



DRIVING INNOVATIVE E-MOBILITY DEVELOPMENT

EVR MOTORS DEVELOPS NEW, SIMULATION-AIDED E-MOTOR TOPOLOGY

Background Information

The shift toward e-mobility is increasing pressure on the automotive industry as the world awaits more sustainable and more affordable transportation solutions. Manufacturers are rushing to electrify their products as they compete with e-vehicles that try to match the performance of internal combustion engine models. Unsurprisingly, many new players are entering the market with fresh ideas and potentially groundbreaking technologies.

About the Customer

EVR Motors Ltd. is one of these new players. The company, based in Israel, designs and develops cost-effective radial flux Permanent Magnet (PM) electric machines for a range of power conversion applications such as renewable energies and vehicle electrification. EVR was established in 2012 and began developing patents for wind turbine generators. They adjusted their roadmap when public taste favored e-mobility, and then developed an innovative electric motor called TS - RFPM (Trapezoidal Stator Radial Flux Motor) based on new, patented technology that provides superior power and torque density - all at lower production costs.

Their Challenge

For several decades, motors for electrical vehicles have been optimized using the same topology, called Radial Flux Permanent Magnet Motor topology (RFPM). Pursuing an entirely new approach, EVR chose not to optimize existing technology as other companies have been doing. Instead, they invented a new topology and developed a completely new type of motor for the electrical vehicle industry called the Trapezoid Stator RFPM topology.

REDUCED NUMBER OF PROTOTYPES BY OVER

50% ▼

REDUCED WEIGHT BY UP TO

50% ▼

ACHIEVED

90% ▲
SIMULATION ACCURACY



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As the base of EVR topology is different from other well-known motor topologies, the use of multiphysics and optimization tools is highly important. This is why the team needed a reliable, robust simulation tool.

Our Solution

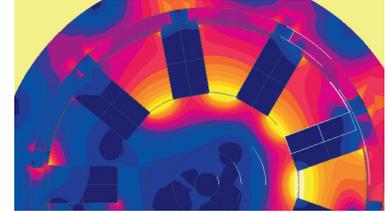
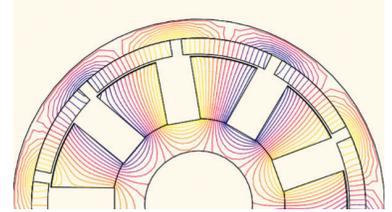
When looking for a powerful and accurate electromagnetic and mechanical simulation tool, they chose Altair® FluxMotor®, Altair® Flux®, Altair® SimLab®, and Altair® HyperMesh® – part of Altair’s complete solution for electric motor design – to simulate their motors before prototyping. Because motor development involves numerous design iterations to meet all electromagnetic and NVH requirements, EVR used the Altair tools, in particular the highly flexible Flux software, to improve the simulations so they became more accurate and delivered results close to the real prototypes they were building physically.

Today, EVR has already achieved a simulation accuracy of about 90%, but they’re aiming to improve this to even higher accuracy of 95-96%. Since their electromagnetic design is brand new and very different than everything that exists today, this is a challenging task. But by using Altair’s solutions, EVR met this challenge and minimized the number of prototypes while meeting all requirements and saving time. The new e-motor was not only lighter than all other motors on the market, it was also more cost-efficient, offering an innovative new smart solution to the highly competitive e-mobility market.

Results

Through simulation, EVR developed and tested its new patented motor, which is half the size than some of the industry’s best e-motors. “Thanks to the Flux simulations, we lowered the number of prototypes. Without the Altair solutions, we would not have been able to develop our new e-motor in such a short time,” said Opher Doron, chief executive officer, EVR Motors.

To learn more, please visit altair.com/e-mobility



TOP: 2D Magnetic flux isovalues in the trapezoid Stator RFPM motor
BOTTOM: 2D Magnetic flux density in the trapezoid Stator RFPM motor