



Test & Certify the Safe Performance of Your New Designs

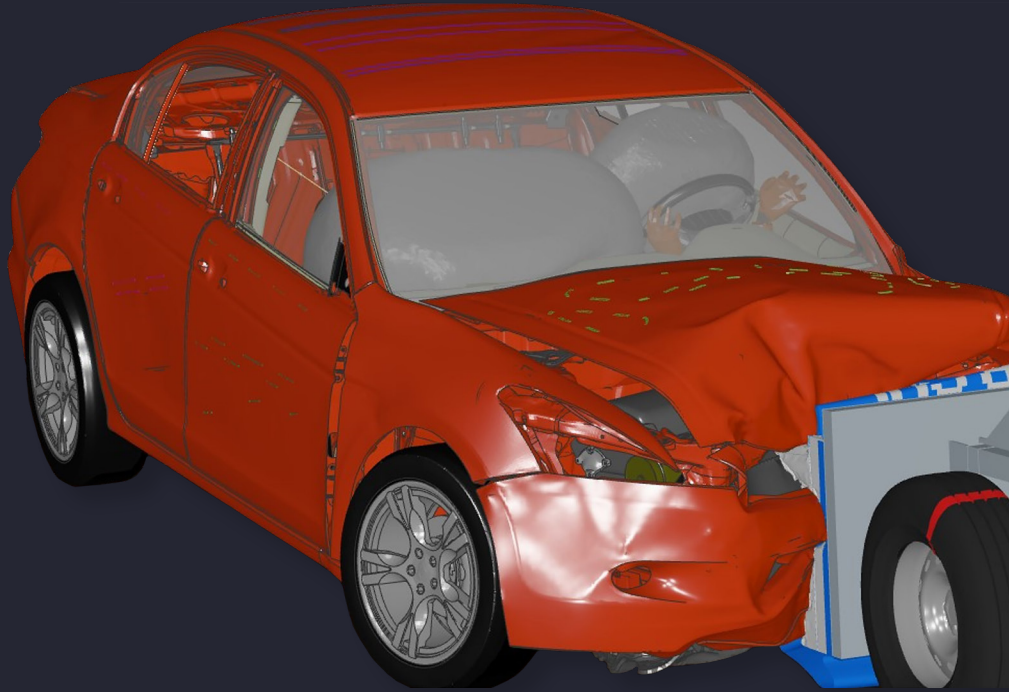
Achieve Complete Virtual Validation



Crash & Safety Testing Solutions | Brochure

Minimize Physical Prototype Builds in the Test and Certification of Vehicle Safety

Emerging technologies in future mobility drive new regulations for active and passive safety. Automakers must comply to ensure safety across diverse scenarios. To address the **growing complexity of vehicle variants**, crash and safety engineers need efficient testing methods. Physical testing poses limitations, delaying design changes and product launches. Consequently, **virtual crash and safety testing is essential** for leading automotive brands, enabling them to **achieve digital certification without endangering humans or the planet**.

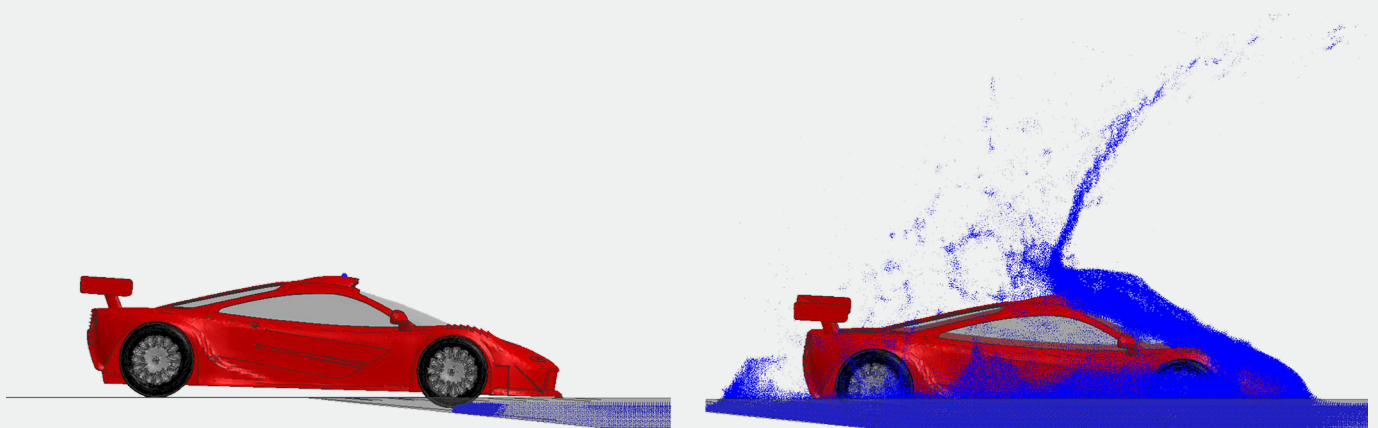


Harnessing Virtual Testing for Effectively Enhancing the Safety of New Designs

In today's vehicle engineering landscape, virtual crash and safety testing is crucial for product development. It enables early refinements, ensuring manufacturers achieve **certification on the first attempt** and requiring **only one regulatory physical release test before market launch**. With ESI's VPS software, engineers can seamlessly explore a wide range of **crash scenarios, regardless of complexity, all within the same timeframe**.

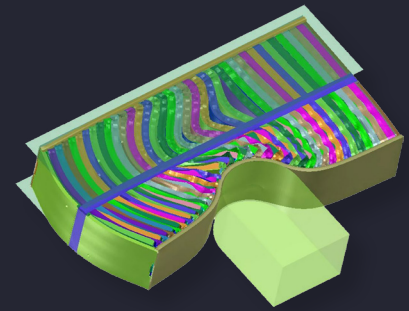
Consider engineering teams developing a new electrified vehicle using novel, eco-friendly, lightweight materials for both interior and exterior designs. How can they gain confidence in the safe crash performance of batteries and these innovative materials during the early stages of development? Such projects thrive on **cross-departmental collaboration**, with designers, safety engineers, and manufacturing experts working together **on a single virtual model**.

This synergy fosters a holistic approach, allowing the team to effectively evaluate how design changes impact overall vehicle performance and crash safety. By identifying potential issues before they become costly errors, this integrated approach **saves time and resources**. It brings early clarity, empowering engineers to make **informed trade-offs that balance safety, performance, and efficiency** in their designs.



Key Applications

Ensure **occupant and pedestrian safety** in collisions with detailed human body models and AI/ML-augmented safety system optimization.

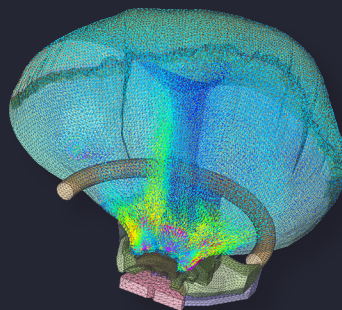


Ensure **durable and strong spot weld structures** by chaining welding simulation software with crash simulation techniques.

Analyze vehicle performance in **water crossings** through integrated simulations for better design insights.

Accelerate crash simulations with **automated dummy positioning** workflows, and accurate **airbag deployment and folding simulation**.

Utilize a single software solution to assess and **predict water intrusion** risks in vehicle structures.



Evaluate vehicle components under various stress conditions to ensure **durability and reliability**.

Evaluate temperature regulation, ergonomic design of interiors, and seat comfort under various conditions to achieve an **optimal passenger experience**.

Enhance **sub-system dynamics**, including hydraulic and pneumatic braking systems (ABS/ESC) and steering performance.

Simulate the **manufacturing process of interior trims** to ensure quality and precise fit in vehicle interiors.

Enhance **propulsion and transmission efficiency** while **optimizing dynamics and thermal comfort** for a superior vehicle experience.

Simulate whiplash scenarios to enhance seat design and improve occupant protection during rear-end collisions.

Evaluate electrification strategies to maximize energy efficiency and performance in electric vehicles.

Crash
& Safety

Dynamics
& Strength

Seat &
Interior

Full Vehicle System
Performance

Accuracy, Speed, and Sustainability: Core Benefits of ESI's Virtual Performance Simulation Software for Crash & Safety Engineering

Fast Parametric Design Space Exploration:

Simulate multiple crash scenarios and explore a variety of design outcomes, from minor impacts to severe collisions, within the same timeframe, ensuring your vehicle's safety under diverse conditions.

Streamline the Development Process with Automatic Model Quality Assessment:

Before executing full simulations, allow VPS to automatically check the integrity and accuracy of your models, ensuring reliability and error-free results.

Evolve Towards Virtual Homologation & Integrated Safety Testing:

Establish a seamless workflow connecting crash and multi-physics system simulations, enhanced by AI and ML technologies, to accelerate the validation of integrated safety scenarios and support certification bodies in virtual homologation.

Safer, Higher-Quality Vehicles with Lower Recall Risks:

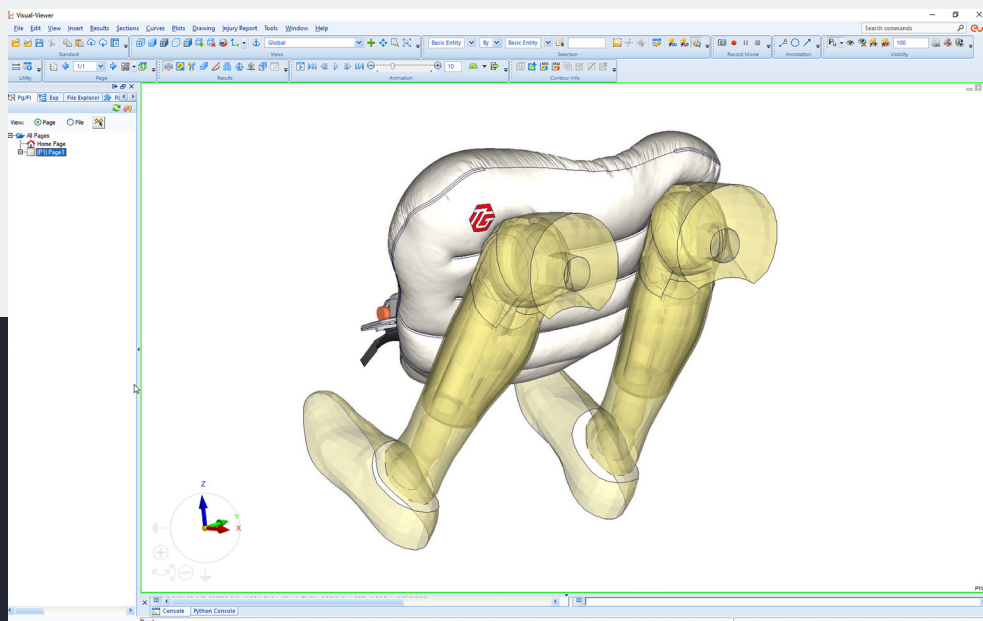
Produce overall safer vehicles to meet your company's 'zero fatalities' goal while reducing warranty costs and minimizing recall risks.

Decreased Carbon Emissions with Minimal Physical Prototypes:

Integrating virtual testing reduces the need for real-world tests, lowering carbon emissions and benefiting both the planet and your bottom line.

Enhance Early-Stage Design Confidence:

Collaborate seamlessly across departments to improve the accuracy and predictability of performance test results, enabling quick and informed design decisions.



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"By using ESI Virtual Performance Solution's airbag module for airbag folding and sewing, the accuracy and lead time for developing complex Knee Airbag (KnAB) have improved drastically. Besides the advanced and user-friendly software products, ESI's outstanding support allowed Toyoda Gosei Europe to further improve our simulation-driven development process significantly."

CAE Toyoda Gosei Europe

Leading automotive brands have transformed their product development processes with ESI's Virtual Performance Solution.

Toyoda Gosei, for example, reduced airbag development lead times by 50% through simulation-driven processes.

This is the power of utilizing virtual prototypes for testing crash and safety performance in a fully digital environment.

Are you ready to explore how ESI's crash and safety solutions can elevate your vehicle development process? Discover how virtual performance simulation can accelerate your safety engineering process.