

Sanghamitra Coolers



2022

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Introduction

In today's weather conditions, air coolers have become an essential part of households especially in **Vidarbha** regions where summer temperatures are extremely high. The public spends a significant amount of money on purchasing air coolers every year, however, the durability and longevity of these products often leave a lot to be desired. Sanghamitra, a team of individuals with a diverse background, has taken it upon themselves to solve this problem by developing a durable and long-lasting air cooler.

The team has conducted extensive research to understand the working principle of air coolers and the components that affect their longevity. They have also analyzed the products available in the market and identified the areas in the product where improvements can be made. The goal of the team is to provide the public with an air cooler that is not only cost-effective but also has a longer lifespan compared to the existing products in the market.

The introduction of better designs will not only benefit the public but also encourage entrepreneurship and innovation in the field of home appliances. With their combined knowledge of science and mathematics, the team is confident in delivering a product that will meet the expectations of the public and make a significant contribution to the market.

Background

Sanghamitra is a team of individuals who are dedicated to exploring new ideas and concepts not just in theory but also in practice. The team comprises individuals from diverse backgrounds, bringing their unique experiences and skills to the table. The team was learning about motors and their applications when they stumbled upon the fact that most non-motor appliances and AC motors use AC current and convert it into DC current for consumption.

In the Vidarbha region of India, where temperatures can soar to **48°C** in the summer, air coolers are a highly sought after appliance. Recognizing the high demand for coolers in the region, and the opportunity to apply their learning in a real-world setting, the team decided to explore the business of manufacturing air coolers. The aim is to develop a cooler that is both affordable and durable, providing long-lasting relief from the scorching heat.

The team is dedicated to exploring every aspect of the cooler business, from product development and research to target market research, pricing, and sales. The goal is to create a cooler that is not only efficient but also sustainable, providing a solution to the problems faced by the public during the hot summer months.

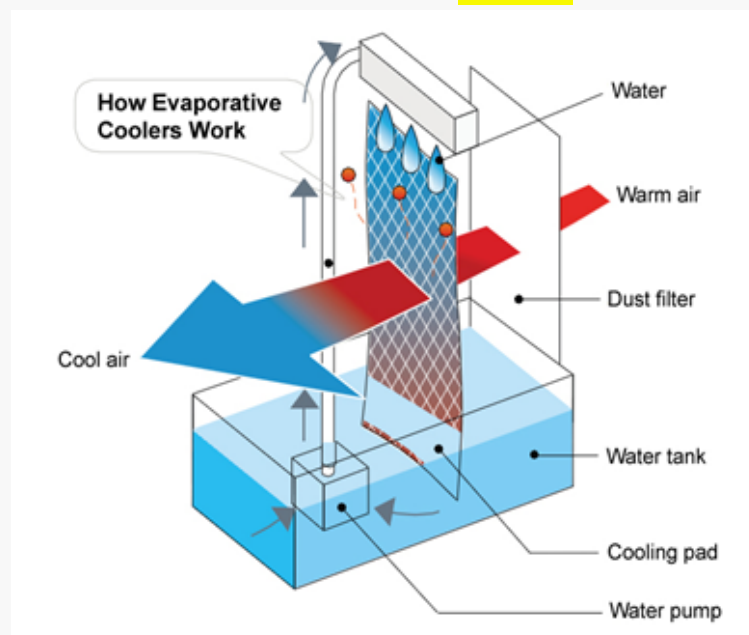
Problem Statement

The high temperatures in the Vidarbha region demand a reliable and efficient air cooling solution. While there are various air coolers available in the market, they often lack durability and have a short lifespan. This leads to frequent replacements and added expenses for consumers.

Sanghamitra aims to address this issue by designing and assembling a durable, long-lasting air cooler that provides efficient cooling for the residents of the Vidarbha region. The team will research and experiment with different materials, designs, and assembly methods to create a product that not only performs well but also withstands the test of time. The team will conduct experiments and evaluations to ensure that the product meets the desired standards and provides an optimal cooling solution to the customers. The goal is to provide a cost-effective solution for consumers who are looking for a reliable and efficient air cooler that can keep their homes cool and comfortable during hot summer months.

Working Principle Of Cooler

Air coolers work on the basic principle of evaporative cooling. Evaporative cooling is a natural process where the evaporation of water is used to cool the air. This is a common phenomenon that can be seen in daily life, such as when sweat evaporates from the skin and removes heat in the form of gas, leading to a cooling effect.



In an air cooler, warm air from the surrounding environment is passed through moistened cooling pads, which are typically made of cellulose or fiber. Water is constantly moved over the cooling pads using a water pump, extracting heat from the warm air and causing it to evaporate. The result is cool, fresh, and moistened air that is thrown into the room via a fan. Many air coolers today come with dedicated trays for adding ice cubes, which helps to chill the water and provide fast and powerful cooling.

The body of an air cooler consists of the main body, cooling pads, and other components such as the fan, pipes, and motor holding frame. The electric parts of an air cooler include the motor, pump, and regulators, which are responsible for controlling the flow of water and the functioning of the fan.

Overall, air coolers provide an effective and energy-efficient solution for cooling during hot weather. Unlike air conditioners, air coolers do not use refrigerants and operate on a much simpler mechanism, making them a more eco-friendly and cost-effective alternative.

Methodology

To design and build a durable and long life air cooler, Sanghamitra team has devised a comprehensive methodology that involves various steps and processes. This methodology is designed to ensure that the final product meets the needs and expectations of the target market.

Online Research: The team conducted online research on air coolers to understand the working principle and different parts of the cooler.

Prototype Testing: The team brought used motors to understand the inner parts and the working of a motor. They also bought a cooler from the market and studied its working to understand the different parts of the body.

Raw Material: The team sourced raw materials for the cooler and conducted quality check parameters with suppliers to ensure that only high-quality materials are used in the final product.

Experiments: To optimize the performance of the air cooler, the team conducted experiments and collected data on different parameters. The experiments were conducted to evaluate the effectiveness of different cooling pads and the cooling capacity of the cooler.

Model Descriptions: The team developed different models of air coolers, including the Sanghamitra coolers model, duct model, and desert model.

Results and Evaluations: The team recorded the results of their experiments and evaluated the performance of different models of air coolers. The results of the evaluations were used to make improvements to the final product.

Assembling: The final step in the methodology is the assembling of the air cooler, where all the different parts are brought together to form a complete and functional product.

The methodology of Sanghamitra air cooler is designed to be rigorous and comprehensive to ensure that the final product is of high quality and meets the needs of the target market.

Experimentation

In the experiment, the performance of an air cooler was evaluated under various conditions of temperature and humidity. The experiment is conducted in a room for isolated environment. The experiment is conducted for The data was collected for half hour. We collected data for every minute changes, and the parameters as follows:

- Time: The time elapsed in hours.
- Dry Bulb Temp of Room: The temperature of the room measured with a thermometer that does not take into account the relative humidity.
- Wet Bulb Temp: The temperature measured with a thermometer that takes into account the relative humidity.
- Humidity: The relative humidity of the room.
- Output of Cooler: The temperature of the outlet air from the cooler.
- Input of Cooler: The temperature of the inlet air to the cooler.
- Change in Inlet and Outlet: The difference between the input and output temperature of the cooler.
- The difference between the outlet temperature of the cooler and the room temperature.

The data obtained from the experiment showed that the air cooler was able to reduce the temperature of the room, as well as lower the humidity levels. The change in inlet and outlet temperatures was significant, indicating that the air cooler was able to cool down the air effectively. The difference between the outlet temperature of the cooler and the room temperature was also significant, with the cooler being able to maintain a temperature that was lower than the room temperature.

The results of the experiment indicate that the air cooler was able to effectively cool down the air in the room and maintain a lower temperature compared to the room temperature. This is an important factor in ensuring comfort in hot and humid environments, especially during the summer months. The lower humidity levels also help in reducing the growth of mold and mildew, which can cause respiratory problems and affect indoor air quality.

Overall, the results of the experiment indicate that air coolers are a practical and effective solution for cooling down hot and humid environments. With their ability to effectively reduce temperature and humidity levels, air coolers can provide a comfortable and safe indoor environment for users. However, it is important to note that air coolers should be used in conjunction with other air conditioning solutions to ensure optimal performance, as air coolers are not capable of cooling large spaces effectively.

In conclusion, the experiment showed that air coolers are an effective and practical solution for cooling down hot and humid environments. The results of the experiment indicate that air coolers are able to effectively reduce temperature and humidity levels, making them an important tool for ensuring comfort and safety in indoor environments. Further research and experimentation is needed to fully understand the performance of air coolers and determine the best ways to optimize their performance.

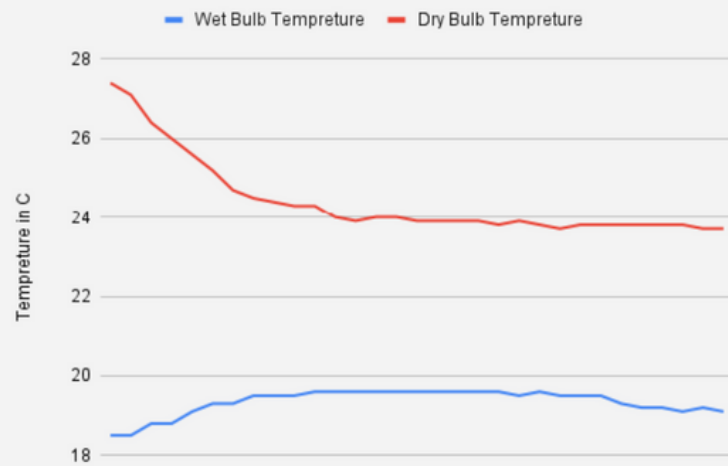
Observations

The experiment demonstrates the effectiveness of the cooler in reducing room temperature and increasing humidity. The cooler was able to decrease the dry bulb temperature of the room from 27.4°C to 23.7°C, while increasing the humidity from 43.8% to 60.5% over a period of 30 minutes. This indicates that the cooler can be effective in creating a more comfortable living or working environment.

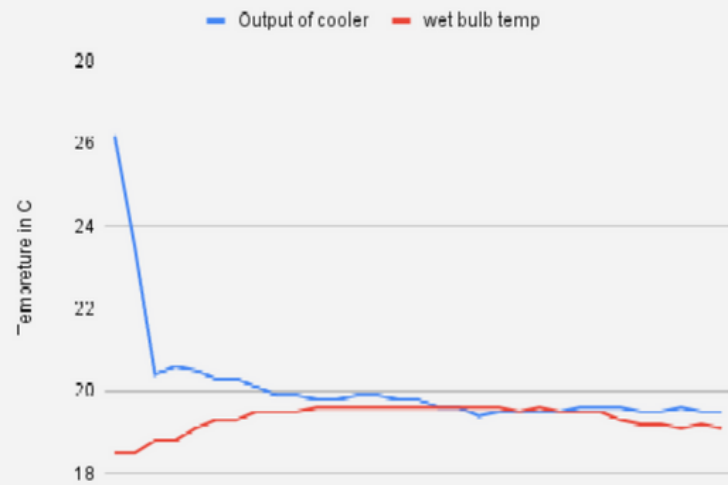
The change in the inlet and outlet temperature of the cooler remained fairly consistent throughout the experiment, ranging from 5.7°C to 7.3°C. This suggests that the cooler was able to maintain a relatively constant output despite fluctuations in ambient temperature and humidity.

The wet bulb temperature of the room remained relatively stable throughout the experiment, ranging from 18.1°C to 19.6°C. This suggests that the cooler was able to maintain a consistent level of humidity in the room, which can be beneficial for both human health and indoor plant growth. The input of the cooler remained consistent throughout the experiment, ranging from 25.5 to 28.5, which suggests that the cooler was able to maintain a stable rate of energy consumption. This can be beneficial for energy efficiency and cost savings.

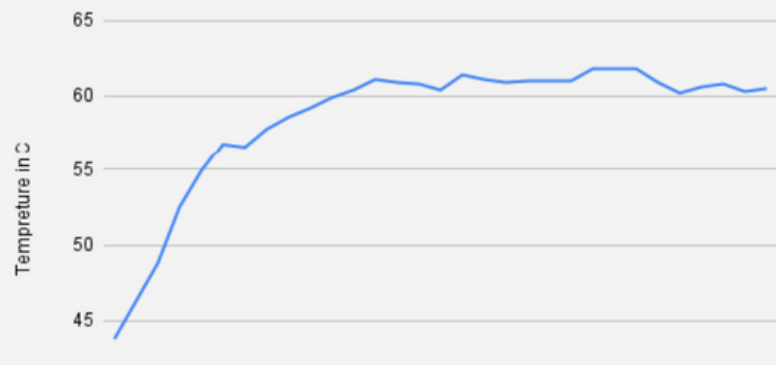
Wet Bulb Temp VS. Dry Bulb Temp Of Room

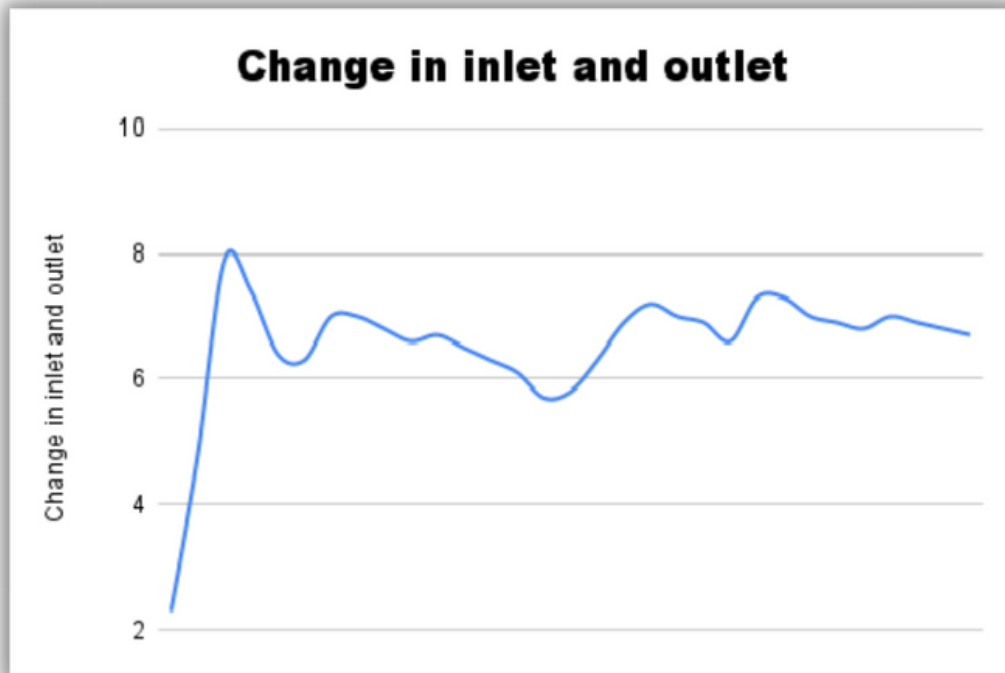


Output of cooler vs. wet bulb temp



Humidity





In conclusion, the data from this experiment supports the effectiveness of the air cooler in regulating temperature and humidity levels in the room. The results demonstrate its ability to cool the air efficiently and maintain a consistent temperature output over time. Furthermore, the data highlights the importance of the air cooler in creating a comfortable and healthy environment by reducing humidity levels.

Result From Half Hour Test

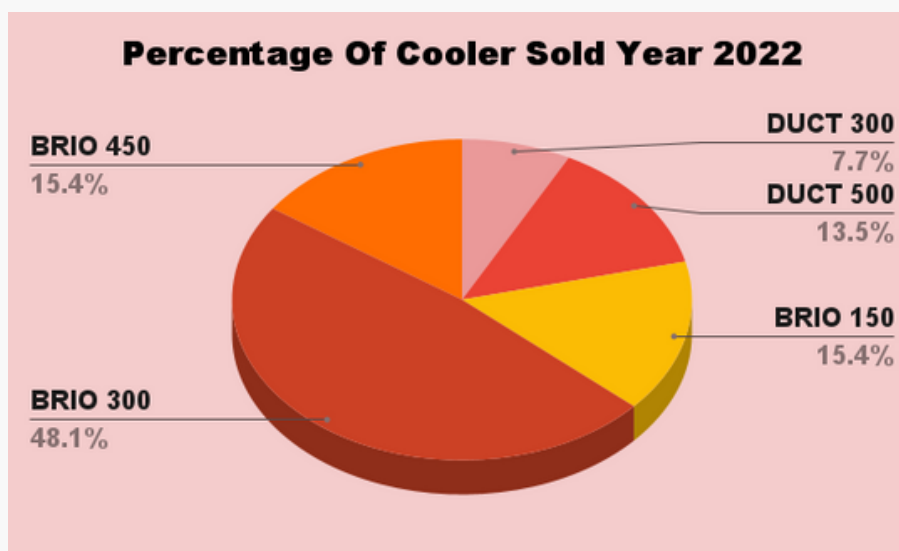
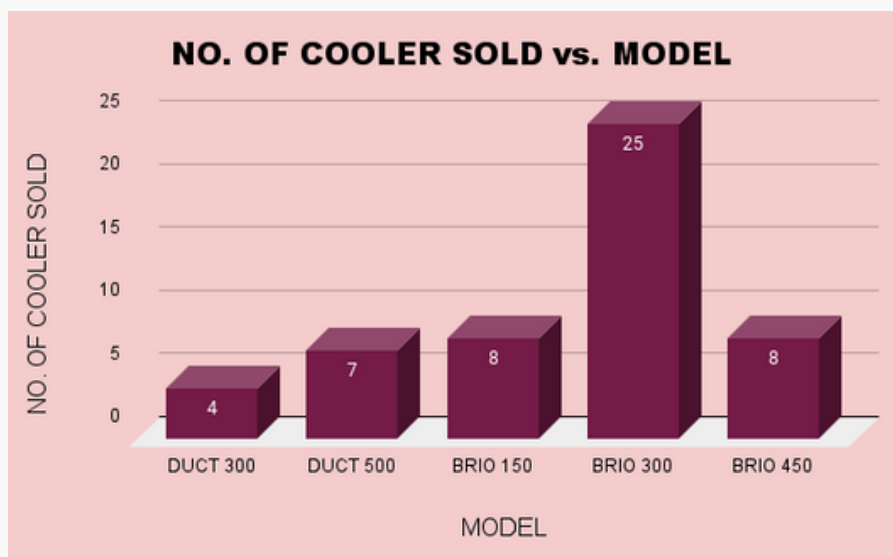
Sr. No.	performance in woodwool	Sanghamitra Cooler
1	Change in dry bulb temp	3.1
2	Change in humidity	22.4
3	wattage	280
4	Current (A)	1.22
5	volt (V)	229
6	total consumption in unit in one hour	0.138

Model Discription

model	UNO 500	UNO 300	BRIO 150	BRIO 300	BRIO 450
Body Height with Trolley	5.5 ft	4.5 ft	2.5 ft	3.5 ft	4.5 ft
Body Material	G.I	G.I	G.I	G.I	G.I
Tank Capacity	75 L	65 L	45 L	80 L	100 L
motor type	Three Speed	Three Speed	Three Speed	Three Speed	Three Speed
Motor Speed (RPM)	1350	1350	1900	1350	1350
Air Flow Reach	40 ft	30 ft	15 ft	25 ft	35 ft
Cooling Capacity	500 sq. ft	300 sq. ft	150 sq. ft	300 sq. ft	450 sq. ft

Sales

Sanghamitra has achieved success in their sales efforts. The initial target was to sell 50 coolers, but the company managed to exceed that goal by selling a total of 54 coolers along with many other parts of the coolers. This indicates that the product is in demand and that the company has been successful in marketing and selling it to customers.



In addition to exceeding the sales target, the company has also seen success in terms of the percentage of coolers sold by each model. The BRIO 300 model had the highest percentage of sales at 48.1%, indicating that it is a popular choice among customers.

Overall, the success of the sales efforts can be attributed to the hard work and dedication of the Sanghamitra team, as well as the quality and popularity of the product. By continuing to focus on effective marketing strategies and providing high-quality products, Sanghamitra is poised for continued success in the future.

Thank You

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