

Design and Fabrication of 360 Motion Air Flow Cooler

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Abstract – This paper is based on the studies of the different air conditioning system. 360 motion air flow cooler which cools air in all 360 direction all around whereas normal or conventional air cooler cools air in only one direction. This cooler make people to sit anywhere in the room as their preference.

Key Words: Conditioning, conventional.

1. INTRODUCTION

An evaporative cooler or swamp cooler, it is a device that cools air by evaporating the water. Evaporative cooling, to evaporate water will absorb the heat in large amount. For evaporative cooling the cooling potential is depend on wet-bulb depression, the difference between wet-bulb temperature (WBT) and dry-bulb temperature (DBT). 360 motion air flow cooler is a smart air cooler having blower which circulates air in all 360 motion all around. From many years many researchers have worked for improving efficiency of evaporative cooling to the maximum possible extent.

Air coolers work on the principal that the cooling is done by the evaporation of water which is already present in them. These coolers also called as desert coolers or swamp coolers. They require water to be filled in the tank of cooler. The cooling effect is produced by means of transition in phase from liquid state of vapors state. As considering 360 motions air cooler is used in dry climates. Air conditioning in today's world is become very essential. Considering human comfort it is necessary to study and do researches on the topic of 360 motion air flow cooler, in order to make it more economical and efficient.

1.1 Objective

To develop and design the air cooling system having low cost and allowing people to sit anywhere as their comfort and preference.

1.2 Problem Statement

Today due to global warming temperature is rising. So, to maintain this increase in heat we use different air-cooling systems, Air Cooler is one of the conventional systems used worldwide. As we want the air coolers which are available in market are not much smart. So, to overcome this problem we are in this project 360

EVAPORATIVE cooler design. We developed and fabricate our air cooler to make it low operational. The overall cost is affordable to everyone. It is eco-friendly, doesn't create pollution. This Air Cooler supplies air without increasing humidity compared with conventional air coolers. 360 directions will allow sitting people anywhere. This air cooler will cool the air in all directions, named as 360 MOTION AIR FLOW COOLER with dual side air flow.

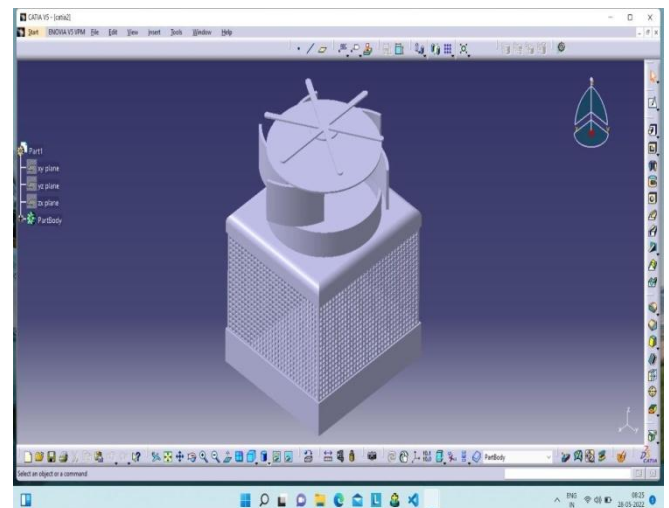


Fig-1 3D View of 360 motion air flow cooler

2. LITERATURE REVIEW

Akhilesh Yadav¹, RajatKumar Bachchan², Sankesh Toraskar³, Dattaprasad Tendolkar⁴, Prof. Ramankumar⁵ explains in this paper titled Design and Fabrication of 360 cooler cum Heater, the design and construction of 360 motion air flow cooler.

Prof. Nilesh Ambaji Jadhav Assistant Professor explained in paper DESIGN OF 360° AIR COOLER AND HEATER, design of 360 motion air cooler.

Mr. Hemanth Suvarna¹, Dhanush R², Ibrahim Khaleel Farooqui³, Mohammed Ifraz⁴ and Muhammed Alfaz⁵ explains in this paper titled as DESIGN AND FABRICATION OF 360 DEGREE COOLER CUM HEATER, 360 air cooler have the advantages over normal air cooling systems. Also explains the fabrication of this air cooler.

1Chaudhari Aniket, 2 Patel Upesh, 3 Patel Bhavik, 4Gamit Nihal, 5 Prof. Dr. Kamlesh Chaudhari explained in paper titled as DESIGN AND FABRICATION OF 360 DEGREE AIR COOLER, details of components used in air cooler.

3. WORKING

First start the pump which sucks water from water tank which is placed at the bottom filled with water. With the help of delivery pipe water goes on stationary pad. Then exhaust fan starts and sucks air from surroundings, air passed through the air pad.

When air is brought into close contact with water, its sensible heat is transferred by water in the form of latent heat.

After a period of time, 360 EVAPORATIVE activities may have sufficiently cooled the air, resulting in a significant increase in humidity. Ice-cubes or chilled water can be added to the water in water tank for better effect.

Water tank – Length: 68cm, Width: 56cm, Depth: 14.5cm

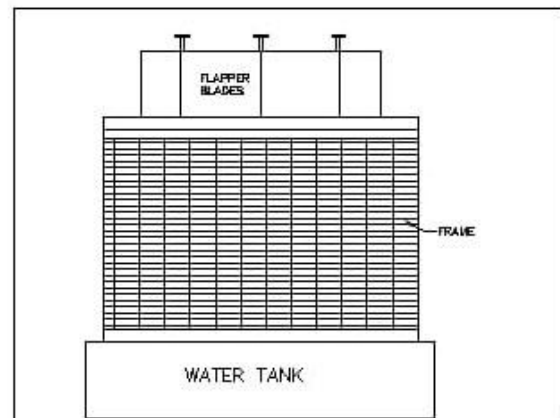


Fig-2 Block Diagram

TRIAL ON AIR COOLER

Initial room temperature – 33°C

Area of room – 200 sq feet

Height of room – 10 feet

Table -1: Trial on Air Cooler

OBSERVATION NUMBER	TEMPRATURE IN DEGREE CENTIGRADE	TIME INTERVAL IN MINUTES
1	33.0	0
2	32.4	15
3	31.7	30
4	30.8	45
5	30.0	60



Actual Image

4. DESIGN

Dimension

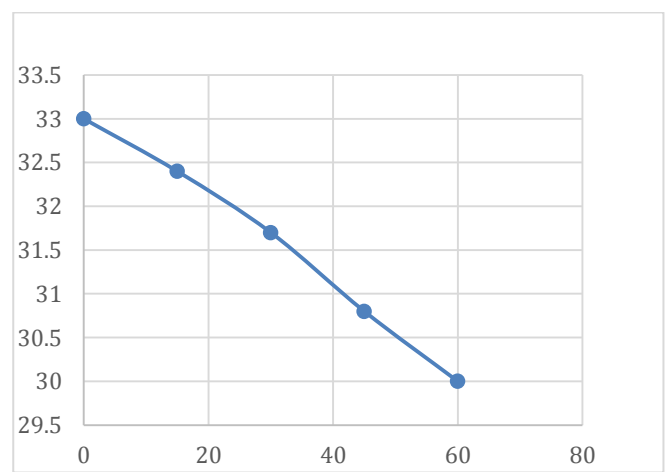
Frame – Length: 55.5cm, Width: 49.5cm,

Frame dimensions 4 sides remain same.

Top circular housing – Diameter: 40cm, thickness: 11cm,

Flapper Blades – 4 blades are there

Width: 8.8cm, Length: 25.2cm,



Graph: - Temp. (In °C) V/s Time (In min.)

$$\text{Velocity of fan} = \frac{\pi DN}{60};$$

$$\text{Convective Heat Transfer, } Q = hA (T_2 - T_1)$$

5. COMPONENTS USED

Table -2: Components used in 360 motion air flow cooler

Sr. no.	Component name	Specification	Material used
1	Exhaust Fan	2600 rpm, 220-240 v, 50 Hz, single phase	Std
2	Pump	220v, 50 Hz	Std
3	Water Tank	68 x 56 cm	Steel
4	Motor	2600 rpm, 220V, 50 Hz single phase AC	Std

5.1 Exhaust Fan: - An exhaust fan is to exhaust hot air while leveraging cold air into a room or larger area. When the fan turns on, the blades turn and the rotation and angle of the blades help to pull the hot air toward the fan where it can be exhausted out of the room.

5.2 Pump: - The pump runs the water through the cooling pads, allowing them to soak the water beforehand. After filling the tank fan can be run. When the cooler is turned on this will help to cool the air.

5.3 Baffles: - Baffles are the components that distribute air in the desired direction, which in this case is all directions. It's made of MS because it needs to absorb vibration and impact pressures from the air, and it needs to be corrosive-resistant because it'll be operating in wet or moist environments frequently.

6. ADVANTAGES

- It is easy to operate. Tubes of cooler is mainly consists of two parts Fan and Pump. Air coolers do not have complicated parts as Air conditioners.
- Because no compressor or other complicated circuits are employed, air coolers consume far less energy than air conditioners.
- Air cooler is filled with water. To fill water anyone door is removed. So, one can clean it easily as it have removable door.
- It has negligible or less maintenance cost. It is affordable to one.

- Air coolers do not have expensive parts. Therefore, they are cheaper on cost.

7. FUTURE SCOPE

By increasing the no of pads through which air will pass further cooled air can be obtained. It is best for comfort cooling in hot and dry. In the Middle East Australia, the Indian subcontinent, Eastern African, northern Mexico, and the southwestern United States EACs are widely used. IEAC can be useful in some comfort cooling applications and also for many commercial applications such as greenhouses and poultry houses. It has the low cost and low power consumption as compared to compressor based A/C system. 360 designs will allow person to sit in any direction. In winter season it can be used for heating room.

8. CONCLUSIONS

The results of this study show that the performance features of drip type 360 EVAPORATIVE cooling can be linked to variables like thickness and climatic parameters like humidity management and comfort. It is feasible to establish the best value for these design characteristics, but the site must be considered, and the design parameters must be optimized for the outdoor conditions.

REFERENCES

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- [4] DESIGN AND FABRICATION OF 360 DEGREE AIR COOLER 1Chaudhari Aniket, 2 Patel Upesh, 3 Patel Bhavik, 4Gamit Nihal, 5 Prof. Dr. Kamlesh Chaudhari