



MULTI-DISCIPLINARY TRADE-OFF ANALYSIS

Concept Vehicle Evaluation

As technology advances, aircraft are becoming more and more complex, with more new technology integrated into their design. The development of today's aircraft includes hydraulics, flight dynamics, structures, avionics, noise and environmental aspects. The growing complexity of modern aircraft design means that it is difficult to predict and trade off performance across complicated multidisciplinary workflows. Engineers face the risk of missing complex interactions between disciplines and lacking an overall picture of all aspects affecting the design.

As the technology incorporated into aircraft evolves, however, so does the technology that is used to manage the design process. The **3DEXPERIENCE** platform allows engineers to connect the disciplines throughout the design process, from fluids, structures, electronics and controls, to requirements catalogs, project management, and production planning. Project managers and engineers can keep track of development at all stages and immediately evaluate the impact of any engineering decision on the entire project.

In the early days, aircraft development was carried out using test models, which were time-consuming, costly and even deadly if something went wrong with this trial and error approach. Today's technology, in contrast, allows engineers to virtually develop an entire aircraft and immediately assess its structural components, safety and flight performance.

The use of simulation technology results in the reduction of development times from the earliest stages of design. Virtual development allows for the rapid evaluation of multiple design variants while accounting for and fulfilling requirements, resulting in lightweight, quiet and fuel-efficient aircraft.

SIMULIA offers a complete portfolio of appropriate fidelity computational tools that include structural mechanics, fluid simulation, electric and electronic components, systems engineering and optimization. Compared to physical testing, these simulation solutions provide greatly reduced turnaround time with highly efficient computations.

The benefits of SIMULIA's technology include the ability to select the right vehicle architecture and optimize overall vehicle performance and quality by, for example, improving fuel economy and range and reducing noise. The technology enables engineers to design the aircraft correctly on the first try, minimizing the risk of late design changes, as well as the requirement of physical designs and prototypes.

SIMULIA's technology is integrated into the **3DEXPERIENCE** platform, which allows managers, designers and engineers across disciplines to collaborate on architecture and conceptual design. Users of the platform can easily evaluate the reliability and robustness of concepts with sensitivity analyses and what-if scenarios. All stakeholders can access all data at any time, accelerating innovation and reducing engineering cycle time per iteration.

Saving time and money is at the forefront of every aircraft manufacturer's mind these days as competition grows fiercer—but this cannot be allowed to compromise safety or quality. SIMULIA's technology allows these manufacturers to rapidly respond to customers' demands and stay competitive, while at the same time adhering to strict aircraft-industry standards.

Regulatory requirements, in fact, are made part of the design specifications, and automatic analysis tools track the fulfillment of these requirements, providing automatic alerts if they are not met. This way, safety and quality are always foremost, even as the same technology speeds up development and reduces cost.

Simulation models enable engineers to quickly evaluate thousands of models and develop reliable, robust designs by accounting for variation in materials, loads, tolerances and operating conditions. For detailed body structure engineering, as an example, engineers can evaluate 10 times more concepts than with traditional methods. Meanwhile, turnaround time can be reduced from three to five days to a mere 30 minutes.

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