Simulated crashes for Audi Q7

Pushing the boundaries – Audi’s Q7 impressively demonstrates how to lead through technology. In developing the Q7’s underlying crash-optimised car body platform, Audi placed its trust in TECOSIM’s simulation know-how.

CHALLENGE
When Audi devised this new vehicle concept, it opened up options for a wide range of different comfort and drive variants. Audi developed both long and short versions of the vehicle body platform for petrol, diesel and hybrid engines. Each platform variant needed to deliver excellent crash performance, irrespective of its weight. In addition to occupant safety, development also focused on the accident-safe design of safety-relevant high-voltage components. The design needed to eliminate danger to occupants and damage to hybrid batteries.

SOLUTION
TECOSIM simulated different crash load cases and assisted Audi in creating a crash-optimised car body platform. The TECOSIM engineers used FE calculations to map specific stress load behaviour in connection technologies and different grade materials.
TECOSIM SERVICES
Simulation of different crash scenarios
TECOSIM helped to make the newly developed platform safe for all crash load cases. There was a special focus on the small overlap crash test requirements, which the vehicle’s predecessor was not able to meet. TECOSIM’s services also centred on load value calculation and simulation for the hybrid battery layout in different rear crash scenarios.

Vehicle body crash optimisation for hybrid drives
During crash optimisation, TECOSIM needed to strike a balance between crash performance and guaranteeing structural rigidity while also keeping an eye on vehicle weight and costs. The CAE experts also took manufacturability and production conditions into account while developing components for the different load paths.

Weight reduction calculations
One clear objective in developing the new vehicle body was to reduce weight significantly. TECOSIM’s FE calculations managed to optimise the use of the different materials – aluminium, normal steel and high-strength steel – in relation to the stress load and layout in the body structure, reducing weight sharply.

CUSTOMER BENEFIT
TECOSIM assisted the company in its challenging task and used calculation and simulation to produce a comparatively lightweight vehicle body, the production costs of which met budget requirements while complying with all safety requirements.

RESULTS
- Calculation and protection of the vehicle body platform
- Successful front impact in small overlap test
- Calculation for rear impact load and car body optimisation
- Weight optimisation with the aid of FE calculations

TECOSIM COMPANY PROFILE
With some 460 employees, TECOSIM is a strong partner for development processes and a specialist in computer-aided engineering (CAE). The internationally active group has its headquarters in Rüsselsheim, Germany, and is represented by seven branches in Germany as well as its own locations in the UK, India, Japan and Austria. TECOSIM provides support for customers in the transport, energy, health, and industry sectors. Its engineers work on challenging tasks in design, construction, simulation, electronics and software development. The services on offer are made complete by process optimisation methods. As a driver of innovation, TECOSIM employs trend-setting methods and provides comprehensive consultation for all stages of product development – from initial concepts through to all-in-one solutions ready for series production.

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