

Success story

Hyundai streamlines Genesis luxury sedan's conceptual design

Employing modeFRONTIER to perfect key vehicle components in the early design phase.

*In the wider context of Hyundai Motor Group R&D efforts aimed at **integrating engineering design, Computer Aided Engineering (CAE) and testing** for vehicle development, ESTECO world-class engineering support proved itself a trustworthy partner in **optimizing the vehicle architecture trade-offs**. In particular, ESTECO modeFRONTIER software solution was utilized in the conceptual design phase for the next generation of Genesis luxury sedan.*

Challenge

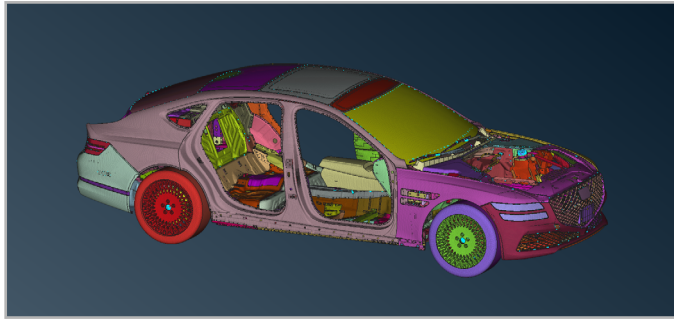


We realized that modeFRONTIER software is the ideal solution for vehicle trade-off-analysis and optimization.

Hyundai's architecture-driven structure conveys vehicle concept planning which takes numerous factors into account from the initial stage of development, including vehicle performance, parts sharing, standardization and even up to procurement, production and suppliers. Currently, their research engineers need to find a proven simulation-driven design technology for upcoming Electric Vehicle (EV) architecture development.

To test this methodology, they took as baseline a Genesis G80 luxury midsize sedan looking at rapidly investigating and identifying the global optimum design region, focusing on mechanical package, system selection, and attribute modeling. The analysis involved components such as suspensions, fuel economy, battery, and architecture costs.

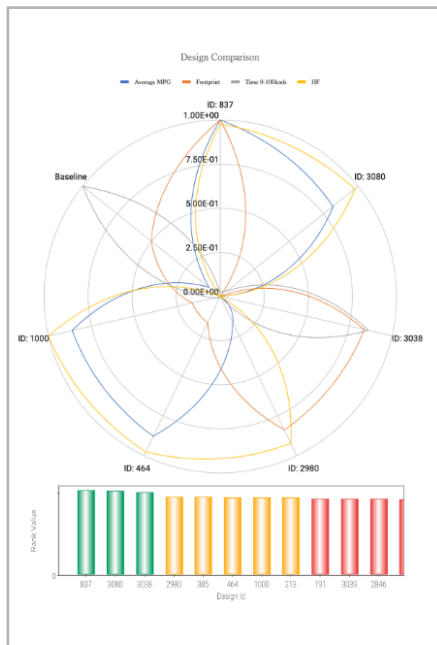
Solution



3D Genesis G80 Sedan

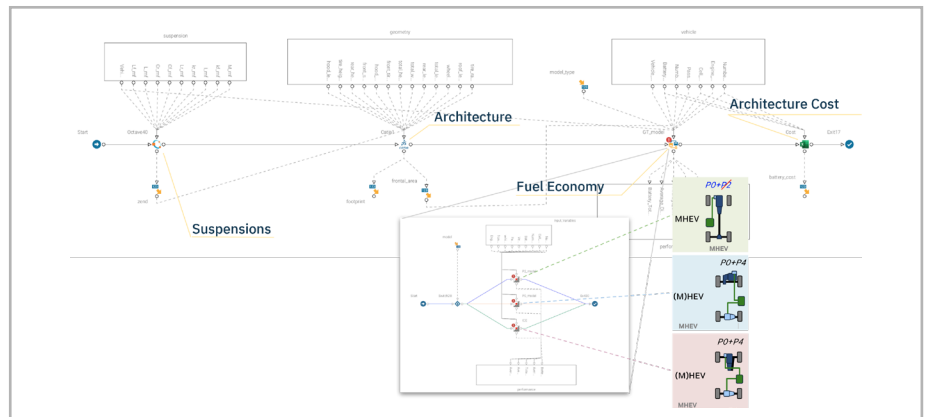
By employing modeFRONTIER, they could perform Trade Space Analysis (TSA) in order to identify a set of system parameters, attributes, and characteristics to satisfy the required vehicle performance during the conceptual product development phase. In practice, starting from an automated multidisciplinary modeFRONTIER workflow, they ran 3000 Design of Experiments (DOE) to rapidly evaluate all the possible vehicle configurations. For this purpose it was mandatory to build fast evaluation simulation models such as Matlab (Octave) for suspensions, Excel for batteries, RSM for the performance and so on, to get the results in a few hours. Then, they applied advanced post-processing techniques such as Clustering and Multi-Criteria Decision Making (MCDM) to group similar designs and rank all reasonable alternatives on the basis of given preferences.

Benefits



Final ranking to make a decision starting from multiple criteria

“We realized that modeFRONTIER software is the ideal solution for vehicle trade-off-analysis and optimization. After generating 3000 different vehicle configurations, we could cluster and then rank all reasonable design alternatives on the basis of user-defined preferences. This significantly accelerated our internal decision making process among all stakeholders involved in the project. We look forward to applying the same methodology for our next EV architecture development projects by also considering ESTECO VOLTA SPDM platform to foster collaboration across departments” - said James (KR) Yoon - Senior Research Engineer, Virtual MBSE & HPC AI Research, Hyundai Motor Company.



modeFRONTIER Multidisciplinary Design Exploration workflow used for Trade Space Analysis

ABOUT Hyundai Motor Company

Established in 1967, Hyundai Motor Company is committed to becoming a lifetime partner in automobiles and beyond, offering a range of world-class vehicles and mobility services in over 200 countries. Employing more than 120,000 staff worldwide, Hyundai has sold about 4.6 million vehicles globally. Hyundai Motor continues to enhance its product line-up with vehicles built on solutions for a more sustainable future, such as NEXO - the world's first dedicated hydrogen-powered SUV. worldwide.hyundai.com



ESTECO is an independent software company, specialized in numerical optimization and simulation process and data management. With a 20-year experience, ESTECO supports over 300 international organizations (such as Ford Motor Company, Honda, Lockheed Martin, Toyota and Whirlpool), accelerating the decision-making process and reducing development time. esteco.com