ISSN (O): 2393-8609

International Journal of Aerospace and Mechanical Engineering

Volume 6 – No.2, September 2019

A Review Paper on Change in Vehicle Temperature under Various Climatic Conditions and Their Effects on Humans

Vikky Chobey
Student, B.Tech Deptt of Automobile Engineering Chandigarh University,Mohali,India
Chobeyvikky@gmail.com

G. Susheel Narayan
Student, B.Tech Deptt of Automobile Engineering Chandigarh University,Mohali,India
susheelgadaley@gmail.com

Padma Manikiran
Student, B.Tech Deptt of Automobile Engineering Chandigarh University,Mohali,India
manikiran8125@gmail.com

ABSTRACT

Today automobile is not a part of transport but also it has become a part of our life. When vehicle is parked, temperature inside it increases drastically that it becomes difficult to sit inside car. So there is a need of cooling system which not only cools the car cabin temperature but also the passengers seated in the cabin. But the cooling system which manufacturing industries manufacture in cars requires power from engine or battery to run which is suitable when we are inside the car but when we the vehicle is parked and engine is at rest then cooling system doesn't work and the temperature inside the car rises rapidly. When we initially get inside the vehicle., temperature of car cabin is too high that we cannot sit inside the car because cooling system needs some time to bring down the temperature. This paper may be broadly being categorized into three parts: - 1) Threats 2) Reason behind heating of car cabin and 3) The preventive measures taken till date.

Keywords

Car cooling system, Thermal, passenger cooling system, Air conditioner portable cooling system, Automobile

1. INTRODUCTION

Nowadays it has become a common task to drive in a private car. This has led to increase in automobiles that too mainly four-wheeler vehicles. Living in a country where the temperature exceeds 50 °C (122 °F) in summers it is very important to note that the temperature increases inside the automobile vehicle increases as well. The cabin temperature can lead one into hyperthermia condition as previously recorded which may lead to death. Hence it has become significantly important to mention that temperature has to be controlled. Though we are being facilitated with air conditioning, it doesn't control the temperature when the vehicle is parked i.e., when the engine is at rest. In this review paper, some of the preventive measures are also been proposed to control cabin temperature when at rest. [1]

The aim of this review paper is to acknowledge the reader with the soring temperatures inside the automobile vehicle during different climatic conditions i.e., summers, winters and springs. It is found that the temperatures inside the vehicle i.e., vehicle cabin is more than the ambient temperature (20 °C). It exceeds 70°C during peak summers and even on a clear sky day the temperature ranges from 41-76°C. Thus this paper may be used to create awareness among the people and further advancements can be done in vehicles to reduce the level of temperature in vehicle cabin. [2]

2. THREATS FROM TEMPERATURE RISING INSIDE CABIN

In all climatic conditions there is a temperature difference between outside and inside the vehicle. Researchers have found that even if adults can bear these temperatures, younger ones like babies and children can be affected. Because children dehydrate quicker than adults and their bodies gets heated up 3 to 4 times faster compared to adults. The reason being unable to regulate their body temperature as they are infants. If younger ones are left inside a car which is parked under the sky even in mild day, then one may face health issues like heat stroke and hyperthermia as their internal body temperature reaches up to 42°C. Heat strokes can be a cause of death in vehicles for infants and children below age 14. Hence it is important to not to leave children inside the car as the temperature will increase within a couple of minutes. [2]

Also, when we park car then there is no cooling system working and car is a fully closed body in all directions and there is no passage of air so the temperature rises inside and when passengers enter the car they can feel the heat from the cabin. Hence it has become important to address this issue (see figure 1). [4]

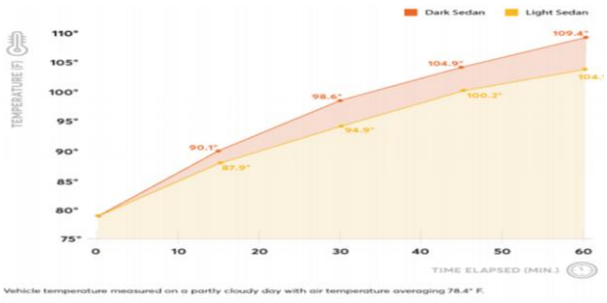

Fig.1- Graph showing rise in temperature of a park car. [2]

3. REASON BEHIND THE HEATING OF CAR CABIN

So as discussed above, temperature inside the car increases within a couple of minutes hence driver has to wait in order that the car cools by itself for some time. This phenomenon is

ISSN (O): 2393-8609

International Journal of Aerospace and Mechanical Engineering

Volume 6 – No.2, September 2019

known as Greenhouse effect as the temperature inside the vehicle is more than the temperature outside the vehicle. In car radiation of thermal energy of sunlight absorbed by dashboard, glasses, windshield etc. It is important to note that temperature rises by itself.

Everybody emits energy that is an element of temperature of certain object. When the sun rays fall on the surface of cabin it re-radiates the energy into IR part of spectrum. The carbon-dioxide and water vapour present in air absorbs this re-radiates energy and hence car gets heated from inside. [5]

4. PREVENTION

4.1 Portable Cooling system

This system can be powered by batteries or solar panels. Here we use Ventilation fan. Thus when the temperature increases inside it pushes the hot air outside. Big advantage is that it is portable and it works efficiently and temperature can be reduced uopto15c-20c. But the drawback with this system is that is a huge risk of theft as the window must be left open in order to push the hot out of car. Even though we Have AC in car for cooling effect. [3]

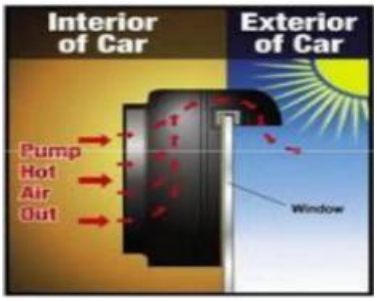

Fig.2 ventilation system [3]

4.2 Sunshade

Even by using sunshade for one hour it reduces the temperature rise by 1.4°C to 4.7°C. It also decreases temperature of dashboard and steering wheel by 8 to 10°C. It basically avoids the direct sun light coming inside the cabin and acts as semi-permeable membrane.

4.3 Surface modification

Researchers have also sought to reduce cabin temperature by lowering heat gain value through the altering vehicle's skin. In the NREL 2006, summer experiments were performed to investigate heat soaking temperatures of vehicle body, a solar reflective coating was tested against a control coating. Here it was found that by performing surface modification to the vehicle, temperature rise was decreased by 12-15 °C.

Some of the other measures for controlling the inner temperature of car cabin are:

- Whenever possible, parking car in garage or in shady areas like under the trees.
- Cover the dashboard region of car.
- Keeping windows slightly open to allow the passage of air.
- Zoned cooling [6]

5. CONCLUSION

This paper concludes that when the car is parked under the direct sunlight or on a clear sky day the temperature inside the car reaches above 80c. Hence it is generally advisable to not to leave children or infants inside car cabin even for couple of minutes as discussed it may cause serious health issues and at times may lead to death even. Always try to park the vehicle in shady places in order to regulate temperature at certain level. If not the sun rays falling in inner part surface of the vehicle gets heat up and the surface in turn emits heat energy and hence gets absorbed by the CO2 and water vapour thus leaving the heat entrapped in the cabin. There are few ways to regulate the temperature but it is not the complete solution to the problem. Hence until the new technology comes up, one is made to rely on these measures if he/she wants to control the rising temperature of vehicle.

6. ACKNOWLEDGMENTS

I want to thank Mr. Sandeep Sharma- our mentor under whose guidance I was able to complete this.

7. REFERENCES

[1] A.grundstein , V.meentmeyer, j dowd , International Journal of Biometeorology ,May 2009, Volume 53, Issue 3, pp 255–261

[2] A.S HIngane , International Research Journal of Engineering and Technology (IRJET), May 2018,Volume 05,Issue 5,page271-274

[3] Y.Shireesha,S.Karthik, L.V.N.ch Mohan, IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE),Apr2015,volume 12,issue 2 page50-57

[4] MD, FAAP ,J.S ,.Surpure, ELSEVIER,Volume11, issue5, may 1982

[5] Muji Setiyo, Sudjito Soeparman, Slamet Wahyudi, Nurkholis Hamidi, Periodica Polytechnica Transportation Engineering,2018,page36-41

[6] Nikunj Y. Pandya, Pravin B. Zinzala, International Journal For Technological Research In Engineering Volume 3, Issue 9, May-2016.