



## **Ansys + Havells India**

“This optimization [of airflow through our Meditate Air Purifier] could not have been done without CFD simulations because there were so many interconnected parameters to understand. Ansys Fluent helped us to monitor the airflow in all three stages of the purifier and adjust the design until we had optimal flow conditions in each segment.”

**Ashit Kumar**

Senior Manager, Computational Fluid Dynamics (CFD) Simulation / Havells India Ltd.

Havells India Ltd. decided to enter the air purifier market to help solve the problem of unacceptably high air quality index (AQI) values, which are frequently greater than 100 in parts of India. They designed the Meditate Air Purifier to be a high-performance, aesthetic addition to any room, with advanced features like a titanium dioxide (TiO<sub>2</sub>) photocatalytic module to break up volatile organic compounds (VOCs). To help them solve design challenges, they used Ansys computational fluid dynamics (CFD) simulations to ensure that airflow through the three stages of the purifier – the case and high-efficiency particulate absorbing (HEPA) filter, the blower, and the TiO<sub>2</sub> module – was optimized for maximum purification capabilities.

### / Challenges

While it may initially seem like moving the largest volume of air through the purifier unit is desirable to clean more air quickly, each of the three stages of the purifier has requirements that make this unrealistic. The pressure drop in the HEPA filter, the noise generated by the spinning rotor in the blower, and the required residence time of the VOCs on the TiO<sub>2</sub> catalyst surface all had to be optimized using one flow rate throughout the device.

### / Technology Used

- Ansys Fluent

### / Engineering Solutions

In the initial design of the outer casing (see Figure 1), the simulation showed that some of the air escaped out of the sides of the purifier unit before reaching the top catalytic purifier unit. In the revised covered design, the HEPA filter (the cylindrical-shaped blue element at the bottom of the simulation images) was made thicker at the bottom and sides. Fluent simulations showed that all airflow remained inside the purifier, exiting from the jets at the top after all purification had been completed.

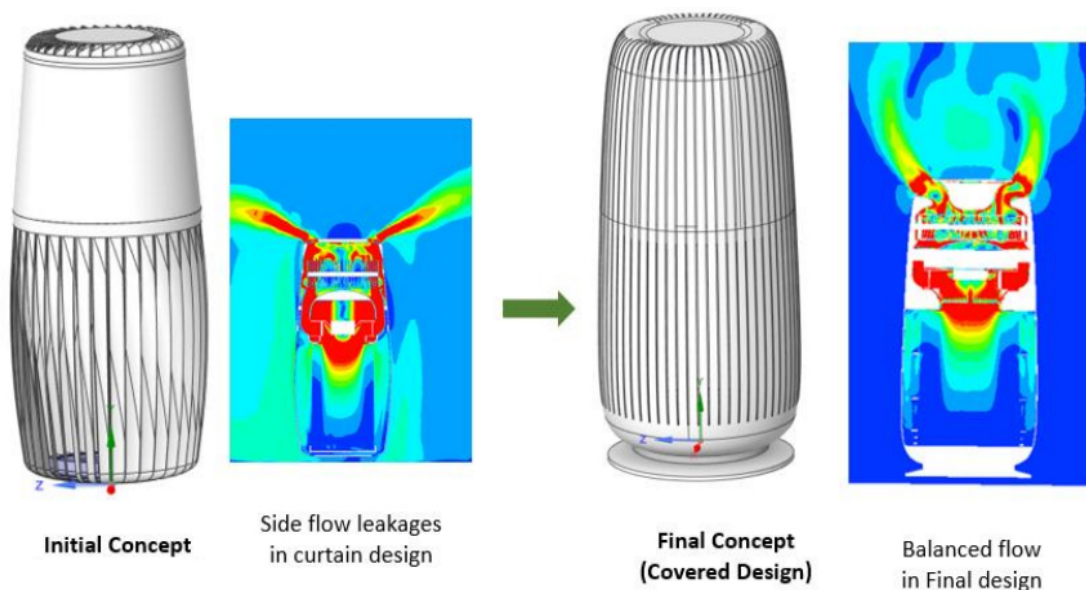


Figure 1. CFD simulations of the initial design and the final covered design of the outer casing. The HEPA filter is the cylindrical-shaped blue element at the bottom in the simulations.

Havells engineers looked at four blower designs and the flow patterns they caused through the purifier using Fluent. The design with the best flow pattern and velocity for delivering the air to the catalytic module was too noisy. Eventually, through a process of iteration, Havells chose an alternative design that delivered the optimal balance of flow velocity, flow location, and noise level.

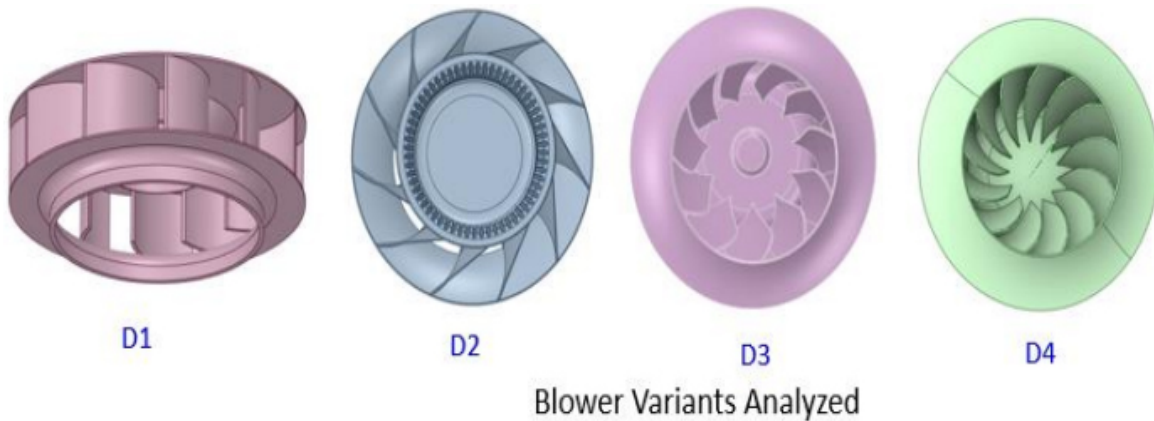


Figure 2. The four blowers investigated by Havells engineers

The catalytic unit consists of parallel fins of a substrate containing the TiO<sub>2</sub> particles. Originally, Havells engineers arranged these fins in a circle with all fins at a 90-degree angle to the blower; that is, they were standing straight up. But the flow was not optimal with this design. By tilting the fins inward at an angle, they improved flow intake through the module and achieved the desired flow velocity range.

## / Benefits

Using Fluent simulations, Havells engineers achieved the optimal airflow for all three stages of their Meditate Air Purifier, balancing the conflicting demands of pressure drop, noise, and residence time in the TiO<sub>2</sub> module for optimal air purification.

## / Company Description

Havells India Limited is a leading Fast Moving Electrical Goods (FMEG) Company and a major power distribution equipment manufacturer with a strong global presence. Havells enjoys enviable market dominance across a wide spectrum of products, including Industrial & Domestic Circuit Protection Devices, Cables & Wires, Motors, Fans, Modular Switches, Home Appliances, Air Conditioners, Electric Water Heaters, Power Capacitors, Luminaires for Domestic, Commercial and Industrial Applications.

**ANSYS, Inc.**  
Southpointe  
2600 Ansys Drive  
Canonsburg, PA 15317  
U.S.A.  
724-746-3304  
[ansysinfo@ansys.com](mailto:ansysinfo@ansys.com)

When visionary companies need to know how their world-changing ideas will perform, they close the gap between design and reality with Ansys simulation. For more than 50 years, Ansys software has enabled innovators across industries to push boundaries by using the predictive power of simulation. From sustainable transportation to advanced semiconductors, from satellite systems to life-saving medical devices, the next great leaps in human advancement will be powered by Ansys.

*Ansys and any and all ANSYS, Inc. brand, product, service and feature names, logos and slogans are registered trademarks or trademarks of ANSYS, Inc. or its subsidiaries in the United States or other countries. All other brand, product, service and feature names or trademarks are the property of their respective owners.*

Visit [www.ansys.com](http://www.ansys.com) for more information.

©2023 ANSYS, Inc. All rights reserved.