

New Mobility – Connected, Autonomous, Shared, Electric

Dr. Weiran Jiang

Farasis

Electric vehicles are becoming a rapid growing part of the automotive scene. Batteries are considered as the most important and challenging components in the development of electric vehicles. Found in 2002 at Silicon Valley in California and had plants and R&D centers established in China and Germany, Farasis Energy is one of the leading battery suppliers who provides energy storage solutions to over 40 customers globally, including multiple giant automotive OEMs. Announced in 2020, Farasis Energy has launched a far-reaching strategic partnership with Daimler and begun to develop advanced Li-ion battery for the next generation Mercedes Benz EV with high energy density and leading-edge safety standard.

According to research statistics, users expressed concern about the purchase of electric vehicles, the largest proportion are worried about battery safety in terms of its crashworthiness and durability over lifetime. The mechanical performance of the battery module is of great interest and the crush and swelling analysis of the battery module is always critical design aspects. However, due to the extremely fast-growing demand, the traditional approaches can hardly meet the timeline expectation of new battery development even with huge amount of efforts and investment on building and testing physical prototype. So, it's imperative to use modeling, simulation, and other advanced virtual solutions to facilitate the design on improving battery safety requirements. Under the help of ESI's modeling platform VPS, Farasis is enabled to come up with effective designs to increase the battery protection to another level.

In this presentation, a generic finite element model is introduced for studying critical design parameters and optimizing the battery module structural strength under crush and cell swelling load. To further boost the modeling efficiency and mitigate the potential errors existing in the modeling process, an automatic workflow has also been developed together by ESI and Farasis and will be introduced in this presentation.