DESIGN AND CONSTRUCTION OF PORTABLE AIR COOLER SYSTEM

A thesis

by

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Department Of Mechanical Engineering

SONARGAON UNIVERSITY (SU)

SEPTEMBER 2024

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of

Bachelor of Science in Mechanical Engineering

SEPTEMBER 2024

DECLARATION

We, hereby, declare that the work presented in this project is the outcome of the investigation and research work performed by us under the supervision of **Md. Ahatashamul Haque Khan Shuvo**, Assistant professor, Department of Mechanical Engineering, Sonargaon University (SU). We also declare that no part of this project and thesis has been or is being submitted elsewhere for the award of any degree

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In my capacity as supervisor of the candidate's project, I certify that the above statements are true to the best of my knowledge.

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ABSTRACT

As global temperatures continue to rise, Bangladesh is experiencing increasingly severe heat waves, leading to a significant impact on the daily lives of its inhabitants. This phenomenon is primarily attributed to climate change, urbanization, and deforestation, resulting in extreme weather conditions and a deteriorating environment. The need for effective cooling solutions has become paramount, as traditional means of ventilation are proving inadequate in providing relief from soaring temperatures. Air coolers present a viable solution, offering energy-efficient and affordable cooling options for households and businesses alike.This study aims to explore the growing demand for air coolers in Bangladesh, examining their role in enhancing comfort and improving the quality of life amid rising temperatures.

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Chapter 1

Introduction

1.1 General

Air cooling systems are one of the most important products in contemporary world. They are vital in creating comfort living conditions. With the effect of global warming temperatures are rising, as a result air conditioner sales are increasing drastically every year. Various types of air conditioning systems are available in the market to cater the needs of different levels of air conditioning for homes, offices, industries, shopping malls etc.

Portable air conditioner is an innovative product originally derived from standard window air conditioner running on vapor compression refrigeration cycle. Standard window air conditioner or Split Air conditioner is limited to be used in room or inside a closed environment, once fixed it cannot be mobilized. Portable air conditioner runs on vapor compression refrigeration cycle with rotary compressor. Unlike conventional air conditioners which run in a closed environment, portable air conditioners can be used in both closed environment and open environments like a retail outlet or a showroom or in any open hall with air conditioner focused on specific location. In addition to that portable air conditioner gives localized air conditioning effect which cannot be achieved with conventional type air conditioners.

In this paper the performance of a portable air conditioner based on vapor compression refrigeration cycle and running on R23 refrigerant has been evaluated. Various types of heat exchanges used in refrigeration and air-conditioning systems have been studied in detail. In the present analysis R-22 refrigerant is used as the working fluid. As, it is an ozone harming substance. An optional refrigerant which is ozone harm free refrigerant should be considered. Their comparison is given below.

Air conditioners, refrigerators and freezers rely on the circulation of a refrigerant--a chemical that can efficiently remove heat from the surroundings R22 is an HCFC, While R134a Is an HFC like R12, which is the original ozone-depleting refrigerant, R22 is marketed under the brand name Freon, and it's one of the earliest CFC

alternatives. Its chemical name is chlorofluorocarbon, and it belongs to a closely related class known as hydro-chlorofluorocarbons (HCFCs). These refrigerants also contain chlorine that can potentially find its way into the upper atmosphere. R134a belongs to another class of CFC alternatives, called hydrofluorocarbons (HFCs), that don't contain chlorine. Its chemical name is tetrafluoroethene. It isn't the only CFC alternative on the market, and it isn't the best.

1.2 Air Conditioner

An air conditioner is a system or a machine that treats air in a defined, usually enclosed area via a refrigeration cycle in which warm air is removed and replaced with cooler and more humid air. Air conditioning (often referred to as AC, A.C., or A/C) is the process of removing heat from a confined space, thus cooling the air, and removing humidity. Air conditioning can be used in both domestic and commercial environments. This process is used to achieve a more comfortable interior environment, typically for humans or animals; however, air conditioning is also used to cool/dehumidify rooms filled with heat-producing electronic devices, such as computer servers, power amplifiers, and even to display and store artwork.

Air conditioners often use a fan to distribute the conditioned air to an occupied space such as a building or a car to improve thermal comfort and indoor air quality. Electric refrigerant-based AC units range from small units that can cool a small bedroom, which can be carried by a single adult, to massive units installed on the roof of office towers that can cool an entire building. The cooling is typically achieved through a refrigeration cycle, but sometimes evaporation or free cooling is used. Air conditioning systems can also be made based on desiccants (chemicals which remove moisture from the air) and subterraneous pipes that can distribute the heated refrigerant to the ground for cooling.

1.3 Literature Review

Franck Lucasa, Pascal Ortegaa, Mathieu Davidb, Frantz Sinamab, Boris Brangeonb Fabien Picgirardc, ICAE2015[4]:A method to evaluate energy performance of buildings cooled by room air conditioners. Because of their low cost, small air conditioning systems (AC) like split air conditioning systems are often installed

without a proper study of building envelope performance. Furthermore, these systems are sometimes installed by tradesmen who neglect to comply with the appropriate rules and regulations. Finally, when routine maintenance is not rigorously carried out, the energetic performance of the system is compromised over time.

This article presents a practical, global approach to diagnose the performance of existing small air-conditioning installations in buildings applied in Reunion Island. This tropical Island aspires to become electricity self-sufficient.. This approach relies on a numerical tool and dynamic simulations of buildings equipped with AC. The simulations, which take account of the building envelope, a description of the system as well as the practices of the users, are based on the kernel calculation Energy. They also take into account the climatic conditions and provide an estimate of the annual electricity consumption related to the cooling of the zone. This global analysis helps to qualify the entire system by assigning an energy label.

- *Buildings account* for over 42% of consumption of final energy [1] in France and between 20 and 40% in other developed countries. Perez Lombard [2] reports that the share of HVAC system for heating ventilation and air conditioning has now become the largest energy end use in the residential and non-residential sector. Wong [4] estimates that its represents one third of the total energy consumption for residential housings in Hong Kong.

- *Improving the design of buildings* and of the AC systems in order to reduce cooling loads is the subject of a great deal of research in southern hemisphere tropical climates. A large body of expertise has evolved, especially in respect to French overseas departments, like Reunion Island. As a result of this work, specific recommendations to design buildings adapted to the tropical climate have been established.

Jadhav T. S., Lele M.M., Engineering Science and Technology, an International Journal 18, 2015[5].Theoretical energy saving analysis of air conditioning system using heat pipe heat exchanger for Indian climatic zones. Heat pipe heat exchanger (HPHX) is an excellent device used for heat recovery in air conditioning systems. The Energy Conservation Building Code (ECBC) e Bureau of Energy Efficiency (BEE)

India classifies Indian climatic zones into five categories viz., Hot and Dry , Warm and Humid ,Composite, Cold and Temperate. From the paper we can say that indicated that very limited information is available on annual energy saving analysis of air conditioning system with HPHX for Indian climatic zones. The paper investigates the possible energy savings using HPHX for heat recovery in air conditioning system for Indian climatic zones. This paper discusses the use of HPHX only for the heat recovery application i.e., exchange of sensible heat between fresh outdoor air and conditioned return air. The maximum energy saving potential is revealed for hot and dry, warm and humid and composite Indian climatic zones.

- *In the last six decades*, India's energy use has increased 16 times and the installed electricity capacity by 84 times. In 2008, India's energy use was the fifth highest in the world. The air conditioning contributes towards significant energy usage of a building. The building sector represents about 33% of electricity consumption in India, with commercial sector and residential sector accounting for 8% and 25% respectively.

- *The Energy Conservation* Building Code (ECBC) e Bureau of Energy Efficiency (BEE) India[2] classifies Indian climatic zones into five categories viz., Hot and Dry (e.g. Ahmadabad, Jodhpur etc), Warm and Humid (e.g. Mumbai, Chennai etc), Composite (e.g. Nagpur, Jaipur etc), Cold (e.g. Guwahati etc) and Temperate (e.g. Bangalore etc).

1.4 Objectives

The objectives of this project are:

- To make a way that is lower middle class family can affrod air cooler.
- To implement a Portable Air Cooler System
- To test the performance of the cooling system.
- Portability design that could be easier for the user.

1.5 Working principle

- Connecting with the power source here is AC 220 volts coming to the circuit.
- The compressor will come with a 220 volt controller unit. From the compressor through the gas condenser to the capillary tube the evaporator side will rotate in a circular motion.
- There will be gas in the compressor which will compress the compressor to the system. When the gas enters the condenser, it will remain heated.
- When the gas goes to the capillary tube , the gas cools and spreads its cold inner reside of room by a fan.
- In this project we are using the gas is R600A
- Here we using two temperature sensor one for indoor another one is for ambient temperature sensor.

1.6 Structure of the Project

This project book consists of five chapter. The first chapter contains the statement of the introduction, our background study for the project, Literature Review, objectives of the study in the project, Methodology and the project organization. Chapter two contains System design and simulation. Here we describe the design of this project, block diagram and circuit diagram, working principle, background and real project, details of component and instrument details of the whole project. Chapter three contains the Hardware implementation. Chapter four deals with the experiment result, calculation, advantages and application of this project. In the final chapter, we discuss about future scope and conclusion of our project.

Chapter 2

System Design and Simulation

2.1 Over view

In this chapter we describe our project block diagram, project working principle, required instrument and final project view.

2.2 Block Diagram

In our project we have set up a Portable Air Cooler Cycle System. Here, in this system, we are use AC source for operate. Here we also use a Compressor, Coolant, Evaporator, Temperature Sensor, Fan, DC Motor, chamber materials etc.

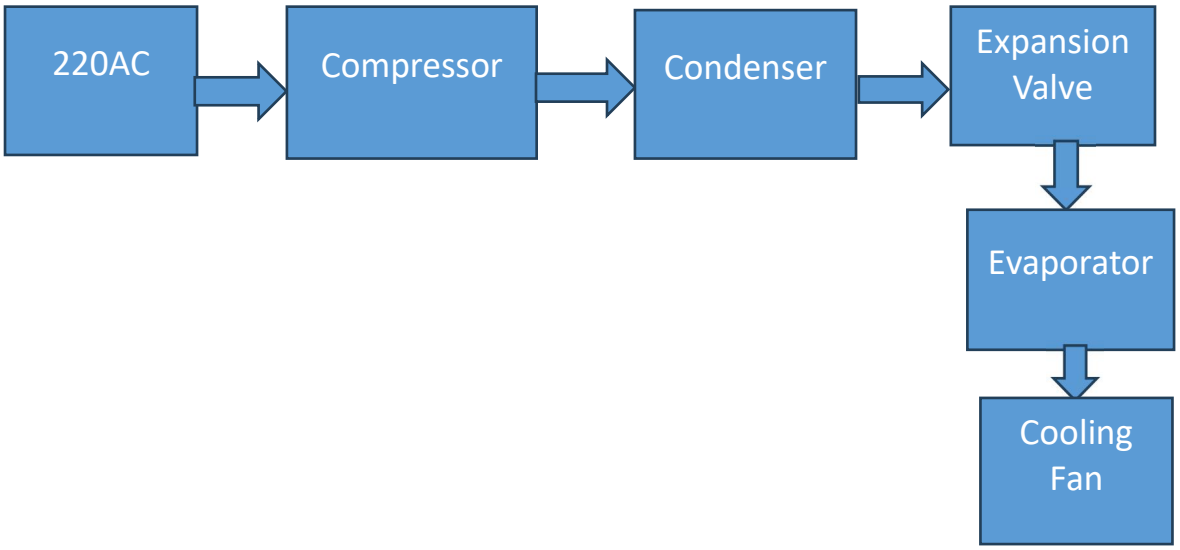


Figure 2.1: Block Diagram of portable air cooler system

1. **Compressor**

Compresses the refrigerant gas, raising its pressure and temperature.

2. **Condenser**

A heat exchanger where the high-pressure, high-temperature gas releases heat to the surroundings and condenses into a high-pressure liquid.

3. **Expansion Valve**

The high-pressure liquid refrigerant passes through the expansion valve, which lowers its pressure and temperature.

4. **Evaporator**

A heat exchanger where the low-pressure refrigerant absorbs heat from the air (or surroundings), cooling the air and causing the refrigerant to evaporate back into a gas.

5. **Fan**

Moves air across the evaporator to cool the air in the room or space.

2.3 Basic Drawing of System

Here we are using compressor,condenser,expansion valve,evaporator,fan and R600A refrigerant gas.The compressor will come with a 220 volt controller unit. From the compressor through the gas condenser to the capillary tube the evaporator side will rotate in a circular motion.

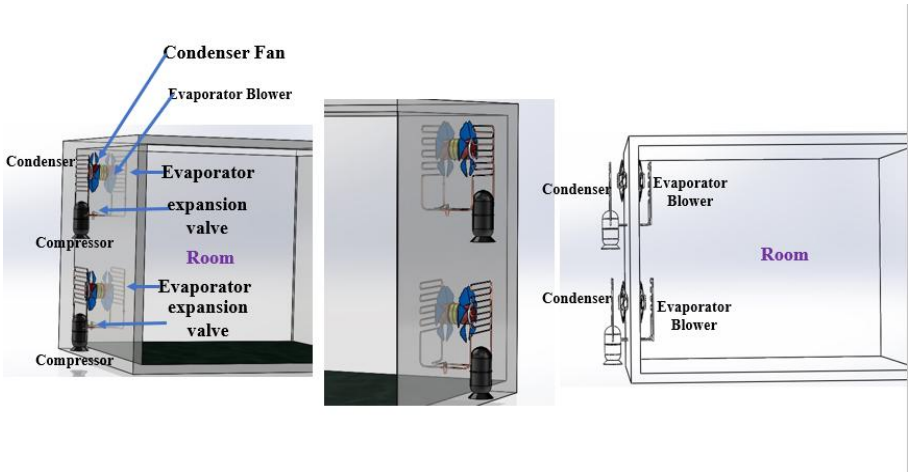


Figure 2.2: Basic Drawing of this System

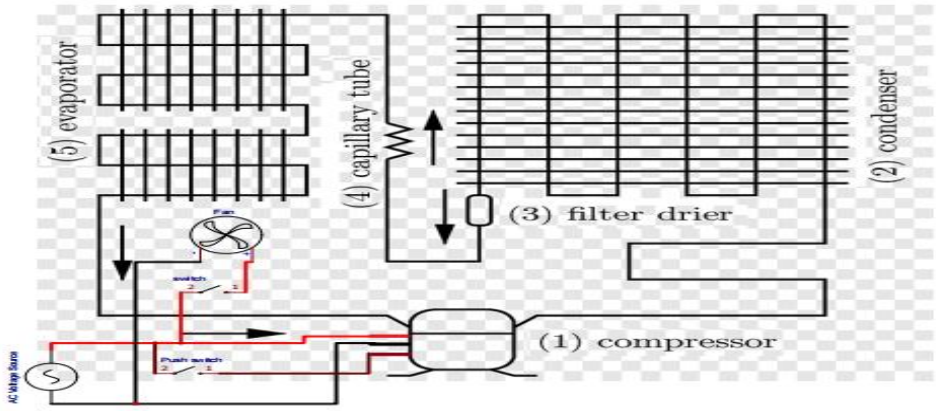
2.4 Schematic Diagram

Heat Transfer: The refrigerant absorbs heat in the evaporator (cooling the air) and releases heat in the condenser (heating the outside air).

Phase Changes: The refrigerant undergoes phase changes — evaporating in the evaporator and condensing in the condenser.

Energy Efficiency: The cooling effect achieved is much greater than the work input in the compressor, which is why refrigeration systems are so widely used.

This cycle repeats continuously, providing consistent cooling in a refrigeration air cooler



2.5 Real View of project

Here we are showing the exact real view from the top side.there are three chamber.one is for compressor,another room using for evaporator and expansion valve, finally the fan is exhausting the cooling air to the Room. And the another side has condenser those releasing the temperature.



Figure 2.3: Our Project Prototype (Top View)

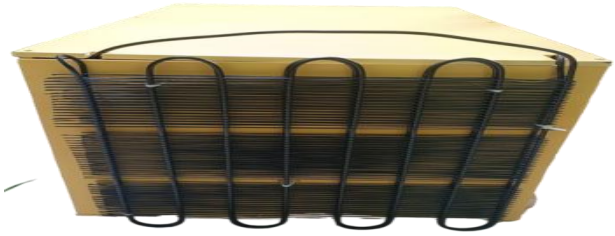


Figure 2.4: Our Project Prototype (Front View)

Chapter 3

Hardware Implementation

3.1 Instrument are using

Hardware is the most visible part of any information system. Here our hardware is Compressor, Coolant, Evaporator, Condenser, Expansion valve, Temperature Sensor, DC Motor, chamber materials etc.

Hardware

1) Compressor
2) Coolant/Gas
3) Evaporator
4) Condenser
5) Expansion valve
6) Temperature Sensor
7) Fan
8) Wire
9) Clip
10) Cable Tie
11) Switch
12) Chamber Materials

3.2 Components Rating and Quantity

Sl. No.	Components Name	Specification	Quantity
01	Compressor	220V AC	1
02	Refrigerant	R600A	60-70 gm
03	Evaporator	Copper tube	50 Feet
04	Condenser	Irone (8 Layers)	1
05	Capillary Tube	34 Size	18 Feet
06	Chamber Materials	PVC	1
07	Fan		1

3.3 Compressor

A **compressor** is a mechanical device that increases the pressure of a gas by reducing its Volume. An air compressor is a specific type of gas compressor. Compressors are similar to pumps: both increase the pressure on a fluid and both can transport the fluid through a pipe. As gases are compressible, the compressor also reduces the volume of a gas. Liquids are relatively in-compressible; while some can be compressed, the main action of a pump is to pressurize and transport liquids.

Many compressors can be staged, that is, the fluid is compressed several times in steps or stages, to increase discharge pressure. Often, the second stage is physically smaller than the primary stage, to accommodate the already compressed gas without reducing its pressure. Each stage further compresses the gas and increases its pressure and also temperature (if inter cooling between stages is not used).

Mathematically the work done by the reciprocating compressor is equal to the work done by compressor **during compression** and discharge minus the work done during the suction of fluid. p_2, v_2, T_2 are the corresponding pressure, volume, and temperature after compression.



Figure 3.1: Compressor

Use of Compressor

Air compressors have many uses, including: supplying high-pressure clean air to fill gas cylinders, supplying moderate-pressure clean air to a submerged surface supplied diver, supplying moderate-pressure clean air for driving some office and school building pneumatic HVAC control system valves, supplying a large.

Use and Application

A compressor is a device that increases the pressure of a substance (usually a gas) by reducing the volume of the substance. Compressors are used in many applications, most of which involve increasing the pressure inside a gas storage container, such as:

- Compression of gases in petroleum refineries and chemical plants
- Storage of gas in high pressure cylinders
- Cabin pressurization in airplanes
- Air storage for underwater activities
- Filling tires

Other applications include, but are not limited to:

- Refrigeration and air conditioners
- Rail vehicle operation
- Gas turbines
- Powering pneumatic tools
- Pipeline transport of natural gas

3.4 R600A Refrigerant

R600A (Iso-Butane) is refrigerant grade Iso-Butane used as a replacement for R12 and R134a in a variety of high temperature refrigeration applications. ... It is the refrigerant of choice for domestic and light commercial refrigeration units, including fridges and freezers, drink dispensers and stand alone display units.

For the longest time, chlorofluorocarbons, hydrochlorofluorocarbons and hydrofluorocarbons have been used as refrigerants. Research, however, has shown that CFC, HCFCs, and HFCs are harmful to the environment. One of the biggest concerns has been the depletion of the ozone layer. Strides have been made (and are still continuing) to ensure that all refrigerants are safe, efficient, and above all, green. Most harmful refrigerants are being phased out and being replaced with eco-friendly refrigerants like R410.

Properties of R600A

Here are some of the top properties of R600 refrigerant.

- R600 is friendly to the environment – doesn't cause the greenhouse effect
- It has a low power consumption
- The refrigerant is compatible with different lubricants
- Its load temperature speed is low
- The cooling performance of R600 is very strong

Uses of R600A

As highlighted earlier, R600 has become the refrigerant of choice because of its eco-friendly properties. Let's look at some of the applications of this refrigerant.

- The refrigerant is used in geothermal power generation
- R600A is ideal for industrial refrigeration
- It's applicable in beverage dispensers
- It's used in dehumidifiers
- R600A can be used in plug-ins and vending machines
- They can also be used as feed stock in the petrochemical industry
- It's used in aerosol spray

3.5 Evaporators

Introduction Evaporation and evaporation are two processes in which simultaneous heat and mass transfer process occurs resulting into separation of vapor from a solution. Evaporation and vaporization occur where molecules obtain enough energy to escape as vapor from a solution. The rate of escape of the surface molecules depends primarily upon the temperature of the liquid, the temperature of the surroundings, the pressure above the liquid, surface area and rate of heat propagation to product.

Working Principle of Evaporator and its Types

The function of evaporator is to absorb heat from surrounding location or medium which is to be cooled by means of refrigerant. The refrigerant either boils as it flows

through a pipe, tube or other type of space so that liquid is continuously wetting all the inside surface or it boils in a shell around submerged tubes through which the fluid to be cooling is flowing. Various methods are used for evaporators, depending upon the refrigerant to be used and evaporator application, but iron, steel and copper predominate. Refrigerant evaporators should be of extended surface or finned tube type whatever practical. In order to keep the average surface temperature down, a good bond between the fin and tube is essential. Integral fins formed out of the tube itself are best in this respect and give the best heat transfer rate.

Type of evaporators based on operating condition:

1. Flooded type evaporator
2. Dry or direct expansion type evaporator

Type of evaporator based on construction:

1. Bare tube evaporator
2. Plate evaporator
3. Finned tube evaporator
4. Shell tube evaporator
5. Tube in tube evaporator

Bare tube evaporator:

The bare tube evaporators are made up of copper tubing or steel pipes. The copper tubing is used for small evaporators where the refrigerant other than ammonia is used while the steel pipes are used with the large evaporators that uses ammonia as refrigerants. The evaporator comprises of several turns of tubing and are usually used for liquid chilling. In blast cooling and freezing operations, atmospheric air flows over bare tube evaporator and the chilled air leaving it used for cooling purposes.

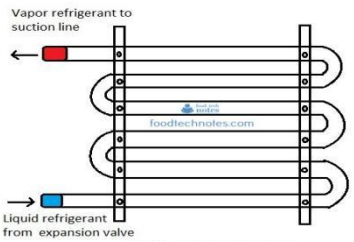


Figure 3.2: Bare Tube Evaporator

Plate evaporators: In plate type evaporators, the coil usually made of copper of aluminum is embedded in the plate so as to form a flat looking surface. Externally the plate type evaporator looks like single plate but inside it, there are several turns of the metal tubing through which the refrigerant flows.The advantage of plate type evaporator is that they are more rigid as the external plate provides lots of safety. The external plate also helps increasing heat transfer from metal tubing to the substance to be chilled. These types of evaporators are easy to clean and can be manufactured cheaply. They can be converted into box shape, partitions or shelves as required for different purposes. Due to various advantage and flexibility offered by plate type evaporator, they are used extensively.

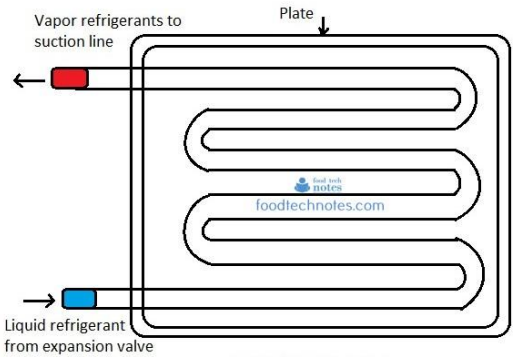


Figure 3.3: Plate Evaporator

Finned tube evaporator:

The finned evaporators are tube type evaporators covered with the fins. When the fluid (air) to be chilled flows over the bare tube evaporator, lots of cooling effect from the refrigerant goes wasted since there is less surface for transfer of heat from fluid to refrigerant. The fins on the finned tube evaporator increases contact surface area and increases heat transfer rate. Thus finned evaporators are more effective than bare tube evaporators.

For fins to be effective, it is very important that there is good contact between coil and the fins. In some cases fins are soldered directly to surface of the coil and in other cases, the fins are just slipped over the surface of tubes or coils. The finned evaporators are most commonly used in the air conditioners of almost all type like

window, split, packaged and central air conditioning. In this system, finned evaporator is known as cooling coil.

The hot air flows over finned evaporator for cooling. To increase effectiveness of heat transfer from evaporator, the tubing are also given internal fins. These fins are made by forming different internal cross section shapes at the time of manufacturing of tubing.

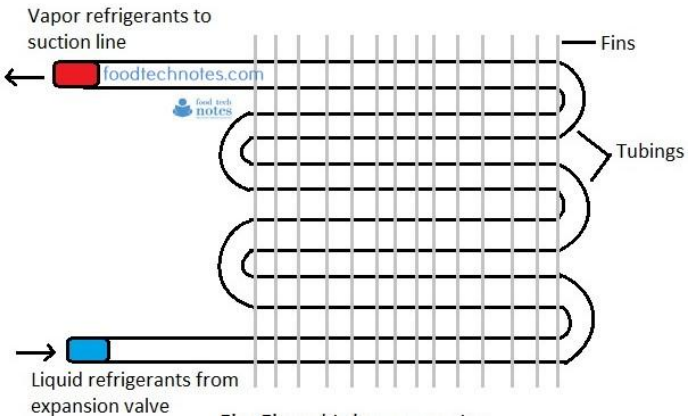


Figure 3.4: Finned Tube Evaporator

3.6 Condenser

In systems involving heat transfer, a condenser is a heat exchanger used to condense a gaseous substance into a liquid state through cooling. In so doing, the latent heat is released by the substance and transferred to the surrounding environment. Condensers are used for efficient heat rejection in many industrial systems. Condensers can be made according to numerous designs, and come in many sizes ranging from rather small (hand-held) to very large (industrial-scale units used in plant processes). For example, a refrigerator uses a condenser to get rid of heat extracted from the interior of the unit to the outside air. Condensers are used in air conditioning, industrial chemical processes such as distillation, steam power plants and other heat-exchange systems. Use of cooling water or surrounding air as the coolant is common in many condensers.[1]

Principle of Operation

A condenser is designed to transfer heat from a working fluid (e.g. water in a steam power plant) to a secondary fluid or the surrounding air. The condenser relies on the efficient heat transfer that occurs during phase changes, in this case during the condensation of a vapor into a liquid. The vapor typically enters the condenser at a temperature above that of the secondary fluid. As the vapor cools, it reaches the saturation temperature, condenses into liquid and releases large quantities of latent heat. As this process occurs along the condenser, the quantity of vapor decreases and the quantity of liquid increases; at the outlet of the condenser, only liquid remains. Some condenser designs contain an additional length to subcool this condensed liquid below the saturation temperature.

Countless variations exist in condenser design, with design variables including the working fluid, the secondary fluid, the geometry and the material. Common secondary fluids include water, air, refrigerants, or phase-change materials.

Condensers have two significant design advantages over other cooling technologies:

- Heat transfer by latent heat is much more efficient than heat transfer by sensible heat only
- The temperature of the working fluid stays relatively constant during condensation, which maximizes the temperature difference between the working and secondary fluid.

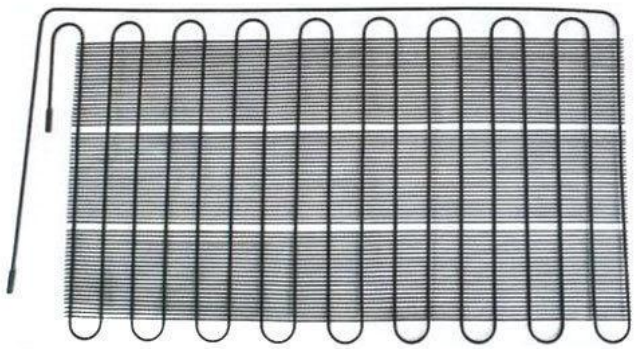


Figure 3.5: Condenser

3.7 W1209 Digital Temperature Controller

The W1209 is an incredibly low cost yet highly functional thermostat controller. With this module (HCTHER0006) you can intelligently control power to most types of electrical device based on the temperature sensed by the included high accuracy NTC temperature sensor. Although this module has an embedded micro controller no

programming knowledge is required. 3 tactile switches allow for configuring various parameters including on & off trigger temperatures. The on board relay can switch up to a maximum of 240V AC at 5A or 14V DC at 10A. The current temperature is displayed in degrees Centigrade via its 3 digit seven segment display and the current relay state by an on board LED.

Specification:

- Temperature Control Range: -50 ~ 110 C
- Resolution at -9.9 to 99.9: 0.1 C
- Resolution at all other temperatures: 1 C
- Measurement Accuracy: 0.1 C
- Control Accuracy: 0.1 C
- Refresh Rate: 0.5 Seconds
- Input Power (DC): 12V
- Measuring Inputs: NTC (10K 0.5%)
- Waterproof Sensor: 0.5M
- Output: 1 Channel Relay Output, Capacity: 10A

Power Consumption

Static Current: <=35mA

Current: <=65mA

Environmental Requirements

Temperature: -10 ~ 60 C

Humidity: 20-85%



Figure 3.6: W1209 digital temperature controller

Chapter 4

Experimental Result and Calculation

4.1 Result

After making our project we observe it very careful. It works as we desire. Our project give output perfectly and all equipment are work perfectly. We check how much it works and we get perfect output from this project.

- Finally, we have completed our project successfully & check our project its run accurately according to our objective.
- At first, we start our system and operate different condition.
- This system measures the temperature with the help of temperature sensor. And make temperature as need in this cooler cycle system.
- All the data output will show in display.

Table: 4.1: Refrigerant R-600a Use

Serial No	Time	T (Hot)	T(Cold)	COP
01	5 min	32℃	27℃	5.4
02	15 min	32℃	25℃	3.57
03	30 min	32℃	23℃	2.55
04	40 min	32℃	22℃	2.2
05	60 min	32℃	21℃	1.9
06	70 min	32℃	20°C	1.66
07	80 min	32℃	19°C	1.46
08	120 min	32℃	Constant 19°C	1.46

After 40 min our comfort temperature is 22℃

When It reached 19°C after 120 min it totally constant.

To calculate the coefficient of performance (COP) The Formula of $COP=\frac{QC}{W}$

Where:

- QC is the amount of heat absorbed by the refrigerant in the evaporator (cold side), usually in kilojoule (kJ).

- W is the work input to the system (compressor), usually in kilojoule (kJ).

In a refrigeration cycle, another way to express COP in terms of temperatures is:

$$\text{COP} = \frac{T_{cold}}{T_{hot} - T_{cold}}$$

$$= \frac{27}{32-27}$$

$$= 5.4$$

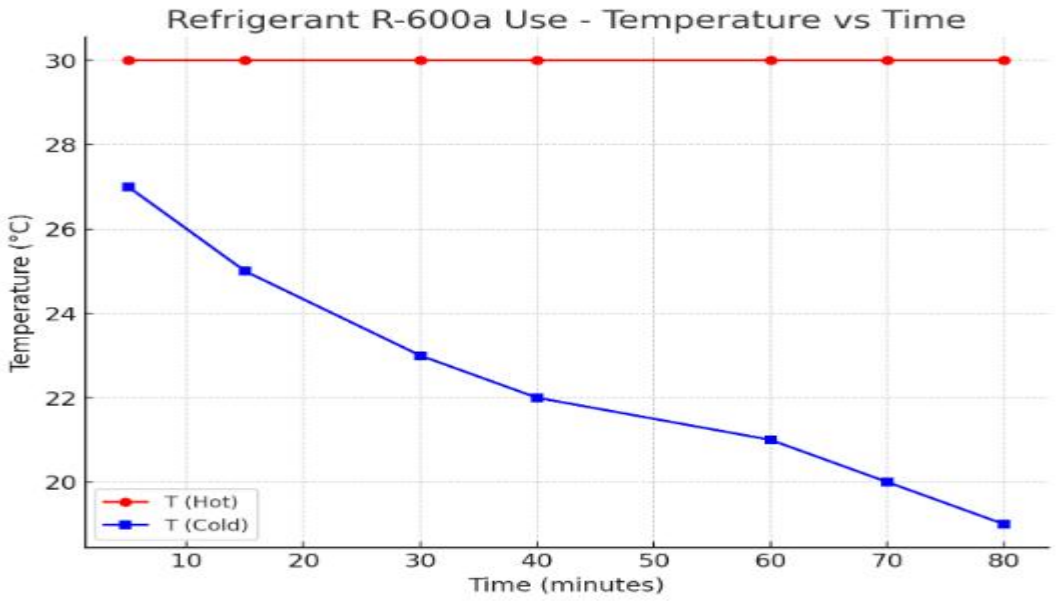


Fig 4.1: Temperature Vs time

Here is the curve showing the relationship between time and temperature (both hot and cold) for Refrigerant R-600a based on the provided data. The red line represents the hot temperature, while the blue line represents the cold temperature over time.

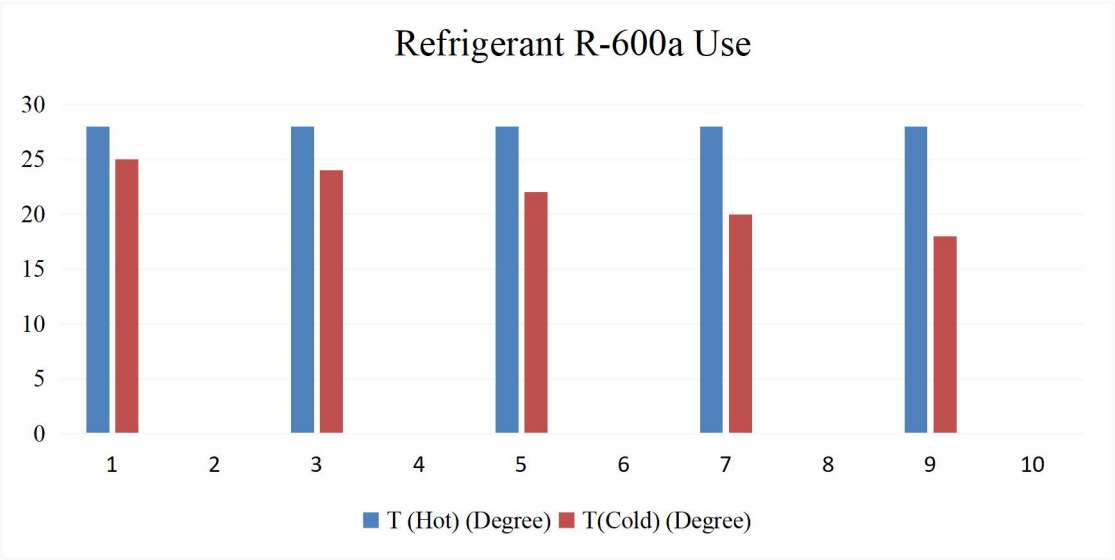


Figure: 4.2: Cooling Part In R600A Refrigerant

In this graph area showing the temperature comes down through the red line and on the other hand blue line is showing the ambient temperature

4.2 T-S Diagram of Refrigerant Cycle

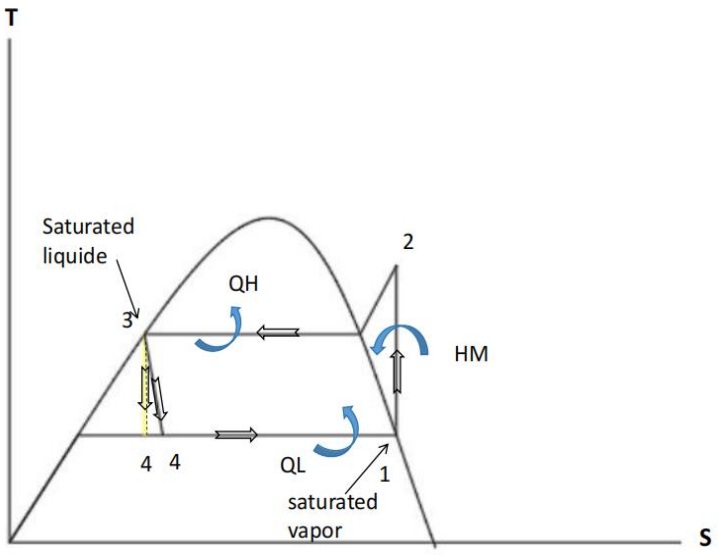


FIG: Diagram for refrigeration cycle

4.3 Advantage

There are many advantages of our project because of its accuracy. Some of the advantages are pointed out below:

- Creates a comfortable and productive work environment.
- Improve outside Air Quality.
- Energy-efficient cooling solution.
- Environmentally friendly.
- No Oil consumption.
- Less skill technicians is sufficient to operate.
- Installation is simplified very much.
- Simple construction
- Ease of operation.

4.4 Application:

The application areas for this project in this modern and practical world are huge and some of these are given below:

- It can be used for Industrial work.
- It can be used in factories.
- It can be use for indoor purpose

Chapter 5

Future Scope and Conclusion

5.1 Future Work

The model can be improved by making some changes in the hardware and components. Some suggestions are given below-

- We will increase its performance level.
- We will make it more economically.
- We will add a sensor and a display to measure and monitoring the cooling situation.

5.2 Conclusion

The portable Air conditioner system satisfies the need of user at the most economical cost. The portable air conditioner is having very low manufacturing and maintenance cost. Its cooling power is comparable to wall air conditioner. It provides transportability, can be move anywhere easily. It would sit nicely in our bedroom, drawing room and kitchen. It is completely non-polluting. Detailed portable air cooler cycle system cycle has been presented along with classification of types of capillary tube full of coolant used in this cooling systems. It is very energy efficient as only the fan and pump require electricity. It also has a very low initial, running and maintenance costs which is very appreciable. It can be very useful in tropical countries which have high temperatures and humidity during the summer.

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