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Review on Design and Analysis of Forced Type Axial Fan Evaporative Condenser

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Abstract: This project aims at design and analysis of forced cooling axial fans evaporative condenser, which is a concept that deals with the heat exchange in ice cooling industries. In this type of condenser, it removes the heat from system to surrounding so that we can formed saturated liquid refrigerant from the superheated refrigerant vapour. This system is used as an advantage over the dry heat transfer unit as it required less amount of water and pumping power is reduced. The basic principle of this type of condenser is to make efficiency effective. It is observed in the existing design of evaporative condenser that natural cooling and splitting of water are two major difficulties to overcome. In this research, we are placing our design in a such a way that heat transfer rate will be increasing by adding water pads, implementing axial fans, forced cooling and modifying some design parameters to clear maximum existing design problems.

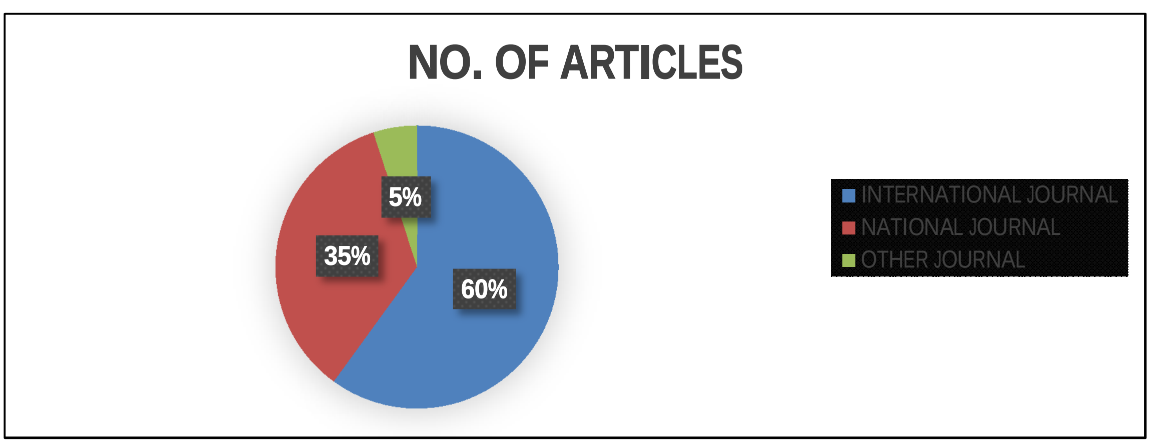
I. INTRODUCTION

Forced type of Evaporative condenser is a device that extract the heat from the receiving refrigerant to the surrounding within tubes bonded system by cooling it water supply system. So, that the refrigerant will be reused. In this present era, the evaporative condenser which are using in the industries are facing through some issues like as space management, flour area, water scarcity problem, tubes design shapes, etc. By taking all these points into considerations, our aim is to create a design covering some of these points. In our system, we are applying some changes at the inlet of our system so that we can cool the refrigerant to reduce power consumption. This will increase efficiency by some rate which is not present in the existing evaporative condenser. In our design we are varying the shapes of tubes by trial and error method, that we can make performance of condenser effective. The refrigerant which we are using is a gas called as ammonia (NH3), generally used but the difference is the conditioning system we are applying on it is slightly varying. The goal of this work is to design and develop a proper analysis on the working and make the feasible alternative modification on the forced type of evaporative condenser.

II. INDENTIFICATION AND DATA COLLECTION

A. Review on literature depending on the existing design of evaporative condenser it's working and the issues that are not visualized.
B. Selection of different international journals, thermal design concept, software project report.
C. Review of these all papers results for us to bring some small modifications that are ignored or may be not taken into consideration.

III. SOME OF THE JOURNALS REFERRED



SOURCES	NO. OF PAPERS
ACEEE INTERNATIONAL JOURNAL ON ELECTRICAL AND POWER ENGINEERING	2
INTERNATIONAL JOURNAL OF ENGINEERING STUDIES AND TECHNICAL APPROACH (IJESTA)	2
INTERNATIONAL JOURNAL OF SCIENTIFIC & ENGINEERING RESEARCH (IJSER)	1
INTERNATIONAL CONFERENCE ON SUSTAINABLE SOLUTIONS FOR ENERGY AND ENVIRONMENT(ICSSEE)	2
INTERNATIONAL JOURNAL OF MERGING TECHNOLOGY AND ADVANCED RESEARCH IN COMPUTING (IJMTARC)	1
INTERNATIONAL JOURNAL FOR INNOVATIVE RESEARCH IN SCIENCE & TECHNOLOGY (IJIRST)	2
INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN TECHNOLOGY (IJIRT)	1
INTERNATIONAL JOURNAL FOR ENGINEERING RESEARCH AND TECHNOLOGY (IJERT)	2

IV. PEER LITERATURE REVIEW

A. Available in market is a simulation of evaporative condenser that speaks about evaporative coil.
B. Two types are present in existing mode and they are traditional evaporative cooler with close loop and composite type of air evaporative cooler.
C. In maximum industries the evaporative condenser is of natural type.
D. In nozzles the mechanical finishing is present i.e. if done with inlet chamfering then pressure drop decreases and if done with outlet chamfering heat transfer increases.
E. The water splitting problems are observed in many industries as the coming water from nozzle gets dispersed in working region leading to electrical damaging and health risk.
F. In existing design, the inlet temperature of the gas coming to the evaporative condenser is more so number of tubes are increased and so the cost.
G. The water sump used is a rectangular type and still the water is not stored in it completely, it gets dispersed in surrounding area also.
H. The tube shape generally used is of elliptical type of cross section with external fins on the outer surface.

V. IMPROVEMENT AS PER REVIEW

A. The evaporative condenser we are designing will take less energy and will cost same as the existing one.
B. There will be small modification on the inlet of the evaporative condenser by applying 1-2 meter of water insulation cooling pad, this will initially cool the hot gas upto 2-3%
C. We are coming with the calculations of all the shapes that are possible for the tubes.
D. The sump we are adding will be a slanted one on the walls and from bottom so water will store inside it and it can be drained easily.
E. It will be in encloser made up of wall that will prevent the wastage of water.
F. We are preparing these modifications for forced axial fan type of evaporative condenser as these modifications may be present in natural type.
G. We are also adding the chimney type structure on over the fans so the hot vapour gets removed fastly that will avoid the damaging of tubes externally.

VI. CONCLUSION

From this review and researches we are able to conclude that the need of evaporative condenser is must in these ice industries at very large amount. Maximum design works on the natural mode of cooling and are situated at outside of industries to do so. From these all views and then by practical concept we are going for force type and with minute modifications will be able to make our design more effective and efficient also. These modifications can be done at very lower cost so it is feasible too. These will overcome some difficulties facing in industries like low cooling, short circuit problems, health advisory issues. We come to know that the efficiency of evaporative condenser can be improved by using water quality management strategy and also the evaporative condenser is proportional to the difference between condensing and wet bulb temperatures. The refrigeration effect produced is maximum for the 3/8th inch condenser tubes and is least for 1/4th inch condenser tubes. As the diameter of the condenser tube goes on increasing, the evaporator temperature goes on decreasing as well.

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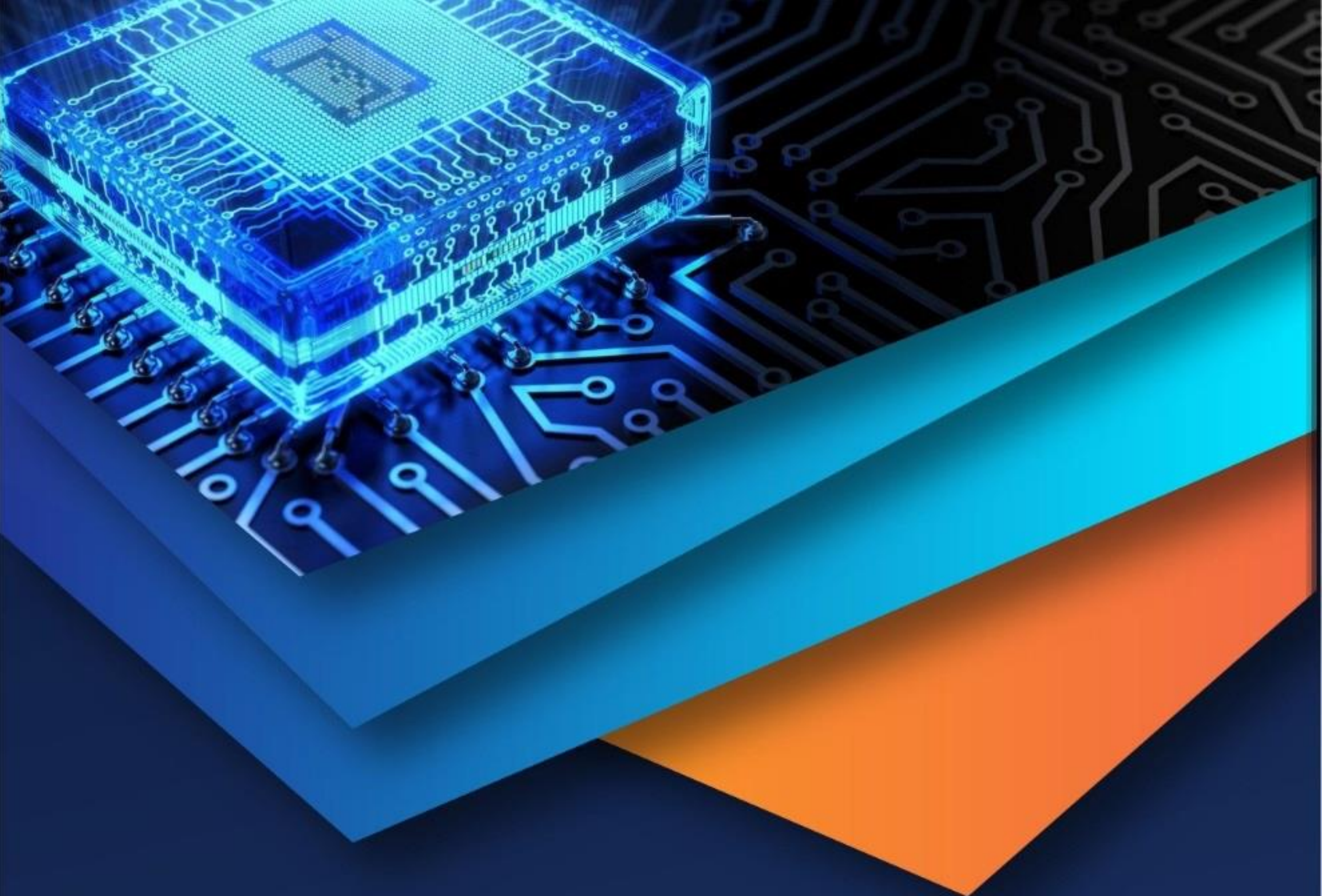

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