

## DESIGN AND FABRICATION OF ALTERNATIVE COOLING SYSTEM FOR CONVENTIONAL PURPOSE

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### ABSTRACT

The main purpose of this alternate cooling system is to circulate cooling air to the surrounding that means it will act as an air cooling system. Instead of using water, ice cubes are used here. The exhaust fan plays a main purpose of the exhaust fan is to suck the air from the closed area (polystyrene container) and supply to surrounding. The polystyrene box is nothing but the thermocol container and it is shaped into required dimensions for fitting the exhaust fan at the center of the box. The sufficient ice cubes are kept inside the box. Once the ice bars are filled into the closed container the vapour arises, after completing all the setting process the exhaust fan is switched to ON position, so that it exhausts the vapour to the surrounding. The cooling capacity is measured with the help of digital thermometer and the temperature is to be noted for every 2 hours so that the verification of the cooling capacity is to be done.

**Keywords:** Refrigeration, Cooling System, styrophorm box, Exhaust fan.

### 1 INTRODUCTION

The entire concept is fully based on the refrigeration system. The main use of this research is to circulate the cooling air to the surrounding (Alosaimy et al., 2013). It is like an air cooling system. Now a day's different types of air cooling system like, water cooling system, air cooler, air conditioner system are present. Similar to those systems, it is one type of the cooling system, which receives the cooling nature from the Ice cubes. This system is very useful as domestic appliance. And it is also an Eco-Friendly (Farhan et al., 2012, Ganeshan et al., 2016). No compressor and copper coils are used as cooling agent. The cooling capacity is same as that of the air cooler. The polystyrene box is used to withstand the temperature of the ice bars for long time. The purpose of exhaust fan is to suck the air from closed area to surrounding. The experiments were tested in the closed room (Porto et al., 2013). Figure 1 shows the assembly part of the air cooling systems.



Figure 1: Full assembling part

### 2 MATERIALS AND METHODS

**2.1 Exhaust Fan:** The details for the exhaust fan as follows. The main purpose of the exhaust fan is

to exhaust the air from inside to outside. The same process is held on this place. It will exhaust the cooling air to the surrounding.

GENERIC NAME : Domestic Ventilation Fan  
SIZE : 6" (150mm)  
SUPPLY VOLTAGE : 220-240V, 50Hz  
INPUT POWER : 28 watt  
SPEED : 1350 rpm  
SWEEP : 150 mm  
POWER SUPPLY : AC VOLTAGE

**2.2 Polystyrene Box (Or) Thermocol Box:** This is one of the components, which is used in this system. The polystyrene box is generally to withstand the temperature office bars for long time. And it is used as for insulation purpose. And it will maintain the temperature and so it also maintains the cooling nature.

**2.3 Thermometer:** This is one of the components in this system. It is used to measure the temperature of the surrounding. And then it will be used for measuring the temperature of the cooling nature in the room. Before starting this experiment, the room temperature will be noted.

### 3 RESULT AND DISCUSSION

The first step of the system is to shape the polystyrene box into cube shape, to obtain the centre of the box as a hole as shown in figure.2 (Rocca et al., 2011). The obtained shape will fit the exhaust fan. So, the shape of the box is measured and shaped as per the exhaust fan. The Exhaust fan is fixed in the Polystyrene box, as shown in figure.3 The Ice-Bars are filled into the polystyrene box, as shown in figure 4. and then the final setup of this system is shown below figure 5.



Figure 2: Cut section of polystyrene or Thermo Cole box



Figure.3 Exhaust fan setup.



Figure 4: Container filled with Ice Bar



Figure 5: Alternative cooling system setup

The polystyrene box is used to withstand the temperature of the Ice Bars for long time. In order to withstand the temperature, the right choice is thermocol (Antunes et al., 2016). Next to the polystyrene the main important thing is Exhaust Fan. The purpose of the Exhaust fan is to exhaust the air from inside of the container to surrounding. The main important component is ice bar. It plays major role in this system. The Ice Bars are filled into the box or container (SenthilRajan et al., 2014). Generally the Ice is filled in the closed box the vapour tends to form on the top of the polystyrene box. Exhausted vapour circulates the cooling air or cooling nature to the surrounding. It will give the sufficient cooling while compared to the water cooling air conditioner (Teng et al., 2012). The polystyrene box is cuts and the exhaust fan is fixed in the centre of the box which is cutter in the box. And then the ice bar also placed into the box. Once the whole setup is finished, switch-on the fan. While the switching on the exhaust fan, it exhausts the cooling air from the ice bar which is placed in the polystyrene box. The cooling system is placed in the closed room. Then the cooling capacity will be checked every 2 hours. Whether the cooling capacity is increased, it is measured by the temperature device known to be a thermometer. The ice bar could not able to withstand the temperature whole day. It could withstand for 2 or 3 hours (Dharmalingam et al., 2014). And then, based on the fan speed also the ice bar will be melted. So, the Exhaust fan is fixed with closing nature. That means, whenever

the exhaust fan will be switched-on the backside door on the exhaust fan is opened slightly, based on the rotation of the fan. When the exhaust fan is switched-off, the backside door will close automatically. It will help to withstand ice bar for several minutes extra. The Ice bar is the main use of this system (Elgandy et al., 2014). Without Ice bar the System tends to failure. The formed the vapour on the top of the box will be exhausted by the Exhaust fan. The temperature is noted and checks the standard the air cooling value. It would be below the room temperature and that is noted for the reference. Whenever the ice bar is melted, that will be replaced and filled with the new ice bar. The melted ice water is out by the small hole, which is in the polystyrene box (Chandrasekaran et al., (2013). The layout of the system was illustrated in the figure 6. Table 1 shows the properties of the material testing

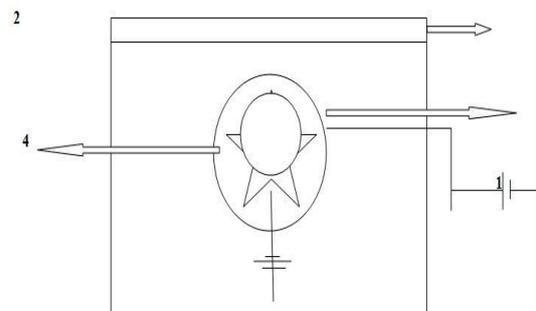


Figure 6: Layout of the system 1. Battery, 2. Polystyrene Box Or Thermocol Box, 3. Hole for Exhaust Fan, 4. Exhaust Fan, 5. Earth Connection.

Table 1. Properties of the material testing

Testing Hours	Room temp. Before cooling	Room temp. After Cooling
Initial Room temp.	27° C	23.5° C
After 1 Hour	23.5° C	20° C
After 2 Hours	19.5° C	17.32° C

#### 4 CONCLUSIONS

The Ice bar is filled into the thermocol setup, and then the room temperature is analyzed by using of thermometer. The lid of the thermocol is closed, why because the atmospheric air is causes to melt the ice bars quickly. The exhaust fan is switched-on. While ice bar in the closed in container the cooling air will be form on the container, that will be exhaust by the fan. The cooling air is the output of this system, that means final the room temperature is the output. Thus, the experimented was completed successfully, and also the cooling capacity is noted. The final output is come under the positive nature, that means the Alternative cooling system is giving the cooling air. Finally, The Experiment of Alternative Cooling system is completed successfully and also it will analyze perfectly.

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