



CASE STUDY /

## Ansys + Atomberg

“Our fan designs are undergoing drastic changes in terms of energy efficiency, materials, and overall look and feel. Our motor technology is continuously evolving, and simulation is an important part of that evolutionary journey. Ansys tools help us to efficiently validate all kinds of variables, including cost optimization, product design, and performance requirements, reducing our prototyping efforts.”

**Manoj Meena**

Chief Executive Officer and Founder / Atomberg

# Ansys Simulation Maximizes Atomberg’s Small Appliance Energy Efficiency in Smart, Streamlined Designs

Traditional ceiling fans consume 70-80 watts of electricity per day, yet only use 22 watts of that energy to power the fan blades — resulting in a net loss of almost 50 watts in the form of heat. This performance has a negative environmental impact on a very large scale. Atomberg was founded to challenge the existing market and deliver new, more energy-efficient home appliance experiences as part of its “sustainable-by-design” R&D strategy.

## / Challenges

Competitive market pressures defined by increasing customer demands for home appliance efficiency drive the fast pace of new product releases. As a result, Atomberg is iterating at breakneck speed to produce lighter, more efficient blade and motor designs enabled by new material choices that involve copper, plastics, and steel. Its journey from product development to market is complicated by prototyping, injection molding, blade and motor design testing, and performance verification – all of which tends to be time-consuming and costly.

## / Ansys Products Used

- Ansys Fluent
- Ansys Maxwell

## / Engineering Solution

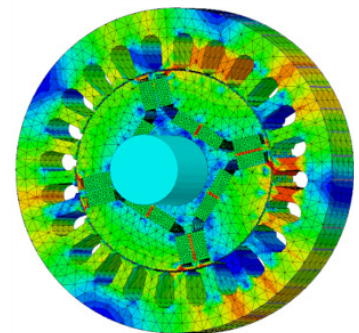
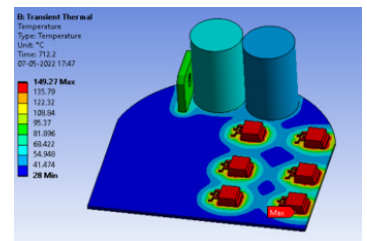
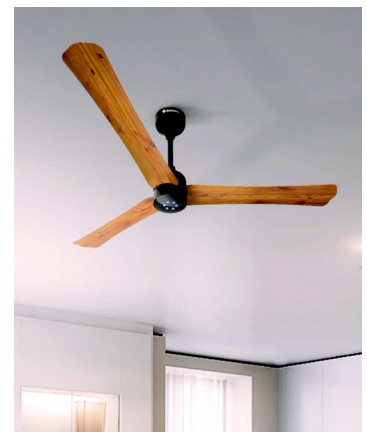
- Designed a mass-manufacturable fan concept that supports rapid design changes as well as significant operational efficiency improvements iteratively, year over year.
- Optimized a 3D profile of the blade in Ansys Fluent at different angles to remove air turbulence responsible for excessive noise as impeller blades slice through the air during normal operation.
- Ran thermal simulations in Ansys Maxwell for optimization of commodity materials including copper and steel, as well as ferrite magnets and those that are motor housing-specific.
- Used Maxwell to conduct a printed circuit board (PCB) study satisfying motor driver electronics requirements, enabling electrical-to-mechanical energy conversion in its brushless DC motor design.

## / Benefits

- Achieved a more compact motor design resulting in a scalable solution that runs on just 28 watts and delivers a 65% increase in energy efficiency during fan operation (a next-gen design is set to increase efficiency by 92%).
- Reduced prototyping activity to one to two iterations per design cycle through virtual modeling, significantly cutting prototyping expenses.
- Achieved 90% design accuracy with no deviance in form performance in its blade molding tool, significantly reducing blade injection molding and tooling costs.
- Improved air flow characteristics of the fan blades, eliminating turbulence to deliver quieter fan operation consistent with home and office environments.
- Identified materials with the stress characteristics and thermal properties that enable peak fan performance while satisfying requirements for a more streamlined, lightweight design.

## / Company Description

Atomberg Technology aspires to be an innovator in the world of household appliances. By combining the virtues of energy efficiency and Internet of Things, they will be coming up with smart, connected, and intelligent appliances that will disrupt the appliances market forever.



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