BATTERY SOLUTIONS
Complete Battery Modeling Solutions

Integrated Multi-Physics & Multi-Scale Approach

GT-SUITE and GT-AutoLion are the leading multi-physics tools required for successful battery engineering, from cell-level, module-level, and pack-level analysis. GT-SUITE and GT-AutoLion provide a flexible environment for battery analysis including performance, degradation, thermal, and safety predictions. These tools also provide streamlined workflows to aid throughout the development process, including 0D, 1D, and 3D modeling; automated CAD conversion; and coupling with Simulink, SiL, and HiL systems.

GT-AutoLion

GT-AutoLion is the leading tool for electrochemical modeling of Lithium-ion and Lithium-metal cells. Advanced models are ready-to-use and require no coding by users.

Performance & Mechanical Prediction

With the Doyle-Fuller-Newman Pseudo-2D (P2D) model, GT-AutoLion predicts the voltage and heat rejection of a cell under any operating condition. Additionally, GT-AutoLion is fully integrated with a mechanical solution for predicting stress & strain caused by swelling of components, such as Silicon and Lithium-metal anodes.
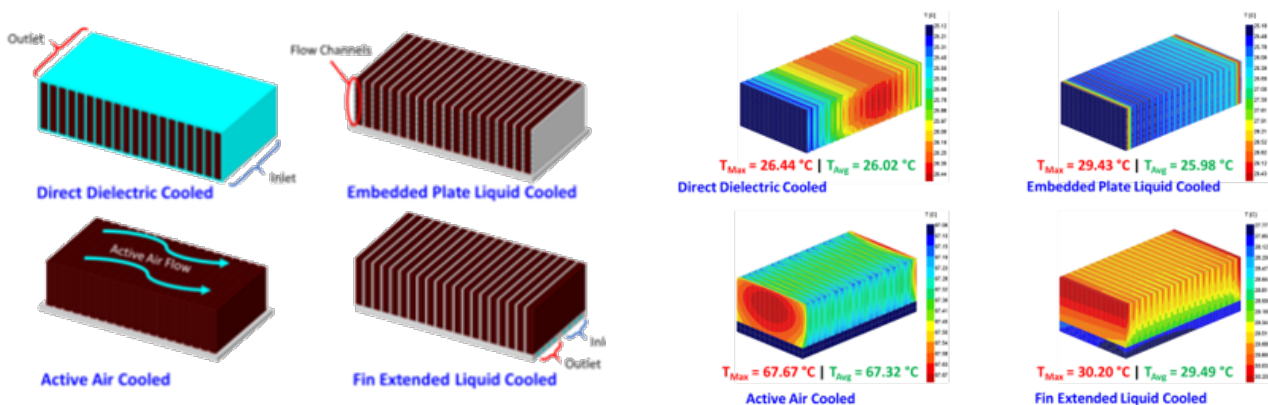
Physics-Based Degradation

GT-AutoLion includes physics-based and validated aging mechanisms built onto the P2D model enabling prediction of both capacity fade and resistance growth. These aging mechanisms are appropriate for both calendar aging and cycle aging scenarios, as well as fast-charging scenarios. By integrating GT-AutoLion into GT-SUITE multi-physics system models, battery degradation over years of operation can be predicted.

Safety

GT-AutoLion and GT-SUITE can be used to predict the heat generation and gas venting during thermal runaway events. By building a thermal model of a battery pack, expensive thermal runaway propagation tests can be replaced with virtual testing.

Deep Physics

GT-SUITE allows both electrical-equivalent and electrochemical battery models to be coupled to advanced thermo-fluids systems, including thermal networks, thermal finite element structures, and the world's most advanced 1-Dimensional flow solution, for electro-thermal analysis of battery modules and packs.

Direct Dielectric Cooled

Embedded Plate Liquid Cooled

Active Air Cooled

Fin Extended Liquid Cooled

T_{Max} = 26.44 °C | T_{Avg} = 26.02 °C — **Direct Dielectric Cooled**

T_{Max} = 29.43 °C | T_{Avg} = 25.98 °C — **Embedded Plate Liquid Cooled**

T_{Max} = 67.67 °C | T_{Avg} = 67.32 °C — **Active Air Cooled**

T_{Max} = 30.20 °C | T_{Avg} = 29.49 °C — **Fin Extended Liquid Cooled**

System, SiL, and HiL Integration

Integrate dynamic, multi-physics models of components for accurate system-level analysis. These models are used to predict EV range, component degradation, thermal warmup of components, human comfort, and more. With GT-AutoLion-RT, physics-inspired electrochemical battery models can even be deployed to Hardware-in-the-Loop systems.

GT