting nozzles. Spraying from varying heights in an atrium showed that a single spray nozzle. Resultant increases in humidity have little or no effect on the thermal comfort as calculated by effective temperature, ET as defined by ASHRAE[3].Climatic influence on the design and operation of chillers systems serving office buildings in a subtropical climate. Climate change is a hot topic which would influence the design and operation of building systems. Many simulation studies focus mainly on the impact of climate change on the overall energy consumption of buildings. . There are many studies on the impact of climate change on the energy use of the building sector, drawing on the predicted meteorological models[4]. A study for commercial building sector in hot and dry climate of Ahmadabad. Energy consumption in the building sector is very high and it is expected to increase further due to increase in standards of living and change in typology of the building. Other major factor which has a significant effect on energy consumption is climate, especially in hot and dry climate. There is vast temperature fluctuation in such type of climate promoting greater use of air conditioning system, thus increasing energy consumption. The Research finding proves that Passive Downdraught Evaporative cooling technique offer real opportunity for improving indoor thermal comfort conditions in a building whilst reducing cooling load of air-conditioning systems[5].Solving model of temperature and humidity profiles in spray cooling zone. Spray cooling is a quite popular cooling method that has recently received much attention worldwide to lower the outdoor temperature and produce comfortable conditions in crowded and high temperature environments[6].

II. Setup

To study and determine the effectiveness of misting fans, both objective and subjective measurements were carried out for a semi-indoor experimental layout at NUS to allow for direct comparison between misting and non-misting fans under the same ambient conditions. To supplement the experimental data, field measurements which include both objective and subjective measurements would also be conducted at office building. Models of hydraulic nozzle were evaluated operating pressures. a single nozzle was connected to a high-pressure water pump. Nozzle droplet size distributions were measured with a PDPA (Phased-Doppler Particle Analyzer). PDPA diameter distribution measurements were taken along the centreline of the spray.

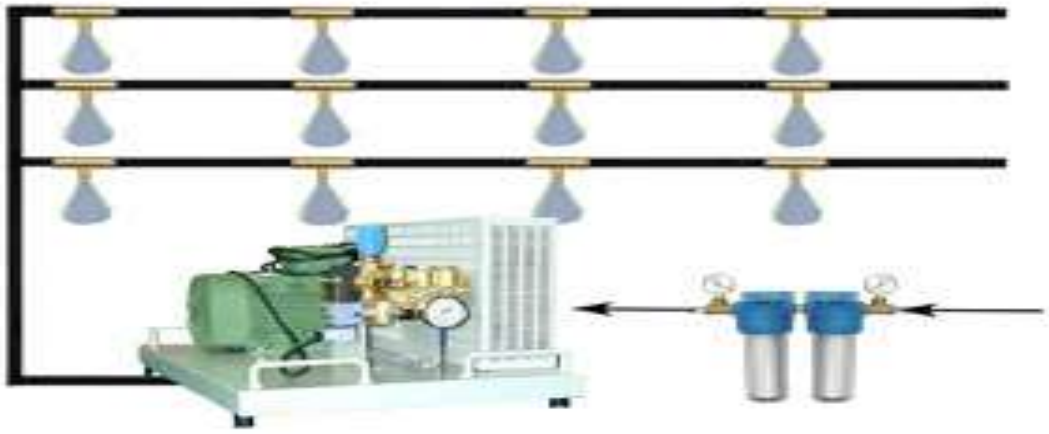

Fig. mist cooling system

III. Conclusion

The Research identifies that building envelope design plays an important role in reducing solar heat gain thus reducing cooling demand and overall energy consumption. Incorporating passive cooling techniques building design and enhancing building material specifications for minimizing the energy consumption is required for sustainable approach which is used at Torrent research centre. It proves that Climate responsive design approach to building design result high level of energy savings. This paper investigates how climate change influences the design and operation of chillers systems serving commercial buildings in a subtropical climate.

Experiments are currently underway to measure the evaporation rates and cooling effects of multiple nozzle arrays in semi-enclosed and outdoor environments near buildings approach. Result of the each scenario with better envelope design and efficient cooling technique has shown significant energy conservation. The findings clearly suggest that while energy efficiency can be achieved through building regulations/ codes and appropriate choice of materials/ construction technology, but the potential for energy efficiency is much higher when such measures are integrated into the design philosophy and approach. The results can be used to estimate the energy. In significant difference in the temperature reduction for different particle size distributions (castings) was not observed. Have the particle size increased distribution (casting), however, the minimum height of remaining particles was lower. Mist particles remained at lower heights when the number of nozzles was increased. And this effect was greater for larger particle sizes. In general, to however, it is known that greater spray presses is necessary for generating finer mists, and it results increase the pump power. The above results demonstrate that spray height and particle size need to be selected carefully if the minimum height of remaining particles is to be strictly controlled.

References

[1] Experimental and numerical investigations of the energy efficiency of conventional air conditioning systems in cooling mode and comfort assurance in office buildings Iona Sarbu, Marius Adam, Energy and Buildings 85 (2014) 45–58.

[2] Performance evaluation of misting fans in hot and humid climate N.H. Wong, Adrian Z.M. Chong, Building and Environment 45 (2010) 2666e2678.

[3] Study of mist-cooling for semi-enclosed spaces in Osaka, Japan. Craig Farnham, Masaki Nakaoa, Masatoshi Nishiokaa, Minako Nabeshimaa Takeo Mizunob, Procedia Environmental Sciences 4 (2011) 228-238.

[4] Climatic influence on the design and operation of chillers systems serving office buildings in a subtropical climate.F.W.Yua, K.T. Chanb, Rachel K.Y. Sit c, Energy and Buildings 55 (2012) 500–507.

[5] To examine the energy conservation potential of passive & hybrid downdraught evaporative cooling: A study for commercial building sector in hot and dry climate of Ahmadabad Mansi Jayswala. Energy Procedia 30 (2012) 1131 – 1142.

[6] Solving model of temperature and humidity profiles in spray cooling .Zone Chen Huang a, Jiao Caia, b, Zhifen Lin c, Qianru Zhang d, Yezan Cui e, Building and Environment 123 (2017) 189-199.

[7] Refrigeration and air-conditioning by C.P.ARORA [Third Edition].

[8] Refrigeration And Air-Conditioning By S. N.Sapali [Second Edition].