

## THE VIRTUES OF VIRTUAL PROTOTYPING

The automotive industry is accustomed to using computer simulation in product development to conduct extensive tests. These virtual tests ensure products meet set performance requirements in various domains such as crash worthiness, stiffness and strength, acoustics, durability, comfort and drivability. In most cases, performance in one domain affects others, but typically each of these areas uses its own suite of simulation tools, and each test is conducted by a different team working in silos, resulting in time-consuming and costly iterations. Converting simulation models to use across different platforms is tenuous, and generating highly accurate results is challenging.



**Peter Schmitt**

ESI eliminates these problems with its end-to-end offering, which links multiple simulation domains to a central and unique simulation model (known as a “single core model”). ESI goes one step further by integrating the impact of materials and fabrication. ESI solutions enable engineers to predict the performance of an actual production part as it is built, taking the manufacturing process—such as casting, stamping and welding—into consideration, rather than just analyzing a nominal CAD model. Peter Schmitt, ESI's Executive Vice President of Sales and Marketing, explains.

### Where can the ESI's solutions be applied?

Our customers use our solutions in areas spanning Virtual Manufacturing—such as sheet metal forming, casting, and welding and assembly; Virtual Performance—such as crash testing, safety, passenger comfort and NVH; and Virtual Environment—such as vibro-acoustics, fluid dynamics and electromagnetics. ESI has expanded its offering to include simulation solutions addressing Advanced Driver Assistance Systems (ADAS) and OD systems engineering. ESI's software solutions enable our customers to develop full virtual prototypes and experience them through Virtual Reality. ESI's immersive virtual prototypes incorporate real-time physics, allowing stakeholders to make decisions based on a realistic prototype and conduct full engineering reviews that lead to virtual pre-certification.

ESI Group was founded in 1973 by four graduates from the University of California, Berkeley. Starting as a consulting company with an expertise in Finite Element Analysis (FEA), ESI's early mission was to “test the untestable.” A virtual car crash test in 1985, done for Volkswagen, became a basis for our flagship software product, PAM-CRASH. Since then, we have expanded both organically and through acquisitions and have more than half of our worldwide revenue coming from the automotive sector. ESI has become unique in its ability to simultaneously validate multiple domains. We also offer applications on a cloud-based platform for customers who prefer the convenience and scalability of that option.

### How does ESI's method save time and money?

The goal of Virtual Prototyping is to determine real-life results without physically testing real-life parts, which conventional approaches don't quite do. Developers still must test and calibrate, sometimes repeatedly, the final simulated result with a

hardware prototype. ESI integrates manufacturing processes which dramatically improve the accuracy and predictability of the virtual prototype. The result is a drastic drop in hardware prototyping. Our goal is to improve industrial product development by enabling manufacturers to pre-certify their products virtually.

### Why is material information so important?

In acoustics work, for example, there can be quite substantial differences between the theoretical part and the actual manufactured part. We can capture that difference and help developers shorten design time. Similarly, a welded steering knuckle may look the same in nominal and manufactured simulations, but the ESI system can identify significant differences in the life of the part well before the part is committed to production.

ESI has evolved into a company with unique Virtual Prototyping capabilities. We believe no other company can match the sophistication and accuracy of our solutions.

### How much prototyping time can ESI's solutions save?

It varies according to the specific project, of course, but when Audi used our solutions to evaluate a vehicle dashboard for thermal and crash performance, they shortened the analysis time from a month to a day. When Lamborghini used ESI to virtually prototype a carbon-fiber-reinforced door frame, they did it in one hour instead of one week, compared to their legacy approach.

These magnitudes of time savings enable developers to shorten cycle times and increase the number of design iterations they can consider, opening new doors for innovation. Our customers also use ESI's capabilities to troubleshoot problems with production components that don't perform as expected. In one case we helped a customer determine that a water leak was due to improper specification rather than a manufacturing error.



### Who uses your solutions?

Our automotive customer base consists of major vehicle manufacturers, tier-one suppliers and sub-tier suppliers. A recent and dramatic example is a small company, launched with three employees, who used ESI software to develop the lightest aircraft seat ever and certified it in just 18 months. Their design reduced seat weight by 50% and contributes to a 3%-5% fuel saving for an aircraft.

### What is your role with the customer?

We license our software and provide consulting services. We're excited when a customer comes to us with a problem nobody else can solve. We work closely with our customers to help them bring innovative products to market faster, leveraging the full capability of Virtual Prototyping.

*Click [HERE](#) or visit [www.esi-group.com](http://www.esi-group.com) to learn more about ESI's Virtual Prototyping software and services.*