



1st International Conference on Mechanical Engineering : Researches and Evolutionary Challenges

(Hybrid Mode Conference)

(ICMech-REC-2023)

June 23-25, 2023

Organised by

Department of Mechanical Engineering

National Institute of Technology Warangal
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PERFORMANCE ANALYSIS OF AIR CONDITIONING SYSTEM UTILIZING CONDENSATE

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ABSTRACT

There is higher requirement of Air conditioning systems due to increase in population and industrialization throughout the globe especially in hot and humid conditions. The largest share of Energy requirement is due to Air conditioning system in the building sector. This paper is presenting a theoretical study about performance analysis of Air Conditioning systems utilizing condensate. For analysis purposes an IOT system is designed to fetch the data at key nodes of a Vapour Compression Refrigeration System (VCRS) cycle using Arduino IDE. It is observed that using condensate results in the desuperheating of the refrigerant while during entry of the condenser, which results in rise in condenser sub-cooling. As trade of getting increased in refrigerant effect and compression work, then in air conditioning system COP reaches maximum. Liquid specific heat & latent heat of vaporization, which are important thermodynamic parameters related with rise in refrigerant impact are important to calculate maximum COP with condenser sub cooling.

KEY WORDS: Vapour Compression Refrigeration system, Condensate, desuperheating, sub-cooling, IOT, Arduino IDE

1. INTRODUCTION

The project is about Performance Analysis of Air Conditioning system utilizing condensate. Condensate refers to the moisture that is extracted from the air when it is cooled and dehumidified by the air conditioning system. For air cooled condenser the ambient air during hot and humid condition are quite high, which affects the sub-cooling of the VCRs cycle. The condensate is being used to desuperheat the high temperature, high pressure refrigerant at the outlet of the compressor followed by air cooling in order to achieve additional sub-cooling of the refrigerant in the system.

The exchange between growing refrigerating impact and particular compression effort causes the Coefficient of Performance to achieve a maximum when condenser sub cooling increases. The greatest COP improvement with condenser sub cooling is determined by the thermodynamic parameters linked to the rise in the refrigerating impact, like liquid specific heat & latent heat of vaporisation [1]. The condensed liquid refrigerant after passing through an expansion valve experiences a sudden pressure decrease while still being in the thermodynamic condition known as a saturated liquid. The pressure decrease causes a part of the liquid to evaporate in an adiabatic flash [2]. Subcooling liquid refrigerant after it exits a condenser with refrigerant from the evaporator exit, apparently in the mode of saturated vapour, is a typical approach to increase COP [3]. The real time monitoring method for installing HVAC systems

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This is to certify that Kamlesh Bachkar, Omkar Kadam, Saugharaj Kharat and Shree Shah has presented a paper entitled as "Performance Analysis Of Air Conditioning System Utilizing Condensate" in 1st International Conference on Mechanical Engineering: Researches and Evolutionary Challenges -2023 conducted by National Institute of Technology Warangal, Telangana from 23 -25 June, 2023.



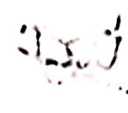
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