



REAL RESULTS, **VIRTUALLY**



# Dear Reader,

No matter what industrial domain you come from, the technological environment you are working in is everything but simple! As a manufacturer or supplier, I know that you are facing many challenges when striving to meet your customers' expectations in terms of quality, robustness, safety, and delivery time. Yet, with the rise of the *Outcome Economy*, where measurable results become more important than the product itself, their demands are growing further, right?

To maintain profitability and growth, you are facing a difficult puzzle: to pursue innovation and risk disruption, or to cling onto processes that are running smoothly but don't match today's expectations? If you dare to venture into digitalization, how will you turn that into proven value and demonstrate ROI for your organization?

Well-aware of these challenges, ESI's commitment is to provide you with and help you implement technological solutions that empower you to innovate efficiently and with confidence.

The physics of materials makes all this possible, a unique expertise we have built since our inception 45 years ago. Material science is in our DNA: it is the fuel for our solutions, enabling our global customers to digitally experience and validate the fabrication, assembly and behavior of your product in different environments – early and throughout the whole product lifecycle.

Our vision is simple yet powerful: **Zero Tests, Zero Prototypes, Zero Downtime**. The benefits are palpable: faster time to market, increased product performance, and reduced costs.

If you want to boost agility and push innovation without sacrificing safety and quality, I personally invite you to engage with us. With ESI's proven zero prototyping approach, together we will **get it right®**.

With my best regards,

**Cristel de Rouvray,**  
Chief Executive Officer, ESI Group



## Quick Facts:



ESI performed the first ever car crash simulation in 1985. Since then, ESI has developed a unique expertise in Computer-Aided Engineering (CAE), allowing manufacturers to reduce or eliminate the need for physical tests and prototypes. Today, ESI solutions extend from product development to product operations, to help companies achieve optimum performance levels.



ESI counts over 2500 customers: major players in the automotive, aerospace, energy, defense, electronics, heavy industries, consumer goods, biomedical, and other sectors. ESI has established partnerships with best-in-class organizations including leading OEMs, academic and governmental institutions.



The company employs over 1200 high-level specialists worldwide supporting customers in more than 40 countries.

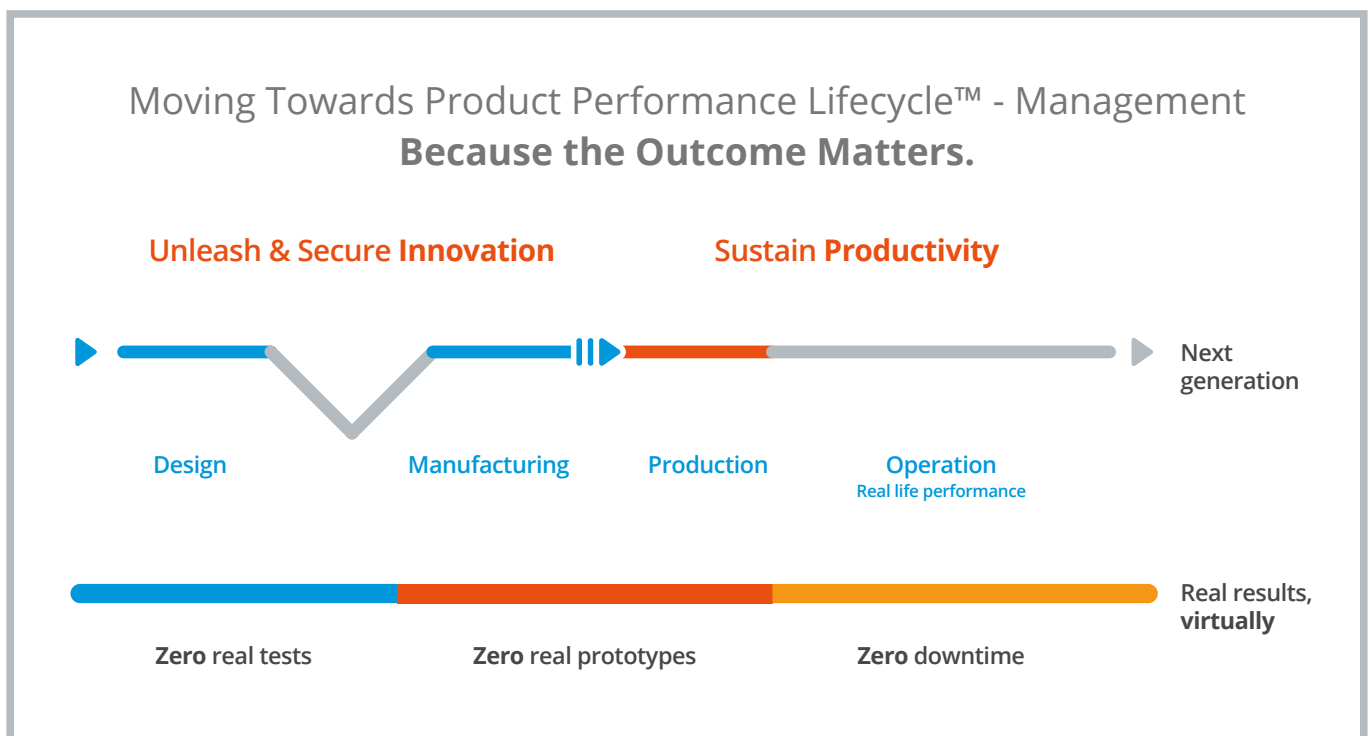
## Our customers include

**GROUND TRANSPORTATION** ALSTOM TRANSPORT, AUTOLIV, BOMBARDIER, BERTRANDT, CATERPILLAR, CONTINENTAL, DAIMLER, FAW VOLKSWAGEN, FAURECIA, FIAT/CHRYSLER, FORD, GENERAL MOTORS, GESTAMP, HONDA, HYUNDAI GROUP, ISUZU, JAGUAR LAND ROVER, MAN, MAZDA, MITSUBISHI MOTORS, PSA PEUGEOT CITROEN, RENAULT NISSAN, SIEMENS, SHANGHAI VOLKSWAGEN, TAKATA, TATA GROUP, TOYOTA MOTOR CORP., VISTEON, VOLKSWAGEN GROUP, VOLVO GROUP | **HEAVY INDUSTRY & MACHINERY** AP&T, ARCELOR MITTAL, JOHN DEERE, UNITED TECHNOLOGIES | **AEROSPACE** AIRBUS, ALCOA, AVIC, BOEING, BOMBARDIER, DASSAULT AVIATION, EUROPEAN SPACE AGENCY, GENERAL DYNAMICS, HONEYWELL, LOCKHEED MARTIN, NASA, NORTHROP GRUMMAN, PCC, ROLLS ROYCE, SAFRAN, TEXTRON AVIATION, THALES, UNITED TECHNOLOGIES | **ENERGY & POWER** ALFA LAVAL, AREVA, CEA, COMEX GROUP, DAHER NPP, DOOSAN SKODA POWER, EDF GROUP, EPRI, GE OIL & GAS, GE POWER, IHI, SHELL | **GOVERNMENT & DEFENSE** BAE SYSTEMS, BOEING, CEA, DCNS, DGA, FRENCH MINISTRY OF RESEARCH, GENERAL DYNAMICS, HUNTINGTON INGALLS INDUSTRIES, LOCKHEED MARTIN, OAK RIDGE NATIONAL LABORATORY, RAYTHEON, U.S. NAVY, U.S. AIRFORCE, U.S. ARMY | **ELECTRONICS & CONSUMER GOODS** 3M, APPLIED MATERIALS, HITACHI, LAM, LG, NEC, SAMSUNG

# Turn the Corner on Your Product Development

Product Lifecycle Management (PLM) has been at the heart of industrial developments for a long time, delivering clear objectives in terms of product quality, cost, and time to market. At ESI, we have proven our commitment to those goals since our foundation back in 1973 and have actively shaped product development processes since the first ever crash simulation, conducted by us together with Volkswagen in 1985. We know how to play PLM. Yet, we also know that in a world filled with technological disruption at such speed and on such demanding levels, where consumers value product performance and ecological footprint over sophisticated features, manufacturers have no viable option to get it wrong.

Earning certifications for new technologies introduced right the first time is one side of the story; ensuring behavior of the product and establishing trust in its next generation prior to market launch and throughout the lifecycle is the other. This is why we, at ESI, believe that traditional PLM is no longer sufficient. If we want to efficiently manage this complexity, we need to ultimately turn the corner in product development, allowing engineers to virtually assess the full picture of the final product in real life. This is what we call **Product Performance Lifecycle™ - Management**.



## What makes all this possible?

Simple. The physics of materials

Actually, it's not so simple. We've leveraged a specific and unique expertise in material science that facilitates our customers to create exceptional products.

# Make the Difference with Virtual Prototyping

The ability to experiment virtually with real data and real physics at the same time gives engineers just the extra degree of freedom they need to design right the first time.

- It is the freedom to displace physical tests and prototypes by virtually replicating product development, testing, and manufacturing with simulations. At ESI, we call this **Virtual Prototyping**. A Virtual Prototype is based on multi-domain simulation models and captures ESI's unique treasure of material physics. Supplemented by advanced Virtual Reality, engineers experience in full immersion their latest designs prior to production. Our customers rely on Virtual Prototypes to digitally demonstrate reliability, safety, and energy efficiency upfront in the development cycle and to pre-certify their new technology right the first time.
- It is the freedom to assess the ageing and behavior of a product at any stage and in any situation in its life. This is what the industry commonly refers to as Digital Twin. At ESI, we went the extra mile in creating a new virtual paradigm. Equipped with smart sensor data collected from real life operations, our Virtual Prototype becomes artificially intelligent to predict maintenance needs based on its current condition. We call this a **Hybrid Twin™**. Our customers use the Hybrid Twin™ to ensure safety and quality of their products in any operating environment and to improve next generation machines.

## It's All About Performance

Virtual Prototype and Hybrid Twin™ – what do the two have in common? It's all about performance.

- **Zero tests** | The performance of design and development for early confidence in the right manufacturing and assembly process without the need for real tests.
- **Zero prototypes** | The proof of performance in terms of safety and sustainability without the need for real pre-production prototypes.
- **Zero downtime** | The performance of the final product in terms of reliability with zero downtime during operations.

Performance is the game-changer for our customers' future business models. This is why we, at ESI, are evolving PLM into PPL. We are convinced that the Management of the **Product Performance Lifecycle™** is the gateway for you to **get it right®**. Our customer stories are proven confirmation.

## Breaking the Silos Between Real-Time Data & Physics

### Virtual Prototype

#### When Physics enrich Models

Virtual Prototyping is mission-critical for our customers, empowering them to virtually innovate and validate the performance of new technologies with confidence, to get it right in reality from the very first time. From crash safety to second life scenarios for EV batteries, crashworthiness studies for lightweight & composite materials, or optimizing energy density in power plants.

### Hybrid Twin™

#### When Physics enrich Data

A Hybrid Twin™ can support the entire lifecycle of your product, providing essential insights that allow you to achieve greater industrial productivity (Smart Factory) while vastly improving the actual product operational performance and contributing to the improvement of your next generation of products.

# Powering the Mobility of the Future

Customers in Ground Transportation make up 57% of ESI's portfolio, including the world's top 10 OEMs and many of their tier-1 and tier-2 suppliers. ESI's dedicated software and team of engineers empower them to reduce product development time, cut costs, and push the limits of innovation.

## Farasis Dominates Bidding Process from a German OEM Thanks to a Virtual Prototype of Their Electric Battery That Surpasses Expectations



*"In just 8 months, we went from limited Virtual Prototyping capability to winning those bids. The head of the whole program conducting the bidding process went out of his way to tell us that the mechanical simulation was an instrumental part in helping us get the design approved. We could not have done that without ESI. Our partnership with ESI is truly strategic in bringing our simulation capabilities to a global leading standard."*

— Dr. Matt Klein,  
Advanced R&D Director,  
Farasis Energy, Inc.

## FCA Industry 4.0 Virtual Assembly Project Achieves ROI in Eight Months with ESI IC.IDO



*"Due to ESI Group's disruptive virtual reality solution, IC.IDO, it was an easy decision for us to implement their software. It met the growing need for increasingly assertive virtual simulations generated by industry 4.0."*

— Eric Beremis Baier Laia,  
Virtual Reality Specialist of MFG2020,  
FCA LATAM

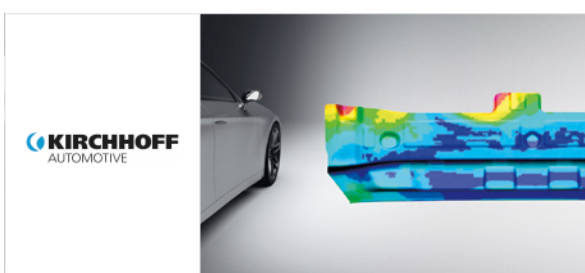
## Virtual Prototyping helps Gazelle Tech Develop an Innovative Vehicle that Reduces Energy Consumption by Half



*"ESI Virtual Performance Solution saves us time and money. We are able to validate the performance of our innovative composite vehicle virtually before even manufacturing the first real prototype."*

— Gaël LAVAUD,  
Chief Executive Officer,  
Gazelle Tech

## Combating Springback with Virtual Prototyping Makes Cutting-Edge Materials Possible for Kirchhoff Polska



*"PAM-STAMP has allowed us to reduce the springing effect several times compared to the current trial and error method. The compensation process determines the relaxed surface of the tool, which minimizes the costs associated with additional structural changes and additional machining."*

— Paweł Bałon, Ph.D.,  
Senior Tooling Designer & Simulation Engineer,  
Kirchhoff Polska

# Dedicated Solutions for Aerospace & Defense

Over the past twenty years, ESI has accompanied the growth of the Aerospace industry with its deep knowledge of the physics of materials, bringing virtual manufacturing to the core of the product innovation and process development. Powering the virtual development of future products, ESI technology is at the heart of the Industry 4.0.

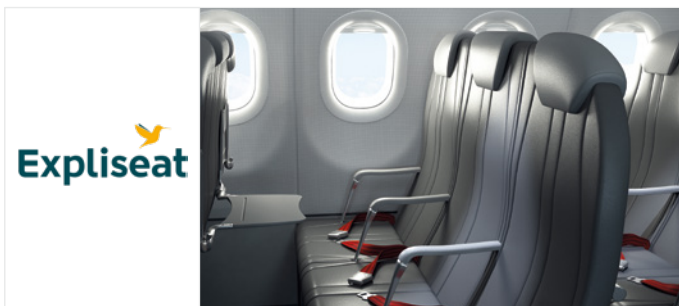
## Safran Nacelles uses Virtual Reality Solution ESI IC.IDO to Validate Nacelles Manufacturing Tooling



*"Virtual reality represents a technology of the future that will have an impact on the efficiency of our developments. The factory of the future is already here."*

— Nicolas Lepape,  
Virtual & Augmented Reality R&T Project Manager,  
Safran Nacelles

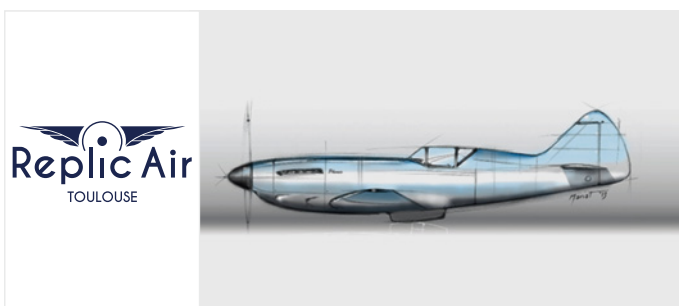
## Explicseat Relies on Full Virtual Prototyping to Develop the World's Lightest Aircraft Seat



*"Virtual Prototyping is a proven industrial approach to pre-certify the manufacturing process and performance of an innovative product, such as our Titanium seat. ESI's Virtual Seat Solution has helped us reduce drastically the development time usually required to design an innovative product, and has allowed us to increase the business value of our company in record time."*

— Vincent Tejedor,  
Chief Technical Officer,  
Explicseat

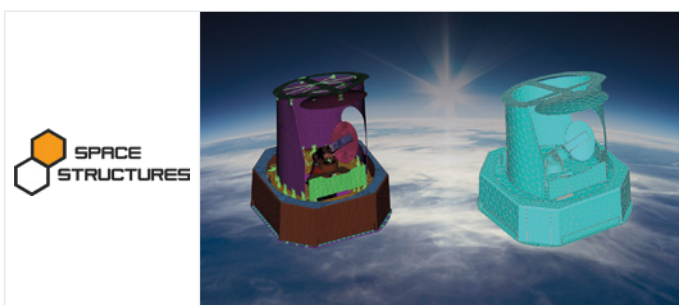
## Additive Manufacturing Simulation Brings History to Life



*"Our collaboration with the ESI team has allowed us to address the manufacturing problems of the system. Thanks to the ESI Additive Manufacturing simulation solution, we were able to make the right decisions to launch a part of the engine cooling system in the shortest possible timeframe."*

— Wilfried Dufaud,  
Cofounder of Aura-Aero and Replic'Air Innovation Leader,  
Dedicated to AM Applications and Scientific Subjects

## Space Structures Uses ESI VA One to Secure the Integrity of Satellite Panels during Launch



*"ESI VA One is an outstanding software product. However, the real success is provided in the proactive, flexible, timely and high-quality support of the ESI team from our first contact with the sales team to our contact with technical support."*

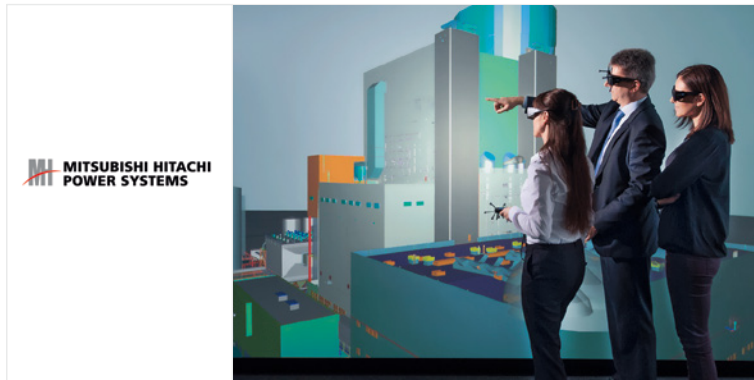
— Taorian Ruess,  
Managing Director,  
Space Structures GmbH

# Driving Innovation Across Industry Sectors

With its Virtual Prototyping Solutions and global team of expert engineers, ESI delivers the right outcome for your engineering challenges. Bring your most innovative projects to life!

## Energy and Power

### Mitsubishi Hitachi Power Systems Europe Significantly Enhances Multi-domain Communication and Engineering Quality with ESI IC.IDO



*“Using IC.IDO allowed us to detect numerous failures in our power station 3D mock-ups, before it was too late to halt the construction process. By identifying these kinds of critical mistakes, Mitsubishi Hitachi Power Systems Europe has avoided significant time loss, and the costly penalties we would have paid. The ROI of IC.IDO is indisputable. ESI helped Hitachi not only detect errors but actually prevent them.”*

— Christoph Kastl,  
Head of technical IT,  
Mitsubishi Hitachi Power Systems Europe

## Heavy Machinery

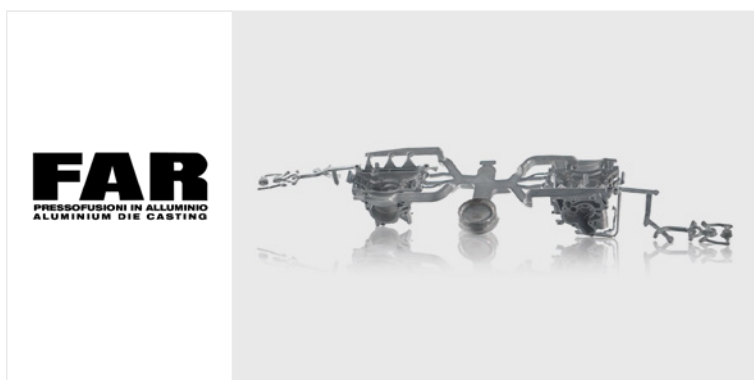
### Creating the Perfect System: Siemens Minerals Utilizes ESI’s SimulationX to Optimize Belt Conveyors



*“Linking the digital models of a belt conveyor’s mechanical and electrical components in ESI’s SimulationX produces a digital twin which allows for design optimizations and virtual commissioning of the belt conveyor. We’re able to test parameters for converters and choose, as well as complex controllers, and chose in advance to validate the technical performance, and to minimize time and tests on site for a faster and safer commissioning process – something from which we benefit as much as our customers.”*

— Dr.-Ing. Torsten Hellmuth ,  
Product Manager Bulk Material Handling,  
Siemens AG, Process Industries and Drives Division

### FAR Uses Two Cavity Die to Improve Production Rate and Margins



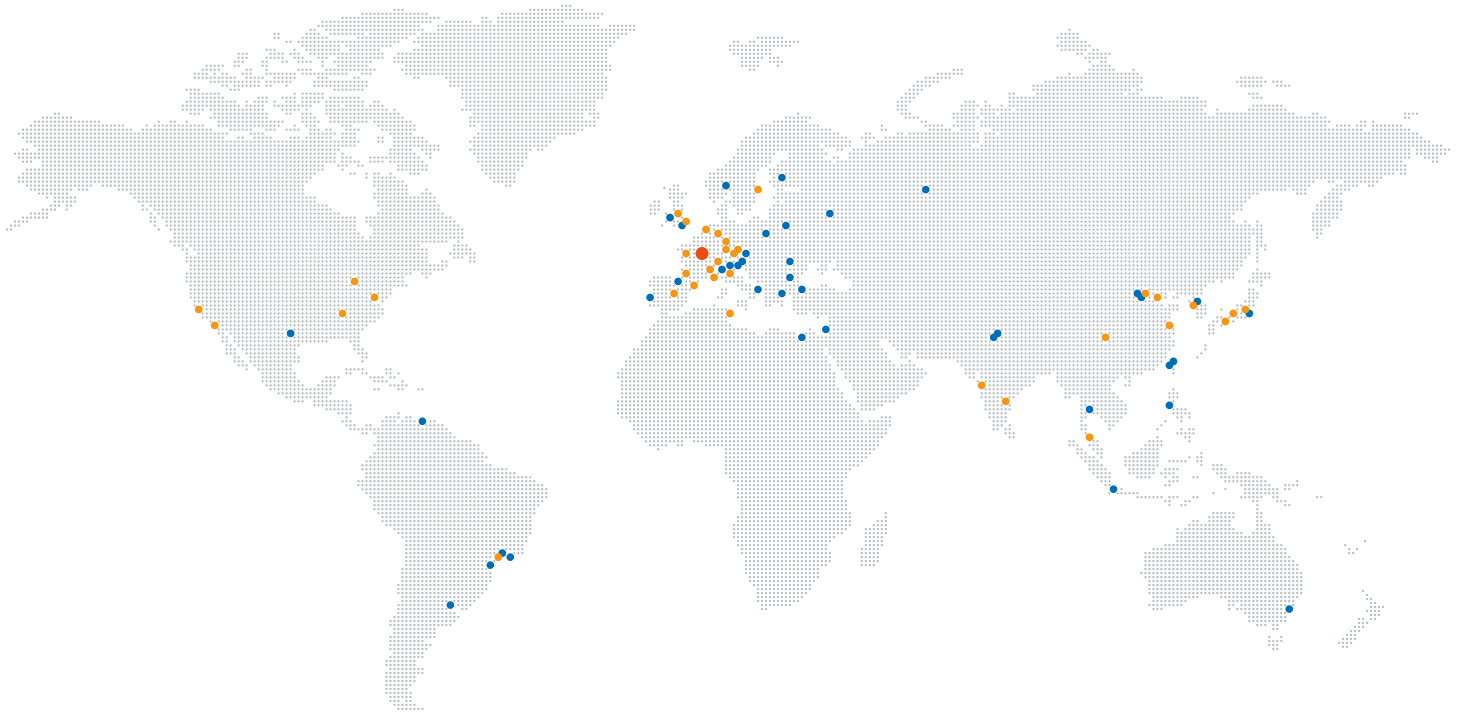
*“FAR has chosen ProCAST of ESI Group to find solutions on cost reduction customer requests. Today Casting simulation is mandatory and necessary to reach best quality results, including choosing the right tonnage of the machine to reduce costs. Thanks to these results in quality and costs, FAR can be competitive in the market.”*

— Gianfranco Lenzi,  
Chief Executive Officer,  
FAR srl

# ESI around the world

ESI provides engineering solutions to its international industrial customer base. With subsidiaries, agents and distributors established in more than 40 countries, ESI Group employs over 1200 professionals worldwide.

● Headquarters    ● Subsidiaries    ● Agent and Distributors



[www.esi-group.com](http://www.esi-group.com)