Abstract

India is the second most populous country in the world with over 1.21 billion people (estimated for April, 2011), more than sixth of the world's population. India is projected to be world's most populous country by 2025, surpassing China, its population exceeding 1.6 billion people by 2050. Comparing with the population there are 2.65 million cars sold in India as of March 2011. According to the society of Indian automotive manufacturer, annual car sales are projected to increase up to 5 million vehicles by 2015 and more than a 9 million by 2020. By 2050, the country is expected to top of the world in car volumes with approximately 611 million vehicles on the nation's roads. The above data shows that, as the
population increase the no. of vehicles also increase. Today, an automobile is a necessity for everyone. For a long or short journey people need car regard to the safety, environment and most important comfort. Owing to these reasons, many vehicles are equipped with heating, ventilating and air conditioning system. In today’s world, no one feel comfortable in a vehicle without HVAC system. Therefore, HVAC becomes an integral part of human life. Today’s present HVAC system is very efficient and reliable but it has some demerits. It has been observed during the last two decades that the O3 –layer is slowly destroyed because of the refrigerant (CFC and HFC) used for the refrigeration and air – conditioning purposes. The common refrigerant used is HFC’s which are leaked and slowly climb into the atmosphere. When they reach to O3 layer they act on O3 –molecules and the layer of O3 is destroyed. A single molecule of HFC’s can destroy thousand of O3 molecules and that’s why it has created a threat for the not only to maintain earth eco system stable but also to existence of earth. Even the percentage of HFC’s are emitted into the atmosphere compared to CO2 is negligible but its global warming effect is few thousand times of CO2. The effect of 100 gm of HFC’s can destroy 0.5 tons of O3 molecule. These HFC’s once destroy O3-layer; it takes lack of years to recover its thickness as it is formed by complex reactions. This is because as HFC’s comes in environment they remain in atmosphere for 18 years. The capacity of HFC’s to increase in earth temperature 10% is contributed by HFC’s only.(see reference) Other demerits includes: - The compressor is driven by the crankshaft of the engine. So it consumes about 5 to10% power of the engine. This consequently reduces mileage of the vehicle. An Air conditioning system consumes as much as 8 h.p. with a unit capacity of 3 tons or 9072 kcal/hr. approximately. So, due to these the pickup of vehicle decreases. The cost of present HVAC system is very high; it may vary depending upon price and model of vehicle. Maintenance and repairing cost of this system is very high. Each component of HVAC is very costly. This system occupies very large space in engine compartment and dashboard. In this system, if any component fails to perform well then the whole system either will not function properly or will not function at all. Instead of this, today’s electronically and computer controlled HVAC system has sensors. If somebody wants to start an AC system, but due to high power requirement of an engine, the AC system will not start and person will need to wait for the starting of the HVAC system. As an mechanical engineer I am trying to overcome these demerits by replacing the existing HVAC system by newly emerging thermoelectric couple or cooler which works on peltier and seebeck effect. Thermoelectric cooling can be considered as one of the major applications of thermoelectric modules (TEM) or thermoelectric coolers (TEC). The main objective of this project is to design a cooling system installed on a conventional blower of car AC. The idea of cooling is based on Peltier effect, as when a dc current flows through TE modules it generates a heat transfer and temperature difference across the ceramic substrates causing one side of the module to be cold and the other side to be hot. The purpose of the project is to make use of the cold side to cool the ambient air to a lower temperature, so that it can be used as a personal cooler. Testing and measurements are also performed using on car (Maruti Suzuki Zen). A simple temperature controller to interface with the cooling system has also been incorporated. Based on an analysis of sizing and design of the TEC air cooling for car, it can be deduced that the cooling system is indeed feasible. Readings taken during testing also testify to the fact that the TE cooling for car can lower the ambient temperature by 7 degree Celsius.
Thermoelectric Air Cooling For Cars

References

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Index Terms

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