ALTAIR® FLUX® CAN TAKE THE HEAT

OPTIMIZING THE ENERGY EXCHANGE OF AN INDUCTION HOB SYSTEM AT GROUPE SEB

About the Customer

Founded in 1857 and headquartered in France, Groupe SEB is one of the world's leading cookware and domestic appliance manufacturers. Groupe SEB owns many renowned worldwide brands, including Tefal, Rowenta, Krups, and Moulinex; it operates out of 25 countries and sells 360 million products annually. The company's product portfolio comprises a range of high-quality domestic products including cookware, electric cooking appliances, laundry equipment, and personal care products. With 1,500 people dedicated to creating new technologies to meet and exceed customer expectations and maintain a leading market position, the company is focused on innovation.

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Thanks to the Altair solutions, we designed a new cooking pan faster and at a lower cost. Our studies based on the numerical model, Flux simulations, and the HyperStudy optimization helped to significantly reduce the number of prototypes and prevented inefficient solutions ahead of time.

Zhenwei Wu, innovation research project manager, Groupe SEB

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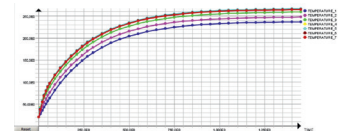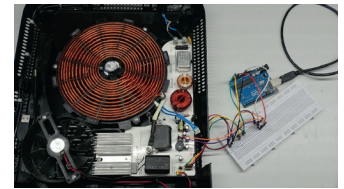**Download Now**
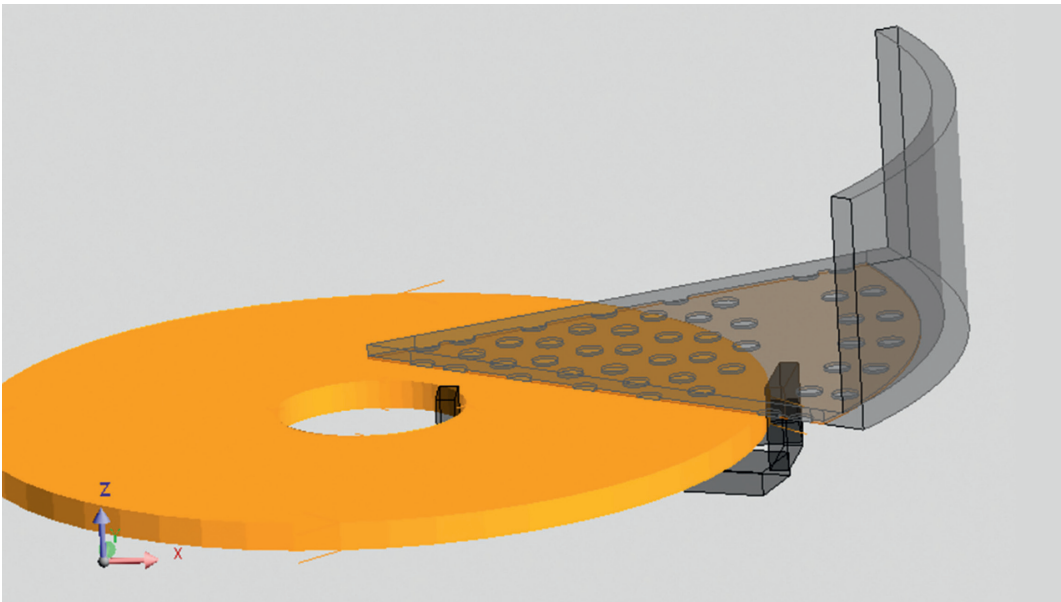
Their Challenge

An induction hob is one of the most energy-efficient heating devices in modern kitchens. As inductive heating becomes ever more popular, cookware manufacturers must develop efficient cooking pans that meet consumers' lofty expectations. As such, Groupe SEB's engineers aimed to create a new pan that fulfilled product requirements while minimizing material and development costs. Because testing physical prototypes is time-consuming, the engineers created a virtual prototype of an induction hob. This prototype had to be parametric so it can be easily adapted to **study the different configurations.** To tackle this complex undertaking, **achieve their design goals, and reduce time to market,** the engineers needed a coupled thermal-electromagnetic analysis software so they could quicker assess and better understand their designs.

Our Solution

Altair and Groupe SEB have been working together for several years – as such, Altair® Flux®, the leading software for simulating thermal and electromagnetic phenomena, was a natural choice for this project. Flux lets users model different physical phenomena and provides insights on internal material behavior that test measurements alone can't provide. And because users can couple Flux with Altair® HyperStudy®, a design exploration tool which performs single or multi-objective optimizations, it was possible to find an optimized solution for different parameters. Because the engineers needed to represent various multi-physical phenomena, they required a 3D model. Thanks to its embedded 3D modeler, Flux designed the geometries of the entire system (pan and hob). By using various geometries, **the team created different design variants and was able to assess what impact different shapes and materials had.** Flux also provided the team with **coupled thermal-electromagnetic analysis features, thus enabling a multi-physical approach.** To validate the model's accuracy, Groupe SEB ran field tests on an induction hob which helped them study various geometries of cooking pans with varying power. By measuring the frequency, they found the resonant frequency and determined the maximum power. To reduce the solving time of the multi-objective challenge (efficiency, volume, costs, heating), they performed single-objective simulations in Altair® HyperStudy® which led them to an optimal result.

Results

In the end, Groupe SEB's team realized a parametric model of an induction hob heating system that considered the entire system's magnetic and thermal aspects. Parallel lab tests confirmed the numeric model's accuracy, which gives the engineers a better understanding of the induction exchange and helped them eliminate valid but inefficient solutions before building a first prototype. **Thanks to Flux and HyperStudy, Groupe SEB developed an optimal solution and designed a new cooking pan faster and at a lower cost.** With Flux, their team obtained insights that previously used laboratory tests couldn't generate.

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