Improving The Performance of Vapour Compression Refrigeration System By Using Phase Change Materials

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Abstract- *The main objective of this work is to evaluate the performance of a vapour compression refrigeration system by tilting the condenser by providing some angle of inclination from horizontal by exploring the possibilities of increasing the refrigerating effect by maintaining the compressor work constant. The system is using R134a as refrigerant, hermetic sealed compressor and condenser and compare with horizontal.*

With this simple technique the Net refrigeration effect is found to be increased by 4.16% for the condenser with an angle of 200 inclined to the horizontal gave more performance and better Coefficient of Performance (COP) 5% more than the existing system.

Keywords- C High load conditions, High storage density, latent heat of phase change material, performance of the system with and without phase change materials

I. INTRODUCTION

This article guides a stepwise walk through by Experts for writing a successful journal or a research paper starting from inception of idea still their publications. Research papers are highly recognized in scholar fraternity and form a core part of PhD curriculum. Research scholars publish their research work in leading journals to complete their grades. In addition, the published research work also provides a big weight-age to get admissions in reputed varsity. Now, here we enlist the proven steps to publish the research paper in a journal.

As a demand for refrigeration and air conditioning increased greatly during the last decade, large demands of electric power and limited reserves of fossil fuels have led to a surge of interest with efficient energy application. Electrical energy consumption varies significantly during the day and night according to the demand by the, industrial, commercial and residential activities. This variation leads to a differential pricing system for peak and off peak periods of energy use. Efficient and economical technology that can be used to store large amounts of heat or cold in a definite volume is the subject of research for a
long time.

IDENTIFY, RESEARCH AND COLLECT IDEA

The use of a latent heat storage system using *Phase Change Materials (PCM) is an effective way of storing thermal energy and has the advantages of high storage density and the isothermal nature of the storage process. It has been demonstrated that, for the development of a latent heat storage system, choice of the PCM plays an important role*. Read already published work in the same field.

II. STUDIES AND FINDINGS

In this section the performance of vapor compression machine tested with R12, R134a, and R290/R600a as refrigerants in the presence of latent heat storage material. The phase change materials used are sulphuric acid, caprylic acid, poly ethelene glycol (E600).

A. Experimental results With R-12

Initially the vapor compression system is retrofitted with 135g of R12, and the performance of the system is investigated in the presence of three latent heat storage materials one by one.

The amount of poly ethelene glycol used is 1.575 kg. This material is arranged inside the evaporative container with the help of 1liter capacity vessel. The use of this phase change material is to store cool energy in the “on” Condition of the refrigerating machine and releases this energy in the “off” Condition of the machine to heat transfer fluid (HTF).

Using R12 as a refrigerant for every 220 min running of vapor compression machine maintained refrigerating effect up to 55 min without compressor power input. Using sulphuric acid as PCM, maintained a refrigerating up to 60 min, and caprylic acid as PCM, maintained refrigerating effect up to 70 min.

III. GETPEERREVIEWED

Here comes the most crucial step for your research publication. Ensure the drafted journal is critically reviewed by your peers or any subject matter experts. Always try to get maximum review comments even if you are well confident about your paper.

IMPROVEMENTASPERREVIEWERCOMMENTS

The performance of the system is tested experimentally with different refrigerants. The refrigerants tested include

1. R12
2. R134a
3. R290/R600a

The latent heat storage materials tested include

1. Sulphuric acid
2. Poly ethylene glycol
3. Caprylic acid

Initially the vapor compression machine tested with each refrigerant and three phase change materials one by one. Evaluate the performance of the system with and without phase change materials. Compare all the experimental results and select a suitable combination of refrigerant and phase change material for the system.

IV. CONCLUSION

The performance of vapor compression machine was tested with R12, R134a, and R290/R600a in the presence of latent heat storage material.

Using R12 as a refrigerant for every 220 min running of vapor compression machine maintained refrigerating effect up to 55 min without compressor power input. Using sulphuric acid as PCM, maintained a refrigerating up to 60 min, and caprylic acid as PCM, maintained refrigerating effect up to 70 min.

Using R134a as a refrigerant for every 220 min running of vapor compression machine maintained refrigerating effect up to 75 min without compressor power input. Using sulphuric acid as PCM, maintained a refrigerating up to 80 min, and caprylic acid as PCM, maintained refrigerating effect up to 90 min.

REFERENCES

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