"Review Of Study And Maintenance Of Refrigeration System"

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Abstract-
When equipment keeps breaking down or not working as expected, it's often because preventive maintenance was never done - only emergency maintenance. Remember that equipment is only as good as it is maintained. All mechanical equipment requires regular maintenance to keep it in top working order. Good service can mean the difference between a few mechanical failures or constant problems. The following is the guide to developing a comprehensive preventive maintenance program. All majorcomponents should be included in the maintenance schedule for proper system maintenance. These include the evaporator(s), the compressor unit, and the condenser.

Keywords : Cooling , Maintenance , Refrigeration , Compressor, etc.

1. Introduction

During commissioning, the preservation of food and other consumable necessities is extremely important. Damage to large quantities of food or hospital blood supplies due to a broken refrigerator or freezer can cause serious morale and health problems. Therefore, one of your most important responsibilitiesas a maintenance person is to maintain the unit's cooling equipment to ensure proper operation.

The topic of the discussion is energy consumption and energy saving at home. In this space, we look for ways to save energy by improving a product or process and thus reducing its energyconsumption. The principal aim of this project is to improve the ecology of the domestic refrigerator with emphasising on reducing the appliance's energy consumption. The working energy of refrigerators is mainly obtained by burning fossil fuels, which increases economic and environmental costs. Therefore, the reduction in energy consumption willc curtail CO2 emissions and the electricity bills of the end user of the refrigerator.

The most important energy-consuming component of a refrigerator is the compressor, which runs 80-90% of the time, keeping the internal temperature at around degrees. In addition, there are approximately 1,500 million refrigerators in the world, many of which are even 20 years old. An interesting contrast is that in colder climates where the outside temperature is degrees or below, households usuallyhave a refrigerator inside the heated house, which works hard to cool the room to a temperature similar to that outside the house

This project solves this inefficiency by using cold outside air to improve the efficiency of the refrigerator in the simplest design form. It also aims to change the traditional refrigerator as little as possible. The need is based on the large number of refrigerators used in the world and the daily usage time of the refrigerator. This is further explored in whole system and in life cycle thinking and it is shown that the largest energy consuming phase of the life cycle of a refrigerator is in the use phase and 80-90% of the timeis electricity running on the compressor. Therefore, based on volume alone, improving energy consumption reduction is the management phase of the refrigerator, which significantly increases the environmental sustainability of the refrigerator globally and during its lifetime.

2. Objectives

The objective of this work is

1) To understand the basic phenomena responsible for producing the cold effect using simple theoretical models based on the ideal behavior of gases.

2) Test a single stage GM impulse tube refrigerator in the mechanical department lab.

Experimental studies include the cooling behavior of the cooling system and suggestions for changes to improve performance.

1. Identify the principles of refrigeration.
2. Describe the components of mechanical cooling systems.
3. Identify the different types of refrigerant.
4. State the refrigerant precautions.
5. Describe the different types of refrigeration equipment.
6. Describes installation procedures for refrigeration equipment.
7. Describes maintenance, service and repair procedures for refrigeration equipment.
8. Describe the maintenance procedures for compressors.
9. Describes maintenance procedures related to engines.

3. Literature Review

- **Matthew Kozner et al. [2008**] Presented experimental and numerical studies of thermoelectric air-cooling and air-heating systems. They reached a cooling power of 50w, corresponding to modules with a capacitance between 1.5 and 2, using an electrical depth supply of 4a and maintaining a temperature difference of 5 ° C between the new and cooled sides.
- **Adam Grosser et al. [2007]** More thanone billion people do not have access to electricity and refrigeration, meaning there are no vital vaccines available to keep them cool. Non-profit organizations are spending millions to develop vaccines that do not require refrigeration, but replacing refrigerators with tech venture capitalistAdam Grosser is a different idea.
- **Boss et al. (2004) [2]** explored the use of multi-layer quantum well (MLQW) thermoelectric in refrigeration applications. MLQW Thermoelectric material is a combination of thin layers of alternating semiconductor material with different electronic band gaps. In this way, the thermal and electrical conductivity of the material can be separated. The non-dimensional figure ofmerit of such composite materials has been experimentally determined to be up to 3 or 4.
- **Chen and Chen et al. (2005) [3]** investigated the use of a micro-channel heat sinkon a TE module used to cool a water tank. The micro-channels are embossed in a silicone layer with a glass cover plate. Four micro-channel heat exchangers are designed with different ports and hydraulic diameters (DH), ranging from 89 ports to 65 µm DH at 150 µm DH to 44 ports.
- **Web et al. (1998) [4]** investigated the use of a thermo siphon as a heat sink for TE modules used for electronics cooling. A porous aluminum surface was used to improve the heat transfer inthe evaporator. The condenser is built with internal microfins to improve compression. An experimental study was conducted with a simple simulation heat load of a thermoelectric module heat rejection. A thermal resistance of 0.0505 K / W was calculated for a 45 mm square improved boiling surface at 75W.
- **Jean Peltier and. Al. [1834**] When an electric current is applied to the junction of two unequal metals, heat is removed from one metal and transferred to the other. It is the basis forthermoelectric cooling. The thermoelectric moduleconsists of a series of small metal cubes of various exotic metals that are physically connected to electricity. As electricity passes through modern cubic junctions, heat is transferred from one metal to another. Solid state thermoelectric modules can transfer large amounts of heat when connected to aheat absorbing device on one side and a heat dissipation device on the other. Cooltron's internal aluminum cold plate wings absorb heat from the material (food and beverage) and thermoelectric modules transfer it to the heat dissipation wings under the control panel. Here, a small fan helps dissipate heat in the air.

4. Project Description

- **Mechanical Refrigeration Systems**

Mechanical cooling systems are an arrangement of system components that apply gas theory in practice to provide artificial cooling. To do this, you must provide: (1) a metered supply of relatively cool pressurized fluid; (2) a device located in the cooled space that operates at reduced pressure so that when cold, the pressurized liquid expands, evaporates, and absorbs heat from the cooled space; (3) means to suppress (compress) the steam; and means of condensing it back to a liquid, removing its superheat, its latent heat of vaporization, and some of its sensible heat.

Each mechanical cooling system operates at two different pressure levels. The dividing line is shown in Figure 1. The wire runs from one end through the discharge valves of the compressor and from the other through the orifice of the measuring device or expansion valve.

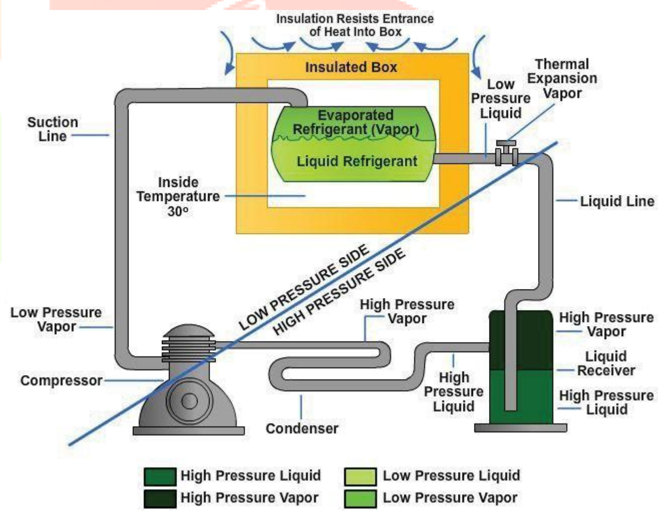

Figure 1. Refrigeration cycle

- **Components**

The refrigeration system consists of four basic components:

- Compressor
- Condenser

- Liquid receiver
- Evaporator
- Control devices
- Others

5. Troubleshooting Refrigeration Equipment

Troubleshooting any type of refrigerationequipment depends on your ability to compare normal operation with the operation of the equipment used. Obviously, to identify these abnormal activities, you must first know what normal activity is. Climate affects driving time. In dry climates, the refrigerator usually works more efficiently. At an ambient temperature of 75°F, the duty cycle is typically about 2 minutes and theoff period is 12 to 20 minutes. This text does not cover all the problems that can arise when working with refrigeration equipment. If you are making the application yourself, you can learn much more through on-the-job and experience and by consulting the manufacturer's user manual.

Before and during troubleshooting or maintenance, safety must be emphasized and safe practices must be followed. All local and national regulations and DoD security regulations must be followed. Some of the most important safety measures that are often overlooked are:

• Protective equipment such as eye protection, gloves, helmet, etc. must be available and used.

• Fire extinguishers must be easily accessible, in good working order and suitable for the situation.

• During maintenance or repair, safety labels such as "Danger", "Hands off", "Do not use" and "Do not throw switch" should be attached to valves and switches and other strategic places.

• Install the machine covers properly before using the machines.

6. Conclusion

Refrigeration systems are of the utmost importance for preserving medicine, blood, and most important, keeping food from spoiling. In this chapter we have introduced to the stages of heat theory and the principles involved in heat transfer and also described how to recognize refrigeration system components along with their application. Finally, this project described how to recognize the characteristics and procedures required to service and troubleshoot refrigeration system equipment.

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