SSRG International Journal of Mechanical Engineering
ISSN: 2348 – 8360 /doi:10.14445/23488360/IJME-V7I8P101
Volume 7 Issue 8, 1-4, August 2020

Design & Analysis Of Waste Heat Recovery In Domestic Refrigeration Using R134a

A. Mohanraj[*1], D. KaroleInfanto[*2], R. Gokul[*3], N.B. KesavGoutham[*4], A. Mageswaran[*5]

[*1]*Assistant Professor, Department of Mechanical Engineering, K S R Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India*

[*2] *UG Student, Department of Mechanical Engineering, K S R Institute for Engineeringand Technology, Tiruchengode, Tamilnadu,India*

[*3]*UG Student, Department of Mechanical Engineering, K S R Institute for Engineering and Technology, Tiruchengode, Tamilnadu,India*

[*4]*UG Student, Department of Mechanical Engineering, K S R Institute for Engineering and Technology, Tiruchengode, Tamilnadu,India*

[*5]*UG Student, Department of Mechanical Engineering, K S R Institute for Engineering and Technology, Tiruchengode, Tamilnadu,India*

ABSTRACT:*Heat is energy, so energy saving is one of the most important matter from the viewpoint of fuel consumption and for the protection of the environment and then the worldcompelled to take the adequate to minimize consumption of energy. By saving energy, we balance the demand and supply of electricity. The domestic refrigerator is used to store goods like fruits, vegetables, milk and other beverages etc.,due to temperature rise enormous amount of heat is released during summer; this refrigerator is capable of rejecting the heat produced. So it is essential to reject this heat outside or utilize it for different purposes like heating water, keeping food hot. To design develop the CREO parametric software and analysis based on computational fluid dynamics in ANSYS software.*

KEYWORDS- *consumption, evaporator, recovery, domestic.*

I. INTRODUCTION

Waste heat is normally energy associated with waste air sources; gas exits the device border and reaches the atmosphere. Not all waste heat is practically recoverable. Recovery of this heat is reliant on the temperature of the discarded waste heat source and the economics convoluted behind the technology assimilated. It is eliminated through a process at a temperature high beyond the ambient temperature, which allows regaining energy for alternative purpose economically.

II. METHODOLOGY

A. Vapor absorption cycle

Ammonia (coolant, water-absorbent), water (refrigerant), lithium bromide (absorbent), are the most common combinations. This low-pressure refrigerant is removed by the compressor and is reused throughout the cooling cycle. The cyclic vapor compression method is used for domestic and industrial applications.It is used for domestication cooling and commercial applications, this vapor compression period.

B. Gas cycle

The gas is choked from very high pressure to low pressure in the throttling valve, and the temperature decreases suddenly whereas the enthalpy is constant. Gas refrigeration system uses this principle. Instead of Freon or Ammonia, the gas is used as a coolant in this device.

Working of the gas refrigeration cycle

The pressure and temperature rise very high as gas is flowing through the compressor. The gas is allowed to flow through the heat exchanger, which executes the function similar to the condenser in the vapour compression cycle, excluding that there are no changes in the phase of air or gas. The air in the heat exchanger releases the water, but the pressure remains in thethrusting valve (called an expander), the medium temperature air and high-pressure enter. The gas enthrals the heat from the element to be cooled and becomes hotter, while the element becomes cooler. This heat exchanger does not alter the gas process

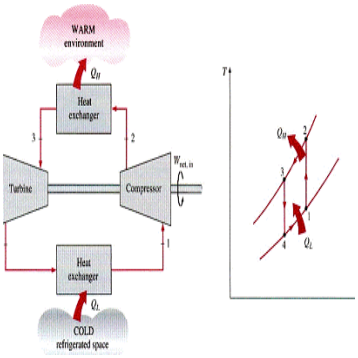

Figure 1 Gas cycle refrigeration

III. ANALYSISOF DOMESTIC REFRIGERATION

A. Airflow rate in 0.3333 kg/s

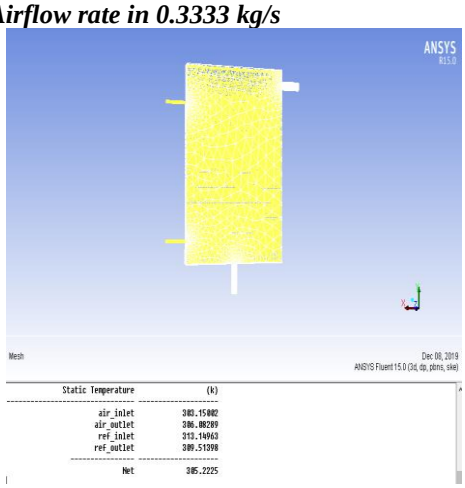

Figure 2 Airflow rate in 0.3333 kg/s

B. Temperature difference of Airflow rate in 0.1667 kg/s

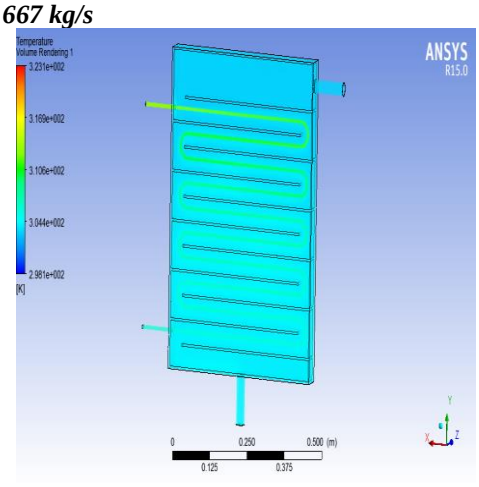

Figure 3Temperature difference of Airflow rate in 0.1667 kg/s

C. Comparative Result of Refrigeration – temperature 40℃:

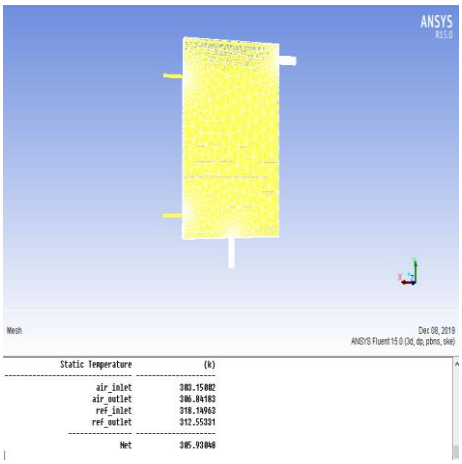

Figure 4 Comparative Result of Refrigeration – temperature 40℃

D. Temperature difference of Airflow rate in 0.1667 kg/s

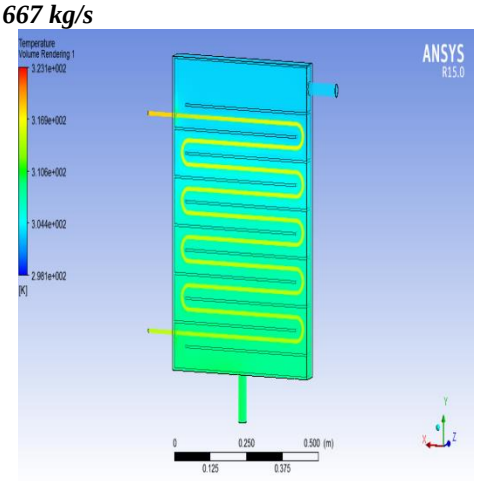

Figure 5 Temperature difference of Airflow rate in 0.1667 kg/s

E. Comparative Result of Refrigeration – temperature 45℃:

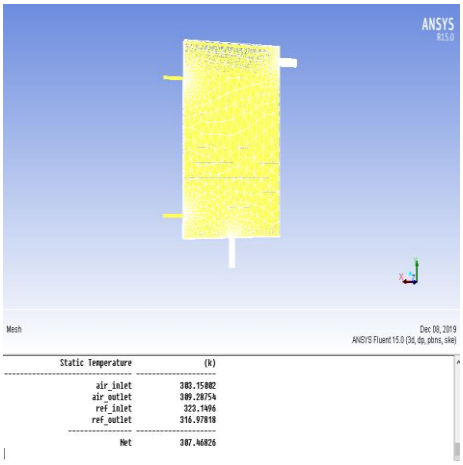

Figure 6 Air flow rate in 0.25 kg/s

F. Air flow rate in 0.3333 kg/s

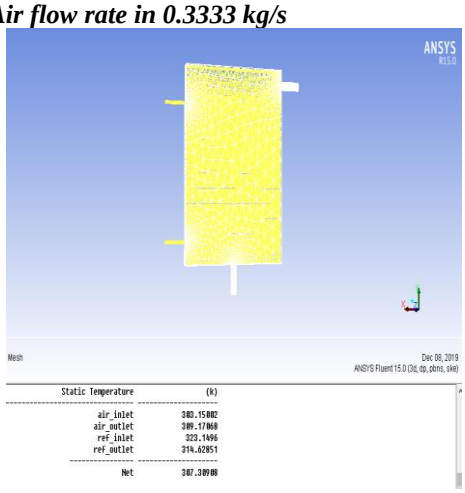

Figure 7 Airflow rate in 0.3333 kg/s

G. Temperature difference of Airflow rate in 0.1667 kg/s

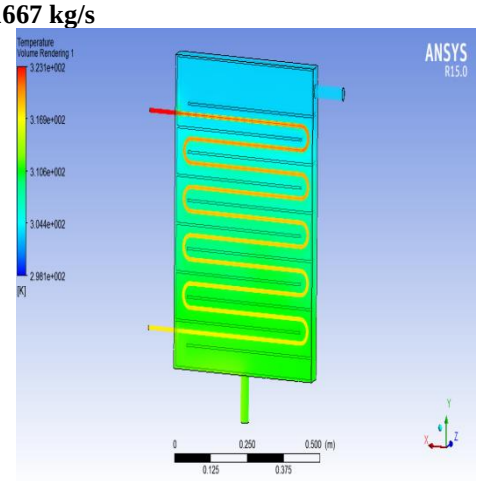

Figure 8 Temperature difference of Airflow rate in 0.1667 kg/s

H. Refrigeration – temperature 50℃ with Water flow

Water flow rate in 0.1667 kg/s

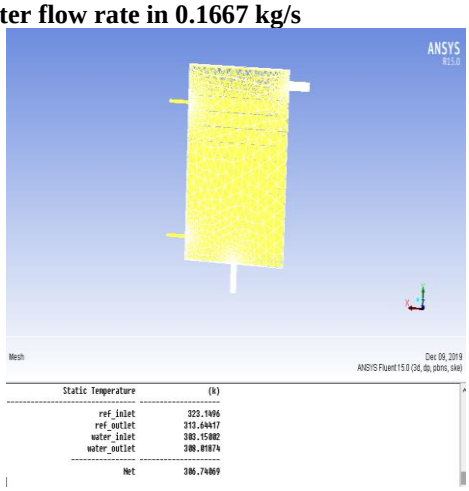

Figure 9Water flow rate in 0.1667 kg/s

I. Water flow rate is 0.25 kg/s

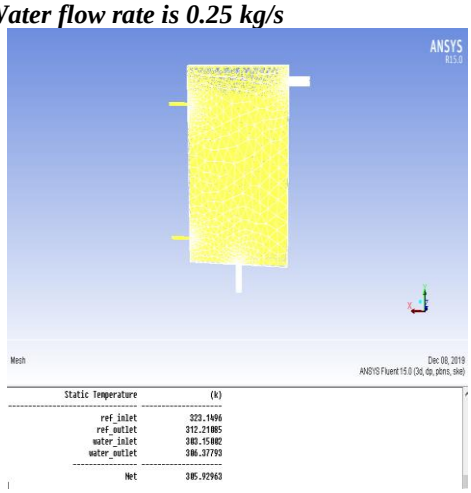

Figure 10Water flow rate in 0.25 kg/s

J. Water flow rate is 0.3333 kg/s

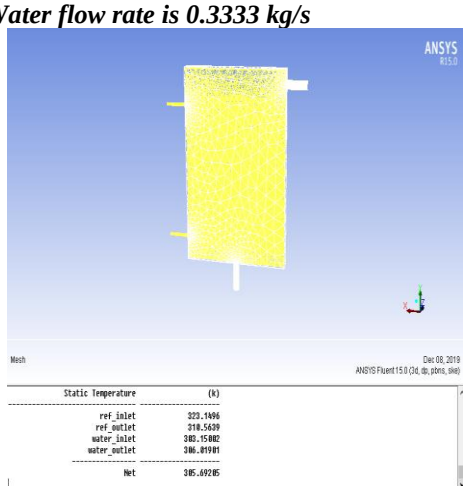

Figure 11 Water flow rate is 0.3333 kg/s

K. Temperature difference of Water flow rate is 0.1667 kg/s

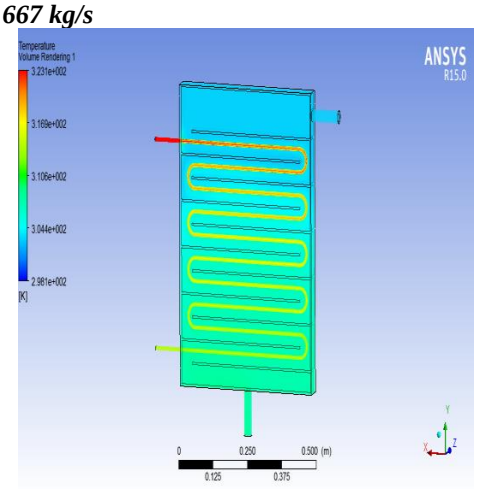

Figure 12 Temperature difference of Water flow rate is 0.1667 kg/s

IV. CONCLUSION

Recovery of waste heat is essentialnowa daydue to the energy crisis. We have seen that after reading a literature review, the way of recovering heat from condenser is found. It will also reduce the consumption of electricity by providing the same power of electricity to the compressor to run evaporator and condenser. It is evident from above investigation that the machine called as "Refrigerator with oven" performs the best result maintains temperature up to 30 - 45 degree in Hot Box, and hot water maintains the 30 to 55 degree. Oven and water heater the efficiency of the refrigerator is not affected.

V. REFERENCES

[1] A.M. Vibhute and Avinash M. Patil, Waste heat recovery in Domestic Refrigerator, International Engineering Research Journal. (2015).

[2] S.B.Lokhande, Dr S.B.Barve, Design & Analysis of Waste Heat Recovery System for Domestic Refrigerator, international journal of modern engineering research. 4 (5) (2014).

[3] AbadhBihariMandal and PankajKumar Waste heat recovery: A review of vapour compression refrigeration system,Carbon – Science and Technology,(2018).

[4] Soma A. Biswas,Sandeep M. Joshi ,Waste Heat Recovery From Domestic Refrigerator,technical research organizationIndia,4(9)(2017).

[5] Prabal Roy, Surjeet Singh Rajpoot, Improvement of Efficiency of Air Refrigeration System by lowering the Inlet Temperature of Air, International Journal of Engineering Trends and Technology . V55(1) (2018) 25-29. ISSN:2231-5381. www.ijettjournal.org. published by seventh sense research group.

[6] Prashant. S. Pathak et al, Review Study of Waste Heat Recovery using Refrigeration System, Global Research and Development Journal for Engineering, 2(5) (2017).

[7] Asst.Prof. AmolVikas Joshi,Waste Heat Recovery in Domestic Refrigeration System in the Application of Water Heating, journal for research, 3(1) (2017).

[8] LakshyaSoni, Pawan Kumar, Rahul Goyal, waste heat recovery system from the domestic refrigerator for water and air heating, international journal of engineering sciences & research technology. (2016).

[9] Sanjana V. Bharambe, Susmit A. Mulay, SuyashJadhav, Design and Analysis of Water Cooled Condenser, SSRG International Journal of Mechanical Engineering.4(6) (2017) 1-5.

[10] TanpureAbhijeet et al, review on waste heat recovery from domestic refrigerator, IJARIIE journal.4(2) (2018).

[11] AnshulSarin, Effective Utilization of Condenser Heat of a Refrigerator in a Heating Chamber, International Journal of Scientific and Research Publications. 7(12) (2017).