SMART VIRTUAL PROTOTYPING
Dear Reader,

As an industrial player in today's globally competitive environment, you cannot escape the challenge of delivering more innovative and smarter products at a lower cost, faster, and with increased reliability.

Leveraging over 40 years of collaborative expertise, our goal at ESI has always been to give you, no matter your industry sector or company size, the ability to meet this challenge by virtually manufacturing, assembling and testing across multiple domains of required performance, physically realistic components and complete virtual products – essentially building and honing your Virtual Prototype all the way to virtual precertification. Thanks to ESI's platform, you have an effective access to the right physics at the right time.

Now, the growing possibilities offered by the Internet of Things (IoT) and Big Data enable a product's lifecycle to be monitored after commissioning. ESI's transformative approach, entitled **Product Performance Lifecycle™ (PPL)**, together with its IoT based **Hybrid Twin™** solution, represent a strongly innovative and inescapable step forward that aims to provide businesses with intelligent control over a product's entire lifecycle – looking beyond its development phase and nominal state covered by Virtual Prototyping – to represent and maintain its performance during in-service use. This disruptive approach, at the core of the **Smart Factory**, offers an essential answer to the key economic challenges of the Industry of the Future and of the **Outcome Economy**.

I hope you enjoy reading here about the successes of ESI's customers and learning about the newly acquired technological bricks that greatly amplify our solutions around the IoT and the Hybrid Twin™. Indeed, ESI is undergoing its own transformation to amplify our **Smart Virtual Prototyping** solutions, showing how committed we are to supporting and accelerating with dedicated efficacy your digital transformation in your industry.

**Alain de Rouvray,**
Chairman & CEO

---

**Quick Facts:**

ESI performed the first ever car crash simulation over 30 years ago. Since then, ESI has developed a unique expertise in manufacturing, testing and experiencing products – all virtually.

Today, ESI counts over 2500 customers: major players in the automotive, aerospace, energy, defense, electronics, heavy industries, consumer goods, biomedical, and other sectors. ESI partners with best-in-class organizations including AREVA, AVIC, Honda, Huawei, the Renault-Nissan Alliance, and our longest standing customer, the Volkswagen Group.

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

**Our customers include**

**GROUND TRANSPORTATION** ALSTOM TRANSPORT, AUTOLIV, BOMBARDIER, BERTRANST, CATERPILLAR, CONTINENTAL, DAIMLER, FAW VOLKSWAGEN, FAURECIA, FIATCHRYSLER, 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

**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, CEAMIN, COMEX GROUP, DAHER NPP, DOOSAN SKODA POWER, EDF GROUP, EPRi, GE OIL & GAS, GE POWER, HII 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
In most manufacturing companies, CAE teams are mapped to represent different engineering fields. Take a car manufacturer, for instance: the design team will hand over their concepts to the crash & safety department, as well as to the other simulation departments who will address Stiffness & Strength, NVH & Durability, Acoustics, Drivability, Comfort, and so on.

Working in silos, engineers soon face the challenge of design trade-offs, as addressing the requirements of one field might be detrimental to others. Teams will go back to the design board numerous times until reaching an acceptable compromise.

ESI’s Virtual Prototyping approach adopts a Single Core Model: enabling teams to work concurrently on the same model of a car’s system or sub-system. They can get instant answers to their ‘what if?’ questions and investigate alternative solutions swiftly – promoting greater innovations.

Using our advanced knowledge in material physics, ESI has developed Virtual Manufacturing software that helps manufacturers simulate their future products as built - not just as designed. Equipped with Virtual Manufacturing and Testing capabilities, engineers can ensure feasibility early in the design process; pre-certify their products and stay ahead of competition.

Once teams have created a Virtual Prototype, they can experience it in real-time, real-scale, in immersive 3D, using Virtual Reality.

What’s next? In the new internet of things (IoT), Virtual Prototypes need to become smart, just like the intelligent and autonomous products they anticipate.
ESI is shaping the Industry of the Future

Disruptive digital technologies are rapidly and profoundly changing the way engineers work! ESI is building new paths to seamlessly connect your virtual prototypes with the latest technologies: Systems Modeling, Advanced Driver Assistance Systems (ADAS) & Autonomous Driving, the Internet of Things, Data Analytics, Machine Learning, and Cloud Computing.

Scilab Open Source Analytical Computational Software Joins ESI’s Portfolio

ESI recently acquired Scilab Enterprises SAS, publisher of Scilab, the most compelling open source alternative to MATLAB®, the commercial software for analytical numerical solutions. Scilab provides a world class powerful environment for engineering computation and scientific applications.

Launch of ESI Cloud for Cloud-based CAE Modeling

Following the acquisition of Ciespace's technology assets, ESI Group launched ESI Cloud. ESI’s Virtual Prototyping solutions are now available in Cloud/SaaS mode. The platform creates considerable additional value to ESI’s existing industrial customers, offering a convenient, mobile, collaborative solution. ESI Cloud also functions as a powerful vector to democratize ESI’s Virtual Prototyping solutions, now within easy reach for small and medium businesses. Register now for a free trial at cloud.esi-group.com

ESI Strengthens its Solutions for Advanced Driver Assistance Systems (ADAS)

Having acquired CIVITEC and its software Pro-SiVIC™, ESI is equipped with breakthrough technology dedicated to the development and integration of embedded Advanced Driver Assistance Systems (ADAS). ESI Pro-SiVIC™ enables the virtual testing of sensors in ultra-realistic 3D scenes, empowering industrial players to develop perception assistance systems from the design phase to the final testing. The software takes into account influencing factors such as lighting conditions, weather, and possible interactions with other road users and objects.

Leveraging the Power of Data Analytics and Machine Learning

With the acquisition of Mineset Inc., ESI customers benefit from a web-based solution for data analytics and Machine Learning, complementing the recently integrated Picviz Labs (now ‘ESI INENDI’), providing a visual analytics solution. This combination of talent and technology contributes to revolutionize the field of simulation data analytics, with extensions to predictive maintenance.

ESI Extends its Offering in Systems Engineering

By acquiring ITI GmbH, ESI adds to its portfolio the leading solution in fast and accurate system simulation: SimulationX. This acquisition allows the bridging of virtual prototypes in a detailed 3D-4D space with the 0D-1D space, positioning ESI further upstream in the industrial product manufacturing chain.
The Industry Standard for Ground Transportation

Customers in Ground Transportation make up 53% 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.

ESI Virtual Performance Solution Helps ŠKODA Score 5 Star Rating from Euro NCAP

“ŠKODA has been using ESI Virtual Performance Solution (VPS) successfully for many years, to conduct virtual car crash tests, to ensure the safety of both the occupants and pedestrians, and to check the stiffness or frequency response of car body components such as the hood or headlights, all on a single-core model. In designing the new and revolutionary ŠKODA Superb, we used VPS early in the development cycle, before design freeze, conducting thousands of virtual tests, investigating different options and design variants, making the best trade-offs, and ultimately obtaining 5 stars at the Euro NCAP.”

Tomáš Kubr, Ph.D.
Head of Functional Development (EKF), ŠKODA AUTO

Vesta Engenharia Compensates for Highest Springback to Date with ESI PAM-STAMP

“Successful springback compensation is the result of a stable and robust process, knowledge of the product demand and a good understanding of the software results.”

Bernardo Perillo, Ricardo Micheletti Viana,
Wellington Caetano Soares Mechanical Engineers,
VESTA Engenharia

Epcor Produces Quality Parts Faster than their Competitor with ESI QuikCAST Casting Simulation Solution

“We tried QuikCAST on a few trial parts and found that it was able to accurately simulate our molding results. It provides a more effective approach than what we were doing before because it makes it possible to look into / at the casting process one step at a time.”

Mike Maratta,
Plant Manager,
Epcor Foundry

Bombardier Exceeding Customer Expectations with ESI IC.IDO

“The virtual visit of our train powered by ESI IC.IDO was from a customer relationship and design management standpoints a fully satisfactory and innovative method. It allowed us to validate complex design aspects in a very user friendly fashion saving time and ultimately cost for the project and our customer. ESI not only provided the tools but the onsite support that allowed us to setup this customer design event within a very short timeline.”

Christophe Tilan,
Project Manager,
Bombardier
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

ESI Contributes to the Project “Passenger Seats of the Future” Led by Zodiac Seats France

Led jointly with Zodiac Seats France, the project involves French industrial, academic and institutional partners. The objective of the project is the identification of innovative solutions to meet the expectations of both airlines and passengers in aircraft seating. ESI Virtual Seat Solution delivers predictive capabilities in Virtual Prototyping and seat comfort prediction from the design to the pre-certification of the aircraft seats.

Aerostructures Manufacturer Aernnova Uses ESI's Composites Simulation Suite to Design and Optimize its Manufacturing Processes

“With ESI's PAM-RTM, we now have a tool and a methodology to predict and correct all possible defects occurring during the injection process; starting at the beginning of the design of the mold, before any physical trial.”

Federico Martin de la Escalera, Head of Research and Technology Department, Aernnova Engineering Solutions Iberica

SimulationX Helps Hatebur Metalforming Equipment Ltd Successfully Model High-dynamic Servo Hydraulic Actuators

“SimulationX has successfully proven to be a reliable tool for modeling high-dynamic servo hydraulic actuators and gives a guarantee for the success of further similar projects at Hatebur”

Taken from the paper “Fast servo hydraulic actuator: simulation vs. testing” by Dr. Mihai Vulcan, Hatebur Metalforming Equipment Ltd., Reinach BL, Switzerland; SimulationX User Forum 2016.
Driving Innovation Across Industry Sectors

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

Civil Engineering
SL RASCH Collaborates with ESI to Achieve Architectural Excellence in Mecca and Medina

“With the know-how of ESI experts and the capabilities built into ESI’s advanced CAE software solutions, designing our innovative structural systems became possible.”

—— Dr. Mahmoud Bodo Rasch, Founder and Owner, SL RASCH GmbH

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 at Mitsubishi Hitachi Power Systems Europe

Biomedical
INEGI Manufactures Customized Hip Prostheses in a Cost Effective Way

“Scientific methods can always save us time and cost. ProCAST is just that tool helping foundry men find the right solutions. For investment casting process, ProCAST can generate different layers of shells and with wrapping outside. This helps predict the temperature field more precisely.”

—— Nannan Song, Senior Researcher Advanced Foundry and Rapid Prototyping Technologies, INEGI

Electronics & Consumer Goods
SAMSUNG Electronics Benefits from a Virtual Prototyping Platform, Saving Up to 90% in Engineering Time

“Using guided CAE automation early in the design process enables us to identify the right concepts and verify design changes in order to save time and cost.”

—— Jeong-Rho Lee, Senior Engineer, SAMSUNG Electronics Corporation
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.

www.esi-group.com