esi talk

The Simulation-Based Design Magazine

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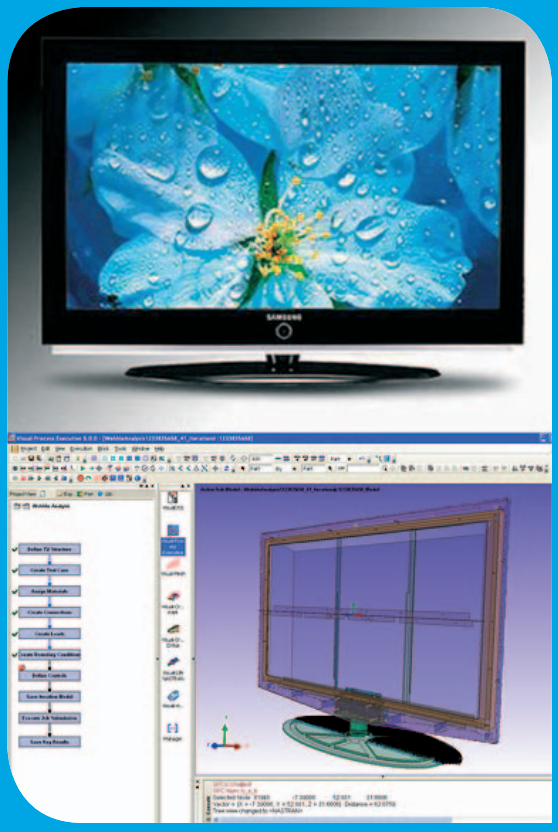
special report

Providing Realistic and Innovative Engineering for Power Generation



Panoz Auto Development Company selects ESI as design partner

SAMSUNG Electronics benefits from a Virtual Prototyping platform

ALTERNATIVE THINKING ABOUT COMPUTER MODELING AND SIMULATION

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contents

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editorial

Vincent Chaillou
Product Operations
President & COO
ESI Group

Get it Right® with End-to-End Virtual Prototyping

Development teams of mechanically engineered products increasingly rely on Simulation-Based Design to meet market requirements. Quality results for Simulation-Based Design mean correct physics, requiring simulation of all performance domains in "as-built" condition, taken into account affordably and on time. To achieve these affordable and timely results, team efforts must be well orchestrated with engineers spending their time on the right tasks for their expertise. ESI's End-to-End engineering platform is uniquely able to help product development teams produce quality results: accurate, for the right cost and at the right time.

Today's complex products with challenging performance requirements demand ever more accurate simulations to avoid failures. ESI's End-to-End platform enables the simulation of manufacturing effects such as stamping, welding and casting, which are not only important to evaluate manufacturability, but vital to improve the performance of simulation models in the fields of Noise, Vibration and Harshness (NVH), Crash-worthiness, Occupant safety, etc. The engineering platform also includes a shared work environment that ensures teams verifiably and efficiently follow well planned processes that cover all facets of Simulation-Based Design. A recent example was the success of Samsung Electronics (story p. 9) in reducing significantly the simulation time while improving the quality of the design using ESI's End-to-End platform.

The End-to-End platform's unique breadth of physics, content management, project management, team workflows and task automation in a shared environment greatly improves the way new products are developed. Indeed, whether you are in the automotive, aerospace, defense, or energy industry, with a need to simulate multiscale, structural, fluid, thermal, chemical, biological, electrical, or mechanical phenomena, ESI's unique End-to-End Virtual Prototyping platform empowers engineering teams to develop better products faster, thus making it the ideal choice for real world simulation.

Providing Realistic and Innovative Engineering for Power Generation

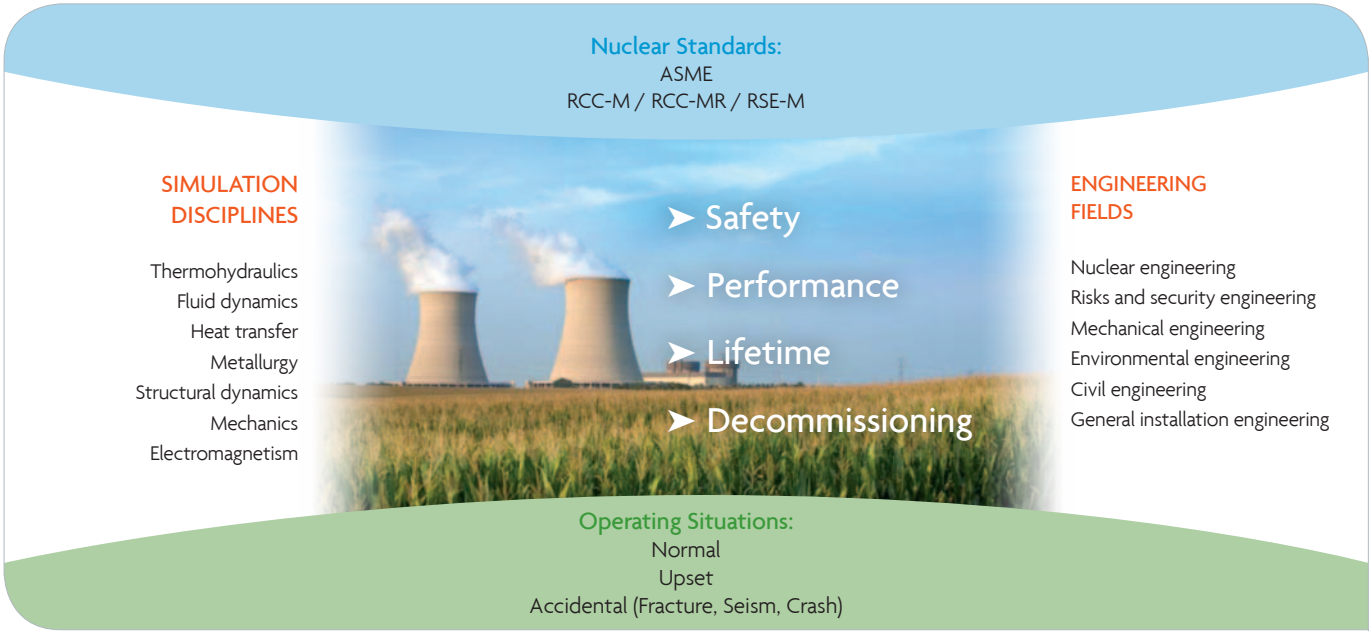
Nuclear engineering is historically the first field of industry where numerical modeling was institutionalized as the commonly accepted approach for designing and justifying the level of safety of **N**uclear **P**ower **P**lants (NPP) in the 1970s.

ESI pioneered in this field as the company was created in 1973 to initially develop consultancy studies for the Nuclear Power sector in cooperation with KWU, the German Nuclear Energy agency, and GRS, a German non-profit company specialized in research and development activities for NPP.

As military and nuclear activities declined during the mid 1980s, efforts were turned to other industrial fields such as the automotive industry, which spurred the development of numerical modeling technology over the years.

With renewed interest for Nuclear Power at the end of the 1990s due to increased energy needs, the economy observed a rapid ongoing expansion of nuclear activities. Indeed, the world's energy needs are likely to double over the next 50 years. With the rise in energy requirements, we will face electricity shortages, fossil fuel price increases, global warming and heavy metal emissions from fossil fuel use. These factors mean the demand for NPP will continue to grow over the years.

While in the 1970s, the methodologies applied matched the available computational means, the latter have made considerable progress in the last 30 years, delivering significant benefits to nuclear engineering practices. Today's field of numerical simulation for nuclear engineering is broad and aims to guarantee conformity with nuclear standards and regulations for safety, performance, and lifetime of NPP in every situation (normal, upset or accidental).



Nuclear engineering challenges addressed with simulation.

3 questions for...

Eric Daubourg,
COO of ESI France

What does ESI offer to the Nuclear Power sector?

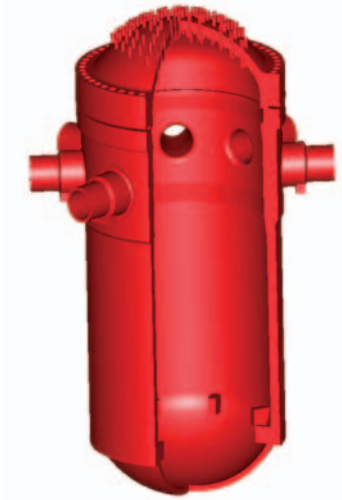
"ESI's offering for the Nuclear Power industry is based on more than 30 years of experience and is highly recognized thanks to our engineers' expertise in diverse disciplines meeting the sector's needs. ESI expertise in the nuclear field was first significantly reinforced in 1997 with the acquisition of Framasoft®, a subsidiary of Framatome (now AREVA). The acquisition enabled us to release a unique suite of simulation solutions based on the process-product approach of the different NPP part design phases. Today, ESI is entering a new era in this sector, facing significant needs in terms of design optimization and time reduction and constrained to high quality and safety regulations."

ESI expertise in the nuclear field can particularly be found among the ESI team in France. Could you please explain why?

"ESI France has indeed developed a high expertise in the energy sector since its creation. Thanks to the Framasoft® technical team's competencies, ESI France has been able to integrate a multiphysics approach associated to manufacturing challenges. Other subsequent acquisitions have then allowed the development of an integrated 'End-to-End' solution which is today well appreciated among our customers. ESI France has also recently strengthened its long lasting partnerships with AREVA, COMEX NUCLEAIRE and EDF as well as with safety authorities such as the IRSN and CEA. The ESI France subsidiary is therefore the most competent in helping and supporting the development of ESI's Nuclear Power activities. We recently had a successful first experience with a project for **M**itsubishi **H**eavy **I**ndustries (MHI) in Japan, in collaboration with our Japanese colleagues from Nihon ESI, based on which we hope for an expansion of our energy activities worldwide."

You mentioned the importance of conformity with nuclear standards. How does ESI comply with the regulations?

"The Nuclear Power industry involves three different parties: the vendors, such as AREVA and COMEX NUCLEAIRE, the distributors, such as EDF (Electricité De France), and the safety regulators, such as the ASN, the IRSN and the CEA. ESI's quality assurance program has been established to meet the stringent needs of the nuclear industry. Indeed, in addition to our ISO 9001 certification, we comply with strict standards for nuclear application such as 10CFR50, NQA1, Q-N-100 and Q-N-300 (for AREVA), and SGAQ (for EDF). This is a key for success in the Nuclear Power field where the expertise of ESI France's consulting team and ESI software products are well recognized by customers and partners."



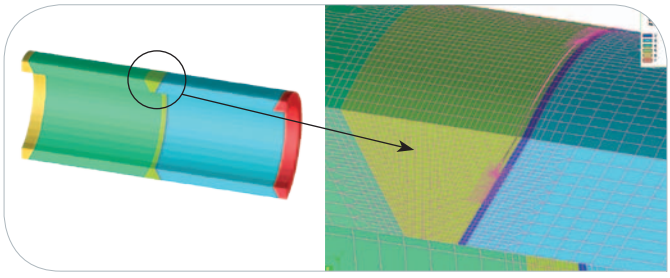
3D SYSTUS/SYSWELD simulation of a reactor vessel
Courtesy: AREVA

Simulation solutions for Nuclear Power

Modeling requirements encompass all fields of physics from thermal-hydraulics to crack propagation, chemistry, structural dynamics and thermo-mechanics, electromagnetism, as well as multiphysics coupling several of these. ESI's wide range of simulation solutions addresses diverse problematics for Nuclear Power.

Simulation of manufacturing processes and fracture mechanics

The BIMET European project, sponsored by **EDF, AREVA, the CEA** and others, was launched to analyze the fracture behavior of crack propagation and stability in bimetallic welded joints in some European plants. The numerical experimentation was completed on a pipe with a cracked dissimilar metal weld and consisted of two different analyses. First, the manufacturing process of the bimetallic welded pipe was simulated using SYSWELD to evaluate welding, heat treatment and machining of the welded joint and predict residual stress. The second analysis was performed with SYSTUS, ESI's versatile multiphysics software, to test crack initiation and propagation. The simulation incorporated the insertion of a circumferential defect in the austenitic buttering of the welded pipe.



Courtesy: AREVA - 16th European Conference of Fracture (ECF16)

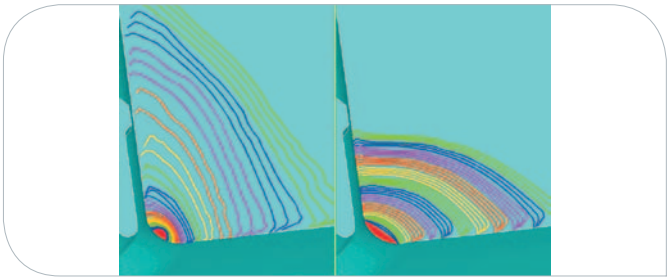
• • •

"ESI studies have an excellent quality level and constitute a reliable basis for solving our problems. The teams' reactivity is their second key quality and allows us to answer to our customers in a very short period of time. The very good interaction between our units and the ESI engineers and managers needs to be sustained as it gives AREVA more flexibility and improves the quality of the numerical tools we develop together."

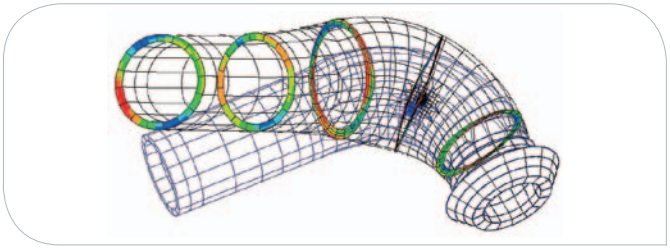
Philippe Gilles,
AREVA International Expert in structures and materials

• • •

ESI offers comprehensive Engineering Services, which go beyond software and studies. In the domain of fracture mechanics analysis, a project named SYSCOUDE was undertaken to analyze a primary bend with crack. The methodology was integrated in a SYSTUS application to automate mesh generation, computation and post-processing for the bend and the crack.



40 years crack propagation
Courtesy: AREVA

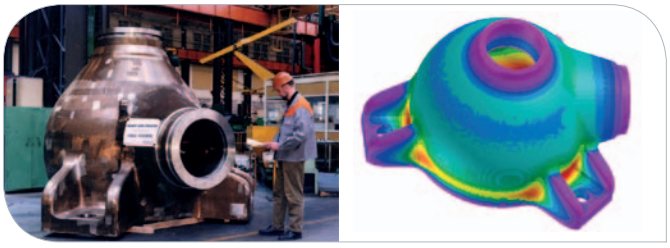


Post-processing of the cracked bend

As for other examples, SYSWELD and SYSTUS were applied to a nozzle repair residual stress analysis performed by **DOOSAN** in Korea and a seismic analysis of auxiliary tank for **AREVA** in France.

Casting simulation examples

ESI performed a simulation-based design of a primary pump considering cast and heat-treatment that will be followed by a crack analysis during operating conditions. This was the first step in an 'as-built' 'as-operated' modeling approach for AREVA JEUMONT.



Solidification phase
Courtesy: AREVA JEUMONT

ESI's casting simulation tool ProCAST was also used to benchmark the transportation of radioactive material under accidental conditions for the 'Bhabha Atomic Research Center' (BARC) in Mumbai, India.

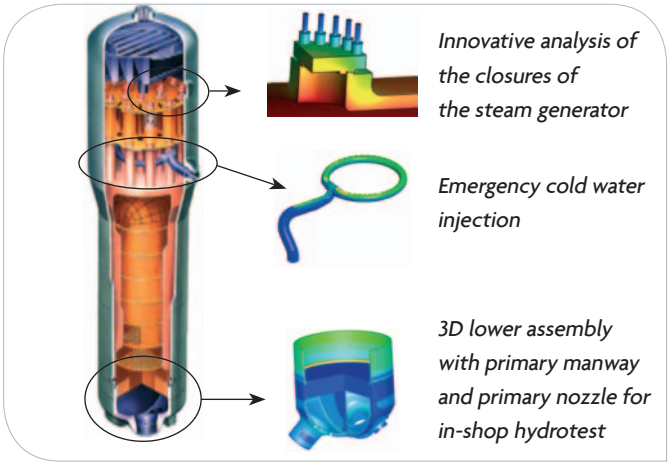
Stress report for replacement steam generators

ESI recently undertook a 3-year collaborative project on NPP maintenance using diverse simulation solutions and services.

COMEX NUCLEAIRE (CxN) completed, in collaboration with ESI, the Behavior Analysis Report for Replacement Steam Generators (RSG) provided by **M**itsubishi **H**eavy **I**ndustries Ltd. (MHI) in Japan. The project was undertaken for **E**lectricité **D**e **F**rance (EDF), French electricity provider, under the control of French **N**uclear **S**afety **A**uthority (ASN). The steam generator's behavior was simulated in its environment, taking into account 40 years of operating conditions and pre-defined accidental situations, using an innovative methodology for realistic simulation aligned with RCC-M and RSE-M nuclear standards.

This realistic approach encompassed:
- Large 3D modeling
- Thermo-hydraulic and thermo-mechanical coupling
- Dynamic and elastoplastic behavior
- Fatigue design and advanced analysis of the multi-perforated tube plate of the steam generator
- Fast fracture analysis

ESI played a major role by providing experts in nuclear simulation and solutions for:
- Thermo-hydraulic analysis of the steam generator based on the innovative meshless Finite Point Methodology (FPM) coupled with SYSTUS, ESI's multiphysics software, and PAM-FLOW, Computational Fluid Dynamics (CFD) code;
- Thermo-mechanical, Fracture mechanics analysis and regulatory checking based on SYSTUS and SYSWELD, welding and heat treatment simulation solutions;
- Shock simulation with PAM-CRASH.



Innovative analysis of the closures of the steam generator

Emergency cold water injection

3D lower assembly with primary manway and primary nozzle for in-shop hydrotest

Courtesy: COMEX NUCLEAIRE

• • •

"This notable work was carried out with a high level of quality using innovative approaches, such as SYSTUS functionalities allowing to complete 3D numerical models with as few hypotheses as possible. These studies include both complex thermo-hydraulic and thermo-mechanic analyses in order to demonstrate the equipment's full conformity with French nuclear regulation."

Dr. François Billon,
Technical Director and Director of the MHI-CxN Partnership

• • •

ESI and COMEX NUCLEAIRE signed a 3-year partnership agreement in July 2008 aiming at developing a universal services offer available worldwide.

International collaboration

ESI also participates in international projects involving several nations to meet the demands of nuclear research and development facilities worldwide.

For example, **AREVA**, **DCNS** and **ESI** are part of the **ITER project** for fusion power. ITER, currently under construction in the South of France, is a large-scale scientific project that aims to demonstrate that fusion is an energy source of the future.

Distortion analysis of the 'Vessel Advanced Technology Segment' (VATS) during electron beam welding assembly
Courtesy: DCNS, AREVA

To date, ESI's involvement in the Nuclear Power industry has been most active in Europe and Asia. ESI North America is gaining ground, attending conferences on Nuclear Power, and has recently become a member of the Nuclear Energy Institute. In addition, ESI should soon experience a shift in its Indian Energy activities due to the new policy in place, positioning Nuclear Power at the heart of India's energy development strategy.

ESI's expertise in Nuclear Power is recognized internationally for providing innovative and practical solutions to the planning, design, construction, operation, and regulation of Nuclear Power Plants and related facilities. With today's growing demand for Nuclear Power, ESI continues to reinforce its commitment to help industrial leaders face nuclear expansion and challenges.

► for more information on ESI's energy and power solutions:
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The CEA uses simulation to engineer 700-bar hydrogen storage tanks

With Simulation-Based Design, the CEA obtained outstanding results in testing the structure of composite elements for an automobile tank.

Vehicles powered by fuel cells have a high potential to reduce both energy consumption and carbon dioxide emissions. However, due to the low density of hydrogen gas, the amount of hydrogen stored onboard is limited. Acceleration of hydrogen storage technology is thus the way forward to meet the requirements of future fuel cell vehicles.

Indeed, the CEA (French Atomic Energy Commission) partnered with Ullit (high-pressure ultra light tanks manufacturer) to accelerate the engineering of onboard gas hydrogen storage technologies for automobiles, as part of the integrated "StorHy" project funded by the European Union.

Using SYSPLY, ESI's advanced software for designing, analyzing and optimizing composite material structures, the CEA managed to build a final prototype of the tank demonstrating the best results in terms of life span, sealing and safety. These criteria are required by European specifications for onboard 700-bar storage.

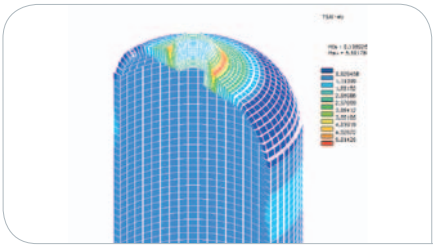
CEA engineered reservoir
Courtesy: the CEA

"Working on the StorHy project, we used SYSPLY to simulate the tank composite elements structure behavior in contact with hydrogen. SYSPLY provided us with tools to manage, through an intuitive Graphical User Interface, the full complexity of the laminate found structures", said **Stéphane Villalonga**, Research Engineer, Military Applications Division, CEA.

> "We had a very detailed 3D vision of our material and we accelerated our design process to get the right simulated prototype, avoiding material waste. SYSPLY helped us save cost and time during our research"
>
> **Stéphane Villalonga,**
> Research Engineer,
> Military Applications Division,
> CEA

As well as minimising material waste, the CEA managed to reduce the production of greenhouse gases. With the newly designed CEA tank and current technologies, a family car equipped with a 70 to 80kW PEMPC fuel cell could be self-powered for about 500 kilometres. The CEA's results represent a huge advance in research and development for the energy sector and, from an environmental perspective, bring us close to decreasing air and atmospheric pollution with alternative sources of energy.

Nowadays, the CEA is continuing research to accelerate the industrial maturity of this type of tank and facilitate its integration into a car. The next stage for ESI would be to use Virtual Performance Solution to provide the CEA with a complete endurance study for crash and explosions.



Tsai Wu criterium
Courtesy: the CEA

ABOUT CEA

The CEA is the French Atomic Energy Commission, established in 1945. A leader in research, development and innovation, the CEA has two main objectives: to become the leading technological research organization in Europe and to ensure that the nuclear deterrent remains effective in the future. The CEA is active in three main fields: Energy, Information and Health Technologies, and Defense and National Security.

www.cea.fr

► **for more information:**
www.esi-group.com/composites

SAMSUNG Electronics benefits from a Virtual Prototyping platform

Using ESI's Visual*DSS*, SAMSUNG Electronics Corporation saves up to 90% engineers' time.

The project's main objective was to automate and simplify repetitive CAE tasks for engineers and CAD designers in Samsung Electronics Corporation's (SEC) Visual Display division. This was achieved by developing and implementing an integrated Simulation-Based Design environment. The project was successfully completed, integrating different existing CAE solutions.

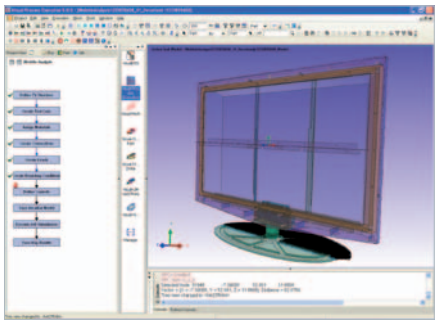
First, Visual*DSS* was implemented to manage the database for project and CAE results. The main system was fully web-enabled, thereby allowing engineers to easily access standard, automated processes and workflows. Several third-party tools' interfaces were also incorporated to the main system as well as a process template for CAE automation to facilitate SEC's most common analyses: Mold Pressure and Wobble analyses.

Technical teams supported SEC throughout the project implementation and rollout. ESI engineers and experts teamed up with CAE and IT experts from SEC to ensure the timely delivery of the complete system according to production usage specifications.

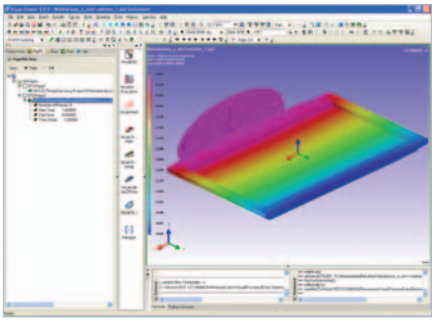
To measure the success of the project implementation, SEC tested the simulation data management system with the design of a new SAMSUNG visual display model: an LCD television screen. SEC observed a significant reduction of the loading time in the design process with 90% time reduction for the Mold Pressure analysis and almost 95% for the Wobble analysis. Along with these measurable benefits, SEC also experienced an increase in work efficiency for the visual display team who were able to verify the effect of component design changes of the entire LCD model much faster than prior to the implementation.

> "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. As we are very satisfied with ESI's support and assistance throughout the project, we are looking into implementing the simulation data management system in other divisions."
>
> **Mr. Jeong-Rho Lee,**
> Senior Engineer,
> SAMSUNG Electronics Corporation

"By integrating Vdot™ and third-party products into our Visual*DSS* solution, we were able to deliver to SEC a unified and modular Simulation-Based Design environment enabling End-to-End Virtual Prototyping", said **Mr. Donghyeob Cho**, Manager, Hankook ESI.



Workflow for Wobble Analysis



Displacement Contour for Wobble Analysis
Courtesy: SAMSUNG

ABOUT SAMSUNG ELECTRONICS CO.

SAMSUNG Electronics Corporation is SAMSUNG's flagship company, leading the global market in high-tech electronics manufacturing and digital media. SAMSUNG's Digital Media and Communications Business encompasses home appliances, mobile phones as well as MP3 players and personal computers.

www.samsung.com

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Recent integration achievements in Virtual Prototyping

Effective integration of the different Computer-Aided Engineering processes is a key success factor to achieve high performance, robust designs in time and within budget.

Three decades of technology developments have led to Simulation-Based Design. Auto makers now need rational integration of available technologies to reap the benefits of Virtual Product Development and thrive in increasingly competitive environments.

"ESI's portfolio has recently evolved to answer this new market need, offering **End-to-End Virtual Prototyping** solutions for multi-domain value chain. This major achievement is the result of a long-term strategic plan for innovation and the convergence of several key technologies; among which the development of adaptive compute models and efficient process-product simulation content management", said **Fouad El-Khaldi**, Solutions Strategy Manager, ESI Group.

Integration of explicit and implicit solutions to unify models across multiple domains

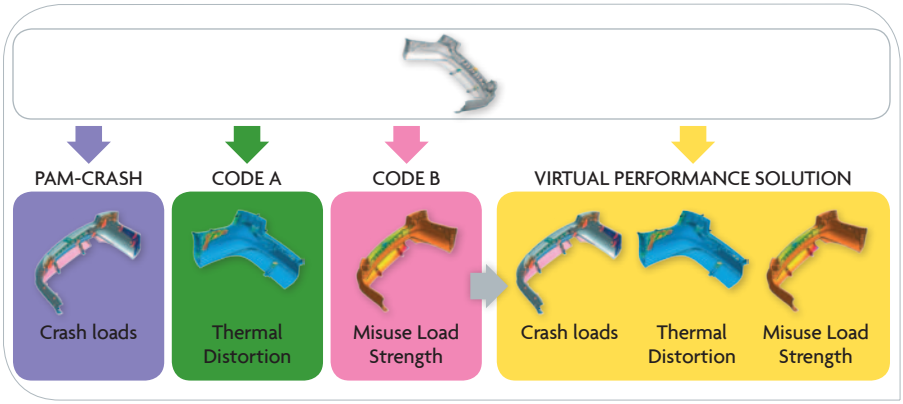
Simulation processes have historically been 'partitioned' into individual domains and still until today, it is common practice in automotive companies to use at least three different Finite Element (FE) solvers for mechanical models of the same part in different domains. This diversity has imposed significant constraints on engineering resources management, on time dedicated to virtual product development, and on direct hardware and software costs.

Thereby, the current trend is to adopt End-to-End software solutions that enable sharing a core Compute Model across multiple domains, at the level of components, products, or enterprise. With **Virtual Performance Solution**, ESI has developed the right technology to meet the need for a native single core compute model approach, requiring ten times less computing time.

Integration of simplified manufacturing models

Using realistic "as built" properties means taking into account the manufacturing and assembly processes that modify the ideal geometry of parts and the material properties. This is not a simple task. First of all, while product design analyses are ideally carried out in early design stages, manufacturing information comes late in the project cycle; and secondly manufacturing and performance simulation solutions are generally in different software environments, which are not designed to communicate.

Consequently, ESI has worked on the process-product integration and developed simplified methods to assess manufacturability issues at an early stage in the process, particularly to evaluate stamping and weld-assembly effects on virtual prototypes.



Chaining of Manufacturing and Performance Analysis based on a single core model for multiple domains
Courtesy: SEAT

Managing simulation processes and their traceability

As these are largely collaborative and distributed, it is essential for automotive projects to track model changes and properly propagate them from their different sources across the project organization.

Visual*DSS*, ESI's end-to-end decision support system, enables all teams involved in the development process to view and access the latest released CAD, design and engineering changes. The platform allows engineers to be notified when their work is impacted by such changes. These visibility and notification mechanisms have become critical as projects happen to be larger and scattered.

Smart project management will be the next integration step: engineers will receive just-in time data, tools, and instructions to accomplish their tasks as effectively as possible, while focusing on value creation through domain expertise rather than tools.

► **for more information:**
www.esi-group.com/virtual-performance
www.esi-group.com/ssi

PAM-STAMP 2G: The simulation code of choice at Superform USA

PAM-STAMP 2G and custom Superplastic Forming (SPF) modules enabled Superform to offer a highly competitive one-piece alternative to a 23-piece welded Air-stair.

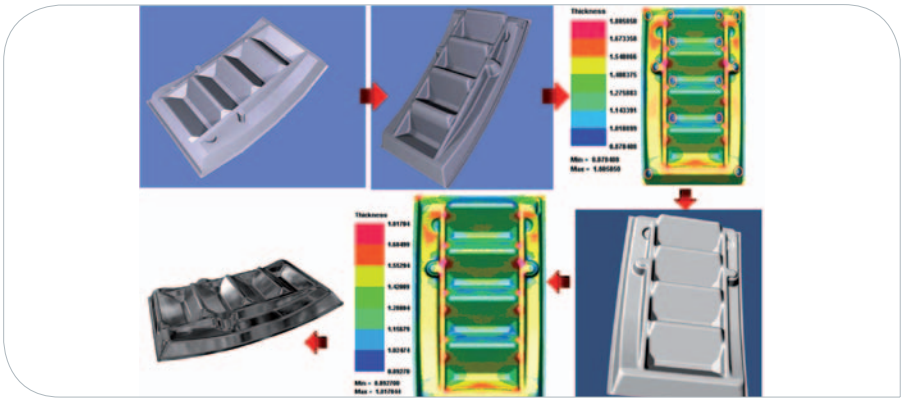
At Superform, making complicated shapes is nothing new, so the introduction of Finite Element (FE) modelling could not fully credited with the ability to take on challenging geometries and successfully 'Superforming' them. What FE modelling does allow is a high level of confidence when the time comes to create the actual form tool, and is invaluable in predicting local thickness variations to support the customer's design requirements.

The simulation code of choice at Superform is PAM-STAMP 2G, ESI's sheet metal forming software with unique modules tailor made for the process.

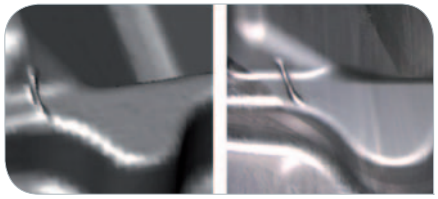
Finite element modelling was used to iteratively optimize the design of a welded Air-stair (a stairway of four steps integrated to the door of a small aircraft), to make it suitable for Superforming and to 'virtually' prove the design's feasibility.

To optimize the thickness distribution, a novel two-stage forming process was used. The heated flat sheet was superplastically pre-stretched in certain regions before being draped over the tool surface to create the final shape; all in a single pressure cycle. Pre-stretching was critical; if over-stretched, simulation predicted a wrinkle.

> "PAM-STAMP 2G has transformed the speed with which we can develop thickness predictions and forming cycles. While we deploy our intuition, experience and creativity to design the tools, PAM-STAMP 2G lets us test the feasibility of our ideas without cutting metal."
>
> **A.J. Barnes,**
> Technical Vice President,
> Superform USA



Different stages in the design iteration process



Remarkable correlation between simulated (left) and actual (right) wrinkle

Thanks to the synergistic capability of Superforming combined with modelling, Superform USA was able to replace a twenty-three piece welded aluminum assembly with a lighter, stiffer and cost effective one-piece design.

"PAM-STAMP 2G's user friendly interface makes FE modelling much faster compared to other codes. It is now an integral part of our technical armory and used almost every day", said **Hari Raman**, Process Engineer, Superform USA.

ABOUT SUPERFORM USA

Part of the Luxfer Group, Superform USA and its sister company Superform Aluminium are the world's leading suppliers of aluminum, magnesium and titanium Superformed components, supplying parts to various industries including Aerospace, Automotive, Truck, Rail, Medical Systems and Architecture. Superform has two manufacturing sites, in the UK and USA, and offers forming solutions for a range of aluminum, magnesium and titanium alloys for a variety of applications.

www.superformusa.com

► **for more information:**
www.esi-group.com/metal-forming

Panoz Auto Development Company selects ESI as design partner

Advanced simulation solutions will allow Panoz to continue delivering new creative design at a much faster pace.

Design has never been as vital as today to an auto maker's success. Much of the reason for this is the similarity in quality between different brands and the general high quality of new cars. But what is not so broadly recognized, in addition to the growing importance of design as a differentiator, is the significant growth in volume of design output. Panoz Auto Development Company is counted among those auto makers which understand the latter.

Panoz raced in the American Le Mans Series

Panoz Auto Development Company is already well-known for its use of new technology and fresh designs which has made it a leader in the automotive industry since 1989. The company recently selected ESI as a design partner for its sports car development program in the belief that ESI's advanced simulation solutions will allow the company to continue delivering new and creative designs at a much faster pace. Indeed, ESI offers today End-to-End Virtual Prototyping, enabling industry leaders to get the virtual job done 'at the right time'.

The collaboration is a win-win situation as it will also benefit ESI by reinforcing its presence in the Motor Sports industry. "Our partnership with Panoz Auto Development is a great opportunity for us to demonstrate all that ESI has to offer," stated **Michael Bloor**, COO, ESI North America. "Panoz has a history of being innovative, creative, and not being afraid of trying something new, which are the traits that have made ESI and our customers successful throughout the years. We look forward to being part of this winning team."

> "ESI is known for its cutting edge technology and being a leader in Simulation-Based Design. ESI provides a comprehensive solution for vehicle development, which is why I wanted to have them as part of our team. This is an opportunity for us to work side by side with ESI, learn from its experts, use its tools, and deliver an even better product to the market faster."
>
> Daniel Panoz,
> President,
> Panoz Auto Development Company

ABOUT PANOZ AUTO DEVELOPMENT COMPANY

Panoz Auto Development is an American manufacturer of high-performance automobiles founded in 1989 and has evolved into one of the premier automobile manufacturing companies in the world. Panoz products include the Panoz Esperante and the Panoz GTS race car. The company holds several diverse affiliates such as Panoz Motor Sports Group, ALMS, and IMSA; owns several companies focused on competition and three of North America's most historic racetracks, which are Road Atlanta, Sebring International Raceway and Mosport Park.

www.panozauto.com.

JEGAN uses ESI's Casting Simulation Suite to optimize its HPDC process

The simulation of foundry processes reduces the number of physical prototypes.

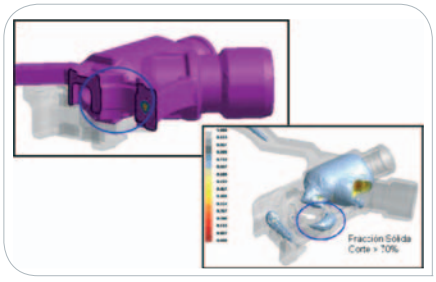
To remain competitive in the global marketplace, components manufacturers are constantly being asked to focus on Research and Development to increase efficiency while lowering production costs and shortening delivery times. JEGAN, one of the main suppliers of Zamak High Pressure Die Casting (HPDC) components for the European and American automotive industry, as well as for the electronics, domestic appliance and construction equipment industries, is thus implementing new technologies to enhance its competitiveness.

In JEGAN's production facility, the various stages of casting production are integrated with a range of alternative surface finishing processes to produce finished castings components and assemblies. In its effort to allocate resources more efficiently for a shorter time to market and to reach product excellence, JEGAN uses ProCAST and QuikCAST, ESI's Casting Simulation Suite. The suite offers a comprehensive set of dedicated applications for the foundry industry to improve casting yield and quality.

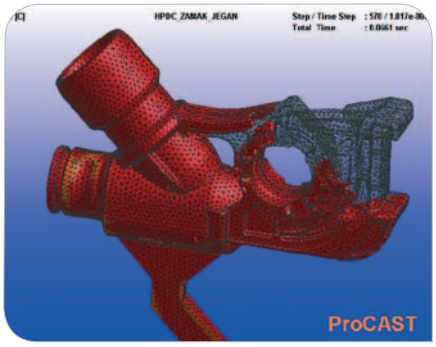
Indeed, while QuikCAST focuses on the basics of casting such as filling, solidification and porosity prediction, ProCAST, based on Finite Element technology, is able to predict deformations and residual stresses, microstructure, grain structures and also address more specific processes such as semi-solid modeling, core blowing, centrifugal casting, lost foam and continuous casting. "ESI's casting set of applications assists us in simulating foundry processes, and thus providing answers to questions that arise in the initial phase of the projects. It not only allows us to solve filling or porosity problems, but also helps us in taking decisions on the design of the filling systems, vents, and overflows," said **Bart Goes**, Project Coordinator, JEGAN.

> "ProCAST and QuikCAST give us the ability to see the injection as if we were inside the mold. With ESI's Casting Simulation Suite, we actually reduce the number of physical prototypes, which means significant cost and time saving."
>
> Bart Goes,
> Project Director,
> JEGAN

JEGAN is supported by ANÁLISIS Y SIMULACIÓN, ESI's trusted engineering partner for the sale, support and training of ProCAST and QuikCAST in Spain and Portugal. ANÁLISIS Y SIMULACIÓN has over 17 years of experience in the implantation of solutions inside the foundry industry, including design and simulation of all process types (gravity, LPDC and HPDC) and employs over 60 high-level specialists covering different engineering areas.



Shrinkage porosity analysis during solidification
Shrinkage porosity result (left)
Liquid pockets formation (right)



Temperature contour during filling

ABOUT JEGAN

JEGAN began its activity in 1972 in the field of parts produced by Pressure Die Casting and utilize today the latest technology in Hot Chamber die casting machines. JEGAN is headquartered in Itziar, Spain and employs 60 people.

www.jegan.es

► for more information:
www.analisisysimulacion.com
www.esi-group.com/casting

Swerea SWECAST AB uses ProCAST to develop thin-walled steel castings

The component wall thickness was decreased from 6mm to 3.5mm, the casting weight reduced significantly and the total production cost cut down by 30%.

In most cases, thin-walled castings involve unnecessary waste and difficulty meeting dimension tolerances. Indeed, as know-how in thin-walled castings is limited, designers frequently incorporate safety coefficients on thicknesses that are needlessly large, and drive away from developing lighter designs.

Can thin-walled castings even be manufactured?

A project for the "production of thin-walled castings for lighter designs" was carried out by Swerea SWECAST and funded by the Swedish government with the main goal:

- to create conditions to design and produce steel and aluminum thin-walled castings
- to identify how simulation can be used to facilitate the production of thin-walled castings.

ProcAST was first used to compare the results of trial runs on prototype castings and to study how process parameters affect the filling process. This experience was later applied to real casting parts.

The experimental scope studied the flow of molten metal in a thin-walled steel casting using simulation. A prototype casting supplied by Smålands Stålgjuteri AB, participant in the project, was considered with the following characteristics: Cylindrical pipe 400 mm long, with a diameter of 100 mm and a wall thickness of 3 mm (Fig. 1).

Trial Runs

To manufacture this prototype casting, traditional sand and shell molds were used supplied by Smålands Stålgjuteri AB. The filling system developed for the purpose of the study was

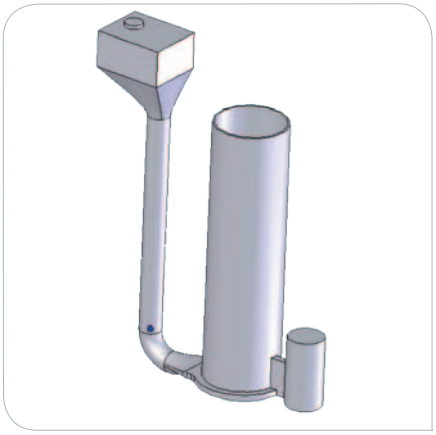


Fig. 1 - Thin walled steel prototype casting.

a pressurized system with a pouring basin. Swerea SWECAST's primary interest was to study the metal behavior inside these thin-walled molds during filling and understand how the melt solidifies thus leading to cold flows. A number of trials was carried out with varying process parameters like pouring temperature and pouring rate, including filling of only partial mold cavity.

The results from these trials acted as a good library. Simulations were done using ProCAST to compare each of these trials.

Parameters

There are many parameters that influence the mold-filling process. The extent to which these parameters are allowed to be altered depends on the simulation program that is used. The following five parameters which were believed to have the greatest effect on results were chosen for study during the comparison:

1. Wall friction,
2. Viscosity in mushy zone,
3. Heat transfer coefficient,
4. Mesh size,
5. Surface tension.

The objectives were to study the extent to which the various parameters affected the filling process, and to achieve the closest possible agreement between simulation and reality.

It turned out that all of the selected parameters affected the results to a greater or lesser degree. The strongest factors were wall friction, heat transfer coefficient, and viscosity in the mushy zone.

Wall friction is a parameter used in the casting simulation software for effective treatment of liquid metal along the mold walls. It varies based on the alloy and the mold material. Heat transfer varies in function of temperature gradient, and it is a key factor, especially for thin-walled castings, to rightly replicate the thermal characteristics during flow. A temperature dependent viscosity in the mushy zone completes a very good model setup.

Mesh size is of no great significance, provided that the model is properly represented and follows the original geometry. Surface tension is a complex phenomenon to simulate, and could possibly consume important computation time. With time being a constraint, it was finally not considered for this study. Also surface tension is more important in aluminum than steel castings.

Special attention was also given for the filling to achieve the right pressure head, flow rate and choke.

The outcome of this was a good correlation between simulation and practical tests for the prototype casting (Fig. 2, Fig. 3).

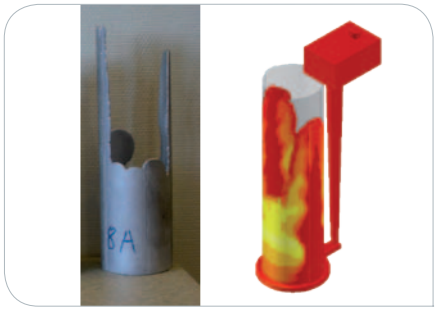


Fig. 2 - Trial run of partially filled prototype casting vs. Simulation results shows favorable correlation.

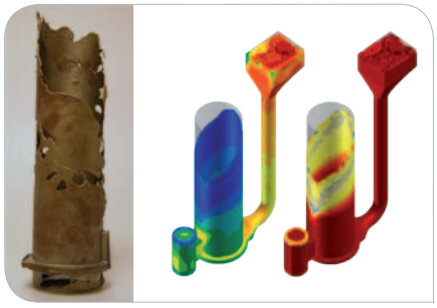


Fig. 3 - Trial run of partially filled prototype casting vs. Simulation results showing favorable correlation (using a different set of parameters than Fig. 2)

Physical try-out on industrial component

Finally, the optimized process parameters obtained from these experiments were used to develop a thin-walled industrial steel part. Simulation was first carried out to develop an optimal filling and a feeding system on this new modified product design. The process parameters were optimized too for robustness. Figure 4 shows a thin shell-formed component. The results, (Fig. 5), provided the confidence needed to go ahead with the redesign and cast industrial steel parts as low as 3.5 mm in wall thickness. The project has resulted in a viable method for developing and verifying materials data that can be used to simulate and produce thin-walled castings. Given correct information and suitable software, this has made it possible to predict as-cast molten metal behavior inside the mold cavities.

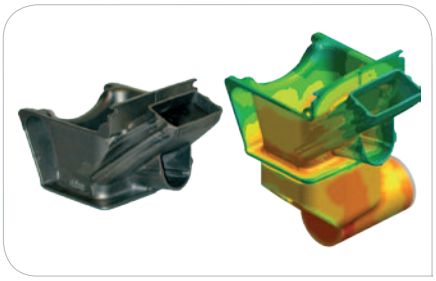


Fig. 4 - Thin-walled industrial steel parts (left) & simulated parts with the filling system (right).

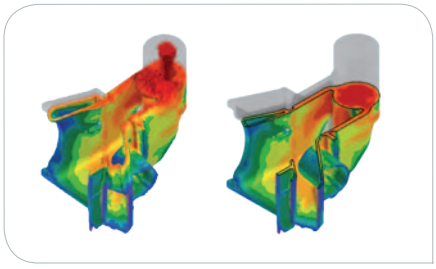
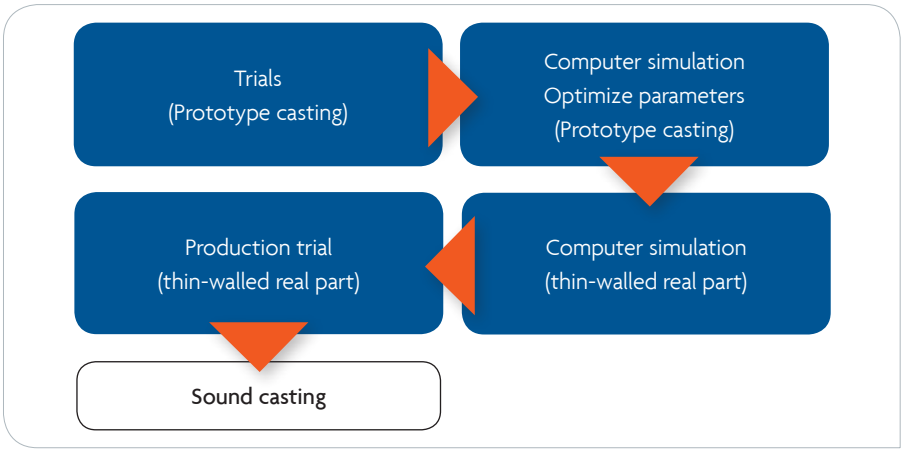


Fig. 5 - Simulation results of thin walled industrial steel part.



Summarized workflow

> "During this project, we used ProCAST software and that gave us the possibility to simulate and optimize thin-walled steel castings. ProCAST is a very competent software, when it comes to simulate thin-walled geometries."
>
> **Per Ytterell,**
> Managing Director,
> Smålands Stålgjuteri AB, Sweden

ABOUT SWEREA SWECAST AB

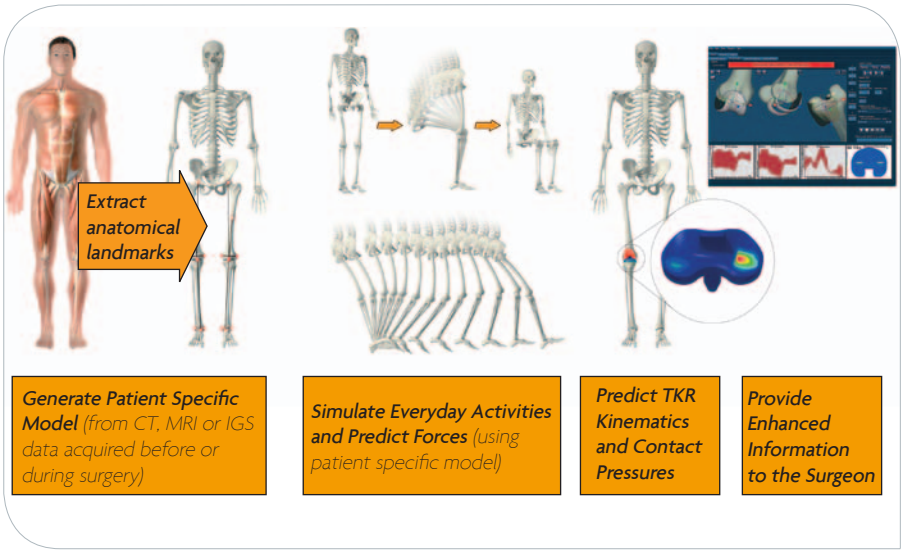
Swerea SWECAST, Swedish Institute of Casting Technolgy, is the R&D and training institute of the Swedish casting industry. Swerea SWECAST and Jönköping Technical University maintain a close cooperation within CIC, Casting Innovation Centre. CIC constitutes the largest single group of researchers in Europe working with foundry technology and related topics.

www.swereaswecast.se/eng/index.htm

► **for more information:**
www.esi-group.com/casting

ESI participates in the DESSOS consortium to assess prosthetic joint implantation

The 'Decision Support Software for Orthopaedic Surgery' (DESSOS) consortium aims at developing and bringing to the market a predictive technology for surgeons, involved in joint replacement procedures, to pre- and intra-operatively assess the optimal prosthetic joint implantation configuration and position. This will maximise the effectiveness of the procedure, allowing the reduction of surgeon variability, and thereby improving functional performance.



Basic concept of the project

The project combines both fundamental and applied research to support the development of knowledge-based software capable of providing surgeons with the necessary recommendations based on patient-specific anatomical data.

Generic models of the lower limb, an inverse musculoskeletal (MS) model and a corresponding Finite Element (FE) model, are first morphed based on key anatomical landmark data such as centre of the femoral head, centre of the ankle etc. collected prior to CAT scans or MRI's or at the time of surgery (Computer-Aided Surgery).

The derived patient-specific MS model is then used to calculate the appropriate muscle and joint contact forces. In order to drive the MS model, global lower limb kinematics are interpolated from a pre-existing kinematics library.

Once the MS model forces have been obtained, they are applied to the corresponding FE model in order to calculate the kinematics of the knee joint replacement and the associated polyethylene stresses. Probabilistic techniques are used to predict an envelope of performance rather than a single deterministic solution.

These results can finally be provided to the surgeon to enhance his/her decision making process. Alternatively, in combination with optimization techniques, they can be used from the start thus improving the initial plan.

The DeSSOS consortium counts several academic members such as Charité, University of Leiden Medical Centre, University of Zaragoza, Zuse Institute Berlin, and University of Southampton as the Project Coordinator. It also affiliates industrial partners such as ESI Group, Pera Innovation, DePuy International Ltd, and Finsbury Ltd for the development phase.

ESI's Role in the DeSSOS project

ESI's expertise, in terms of FE Analysis (FEA) and computational engineering skills, provides DeSSOS with the Information and Communications Technologies (ICT) capable of modelling this complex problematic. The technical support of the other partners is essential in the FEA solver, which is a core part of the DeSSOS consortium's development phase.

The work to be done as part of the project includes tasks such as the implementation of complex ligament modelling, specific ligament material and Zaragoza's Natural Element meshless Method (NEM), as well as optimization development.

► **for more information:**
www.esi-group.com/dessos

ESI and the PT-Grid project

SPONSORED BY THE

ESI GmbH supports the PT-Grid project to further develop Plasma Modeling and Simulation.

Plasma Technology (PT) is considered one of the most important modern technologies for applications in the semiconductor industry, light source development, welding technology, and in the surface treatment of glass, plastics and metals.

ESI GmbH, ESI's German subsidiary, along with several other industrial and academic partners, participates in the PT-Grid project to support Plasma modeling and simulation, using its ACE+ Suite of Computational Fluid Dynamics (CFD) and Multiphysics simulation software. Plasma modeling and simulation are indeed of extreme importance for the further development of plasma technology, as the use of grid resources offers considerable potential for user-friendly fundamental research and contract research.

Dedicated models to describe certain plasma phenomena and properties, provided by partners inside the PT-Grid initiative, will be coupled with CFD-ACE+ to provide an advanced online available consulting tool for plasma applications to industrial customers. On the basis of several thousand CPU's inside the D-Grid computer infrastructure, users won't be held back by hardware issues and will be able to run as many serial or parallel computations as they need for their applications.

With the integration of CFD-ACE+ into grid-computing environments, ESI will take a leading part in the development of an innovative platform for most sophisticated plasma simulations.

> "As coordinator of the PT-Grid initiative and direct development partner within a subproject, the INP Greifswald appreciates the participation of ESI GmbH as a representative of a commercial software provider and is looking forward to the partnership in the development of an industry-oriented plasma consulting tool based on ESI's CFD-ACE+ software and our dedicated knowledge about plasma chemistry and modeling"
>
> Thomas Harder,
> Physicist,
> INP Greifswald

"The new online consulting tool and the adaptation of CFD-ACE+ to grid computing will extend the clientele for ESI's CFD software and will play an important part in adapting further ESI software solutions for grid computing", said **Wolfgang Ottow**, CFD and Multiphysics consulting engineer, ESI GmbH. "ESI customers will benefit from the collaboration with top experts from research associations such as Leibniz Institute for Plasma Science and Technology in Greifswald and universities such as the Institute of Theoretical Electrical Engineering in Bochum in the field of plasma research and modeling."

ABOUT PT-GRID

The PT-Grid is a 3-year joint initiative funded by the German Federal Ministry of Education and Research (BMBF). The main objective of the PT-Grid is to provide small and medium-sized enterprises the access to complex plasma technological simulations on the basis of the D-Grid computer infrastructure, which provides almost infinite computing and storage capacity; flexibility, adaptability and automation through dynamic and concerted interoperation of networked resources.

www.pt-grid.de
www.d-grid.de

► for more information:
www.esi-group.com/fluid-dynamics

Virtual Seat Prototyping with PAM-COMFORT

Computer-Aided-Engineering (CAE) capabilities have long been used to predict the behavior of the seat structure under static and dynamic loading in the field of passive safety and crash analysis. As seats have recently become a key component in the transportation market segment, new capabilities have been developed to comply with more and more demanding and sometimes conflicting requirements, related to occupant safety regulations, comfort, styling, weight and size reduction, durability, vibrations, electronic equipment and sensors, trimming process, and ergonomics.

Simulation-based design allows the prediction of seat comfort performance at a very early stage in the seat design process, to get the seat right the first time. Indeed, thanks to Virtual Seat Prototyping, only virtual seats that pass the series of virtual tests are physically manufactured and tested. Benefits are consequently significant: drastical cost reduction and time-saving, improved seat quality and performance, and greater synergies within a team as well as suppliers and customers.

PAM-COMFORT: original advanced solution for virtual seat prototyping

PAM-COMFORT addresses market demands by offering a scalable, innovative and customized solution dedicated to the virtual manufacturing and virtual testing (static and dynamic) of the soft parts of the seat through chained simulations. The use of chained simulations and detailed physics, such as deformations and non-linear materials, are required to accurately describe the behavior of the seat under numerous loading conditions and to allow design variations.

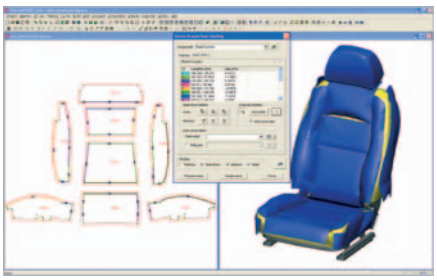
PAM-COMFORT includes a graphical user interface dedicated to seat model building and performance analysis, as well as finite element solvers for manufacturing, static and vibrations. It embraces major enhancements in seat design, with the prediction of seat manufacturing effects, comfort-related mechanical parameters, and the seat transfer function. As PAM-COMFORT also draws on ESI's dummies and human models' library with positioning and scaling automated tools, the solution can be chained to PAM-CRASH to improve the accuracy and predictiveness of crash simulations.

Industry leader Renault has recently validated the modeling precision and robustness of PAM-COMFORT. "This simulation input can really be considered as an "ultra realistic" model, since it allows the simulation of the whole complex mechanical phenomena of the seat, the non-linearity of the materials, the large displacements of the cushion foam and springs, as well as the effect of the cover trimming", declared Mr **Jérôme Makala**, Head of Comfort and Safety Research Department, Renault Group.

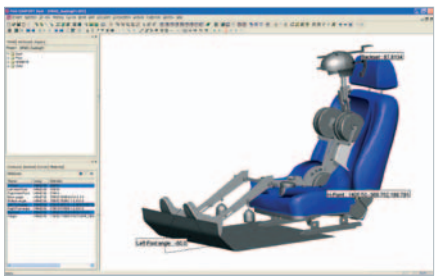
The new release of PAM-COMFORT underlines the distinct effort of ESI's comfort team in developing the solution, and delivering unrivalled capabilities for comfort testing to improve seat quality and performance.

> "The developed models and methodology allow the computation of predictive results, using only physical parameters and without any tuning of filtering. This good correlation between simulations and tests confirms the ability to assess the riding seat comfort in a full virtual process."
>
> **Jérôme Makala,**
> Head of Comfort and Safety Research Department, Renault Group

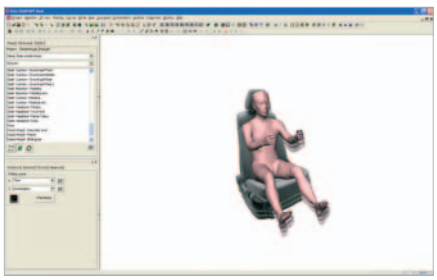
▶ **for more information:**
www.esi-group.com/comfort



1 - Seat manufacturing with trimming process



2 - Occupant posture and comfort



3 - Occupied seat transmissibility

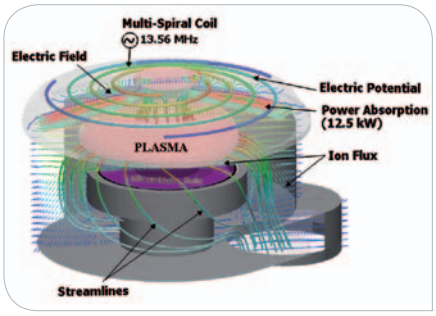
ACE+ Suite Version 2009.2 drives innovation at the limits of physics

ESI's ACE+ Suite allows the acceleration of the product development process by accurately simulating multiple physics in a single solution, thereby making the suite a powerful asset for customers.

"The latest release of the ACE+ Suite includes many new features and developments designed to further improve our value proposition of high productivity coupled with highly accurate physics for the applications we have targeted", said **Joseph Strelow**, Director of Virtual Environment Solutions at ESI. "This release benefits significantly from the expansion of our global CFD services activity which is becoming the driving force behind this application-focused approach to development".

Indeed, with the objective of increasing usability, robustness and accuracy, Version 2009.2 includes significant updates, which benefit select industries such as:

- **Automotive**, with the implementation of a new advanced turbulence model and the inclusion of automated boundary layer meshing in CFD-VisCART, improving the speed and accuracy for large aerodynamic simulations;
- **Aeropsace**, with the ability to allow thermal coupling between CFD-FASTRAN and CFD-ACE+ to simulate high-mach re-entry heating of spacecraft;
- **Fuel Cell**, with the refining of CFD-ACE+ multi-phase and porous media capability allowing a more accurate simulation of complex electrochemical energy conversion devices' performance;
- and **Semiconductor**, with the improvement of its manufacturing process simulation toolset for analyzing capacitive coupled plasma (CCP).



CFD-ACE+ semiconductor process simulations are used to optimize etch rates and their uniformity at the wafer.

► **for more information:**
www.esi-group.com/fluid-dynamics

welding & heat treatment

Time and cost reduction with Welding Simulation Suite Version 2009

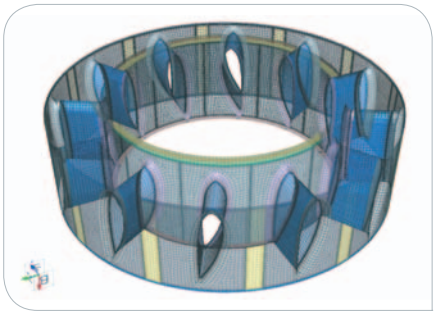
Dedicated to all engineers who manage the welding assembly of large and complex welded designs, ESI's Welding Simulation Suite includes Weld Planner and PAM-ASSEMBLY with main objective to significantly reduce time and cost to arrive at the bill of material and at a feasible process design.

In the early design and process evaluation phase, Weld Planner is first used to quickly evaluate numbers and positions of welds, clamping conditions, and design. While its dedicated GUI, ease of use and simulation speed meet the requirements of product and process design, Weld Planner enables engineers to find the best possible design in the shortest possible time range.

PAM-ASSEMBLY is then used to validate the preliminary decisions. The complete material physics are computed in local models, thus feeding the global model which is used to compute the overall distortion. Therefore, the computational effort is reduced from months to minutes, without losing any precision.

"Rolls Royce found Weld Planner impressive due to the time taken to perform the analysis, the quality of results produced and the flexibility it offered in the early design cycle", said **Scott Wood**, CEng MIMechE – Mechanical Engineer - Advanced Engineering, Transmissions, Structures & Drives, Rolls-Royce. "Weld Planner enabled an investigation of the fabrication route to be integrated with the thermo-mechanical design stages of the assembly."

ESI's Welding Distortion Engineering Suite version 2009 embedment in a complete CAE environment makes it the ideal design evaluation tool for welding industrials.



55,500 elements, 64 welds, 121 clamps. Courtesy: Rolls-Royce

► **for more information:**
www.esi-group.com/welding

Better results with Sheet Metal Forming Simulation Suite Version 2009

The latest release of PAM-STAMP 2G and PAM-TUBE 2G offers a single software suite for all metal forming needs: the Sheet Metal Forming Simulation Suite.

Version 2009 of **PAM-STAMP 2G** continues to address the evolving market's demands with a score of new features and improvements, providing stamping-oriented tools for Automotive, Aerospace, and general Sheet Metal Forming applications. Indeed, beyond revealing several enhanced functionalities including springback, multi-layer material, and new post-process capabilities, a number of new process simulations and optimizations have been added to PAM-STAMP 2G's latest release:

The fully integrated Sheet Metal Forming Simulation Suite incorporating PAM-STAMP 2G and PAM-TUBE 2G

- Rollhemming, enabling the simulation of the real robotic roller movement
- Superplastic forming
- Buckling analysis for stamping process instability analysis
- Blank outline optimization
- Trim line optimization
- Die compensation, providing high surface quality results.

PAM-TUBE 2G Version 2009, streamlining the full forming process, also hosts a variety of enhancements based on user feedback from the last version, among which:

- Design of the pre-forming tools, providing the user with a more complete end-to-end solution for complex hydroforming parts
- Functionalities improvements and simplifications in tubemaker, such as a true one-click solution for the addendum creation
- Interactive creation of tailored tube
- Automated bending setup to simulate even multi-stage processes
- Support for 3 new variations of bending: stretch-, press- and freeform bending.

Hence, the new release offers an accurate and realistic modeling tool for tube forming simulation, which includes an intuitive pre-processing module, leading the user through process design in order to ensure better forming results.

► **for more information:**
www.esi-group.com/metal-forming

simulation systems integration

Visual-Environment 5.5 release

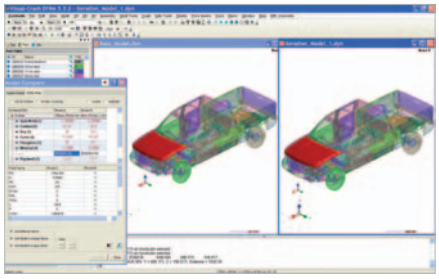
In its endeavor to provide customers with a platform that enables End-to-End Virtual Prototyping, ESI has reached another milestone with the release of Visual-Environment 5.5.

Visual-Environment integrates several different applications which are constantly updated to respond to the needs of various industries. Visual-Environment 5.5 particularly meets the requirements of automotive engineers.

First of all, the new release of Visual-Crash PAM offers a Rapid Model Checker, an integrated process to ensure an error-free model setup and hassle-free solver run. Also included is a Barrier Positioning tool enabling the compliance with various safety regulations such as FMVSS and IIHS. The highlight of this release is its Model Comparison tool, which is also offered in Visual-Crash DYNA.

"DOW uses Visual-Crash DYNA to develop and deliver innovative solutions," said **Mansour Mirdamadi**, Senior Engineering Leader, Dow Automotive Systems. "The model browser and comparison tool in the latest release 5.5 allows our engineers to obtain multiple versions of LS-DYNA input decks, identifying changes made to the full vehicle model rapidly, thereby helping us in delivering optimized products to our customers."

Other applications in Visual-Environment have been updated such as Visual-Safe, enabling airbag folding and positioning anywhere in the car environment; Visual-Viewer, in which animation speed has been re-organized to meet the ever increasing performance targets; and Visual-Composites, allowing the integration of manufacturing effects by introducing the layer concept, thus responding to OEMs increasing use of composite materials.



Comparing two iterations with Model Compare Courtesy: National Crash Analysis Center

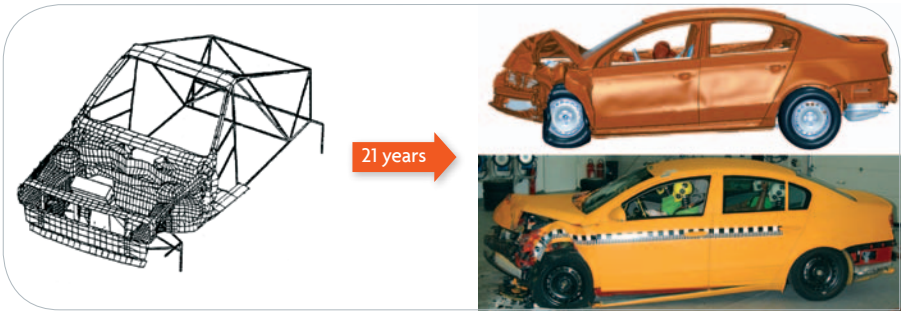
► **for more information:**
www.esi-group.com/ssi

ESI GmbH celebrates its 30th anniversary

ESI's German subsidiary, first subsidiary established outside of France, was founded six years after ESI's creation in 1973 to undertake consulting studies for the nuclear, civil and military industries in Germany.

During the mid 1980's, the military and nuclear activities declined and a great effort was made to enter the booming German car market; thereby adding to ESI's customer portfolio such prestigious names as Volkswagen Group, BMW Group and Audi AG. Indeed, ESI in collaboration with Volkswagen Group developed its first car crash simulation methodology in 1986. From then on, ESI GmbH played a major role in industrializing crashworthiness simulation worldwide; helping transfer know-how to the local representatives in America and Asia as the company grew.

"I count myself very fortunate to have seen and contributed to the development and industrialization of products such as PAM-CRASH which became a commercial success, and also helped make cars and transportation genuinely safer. Even after nearly 25 years, it still is exciting to witness the innovative developments that continue to go into those products", said **Dr. Anthony Pickett**, Scientific Director at ESI GmbH.



The first full car crash simulation model: The VW Polo – 1985 (left)
Frontal impact car model simulation (EuroNCAP certification) - 2006: Courtesy of Volkswagen AG (right)

ESI GmbH has steadily grown over the years and now counts 3 offices, in Eschborn, Munich, and Essen with a workforce of 52 employees.

"We have built strong relationships with our customers over the past 30 years and those have helped ESI GmbH introduce leading technology to the market," declared **Haluk Menderes**, ESI GmbH Managing Director. "We are today well equipped to be a trusted advisor and partner enabling End-to-End Virtual Prototyping so that our customers can get it right at the right time".

Join ESI online

Want to follow-up on latest developments and advances in Simulation-Based Design?
Blog and Tweet with ESI.

ESI presents our official corporate blog, providing the Simulation community with a direct interface to share experiences and successes in Virtual Prototyping.

Two of the latest blog posts feature some of our customers' recent successes:

- DSB EURO boosts its productivity with ProCAST and support from MECAS ESI.
- NAMTEC adds WELD PLANNER to its suite of simulation software for rapid analysis of welded assemblies.

Another recent blog post is the Virtual Performance Solution video demonstrating how to optimize our customers' product performance with Simulation-Based Design.

▶ **to interact directly on those stories, simply post your comments on ESI Blog:**
http://talk.esi-group.com

▶ **follow ESI on twitter :**
www.twitter.com/ESIgroup

Save the date!

Jan 19-21, 2010	EUROGUSS 2010	8th International Trade Fair for Die Casting: Technology, Processes, Products	Nürnberg, Germany
Feb 8-12, 2010	Innovative Seating Conference 2010	5th Annual Congress on Innovative Seating, sponsored by ESI Group	Frankfurt, Germany
Mar 01-05, 2010	Getting Started with Virtual Performance Solution	Learn to perform static, dynamic analysis and dynamic impact simulations	Madrid, Spain
Mar 22, 2010	Visual-Mesh for 1D, 2D and 3D Element Meshing	Training on Visual-Mesh, the complete meshing tool which supports CAD Import, 1D, 2D and 3D meshing and editing features.	Bangalore, India
Mar 22-23, 2010	Fracture Seminar	Expert course on fracture modeling and its applications to industrial processes.	Nürnberg, Germany
Apr 12-16, 2010	Tube Dûsseldorf	International Trade Fair for Tube and Pipe	Düsseldorf, Germany
Apr 13-15, 2010	JEC Composites 2010	JEC Composites Show: the biggest composites exhibition in Europe	Paris, France
Apr 13-15, 2010	SAE 2010 World Congress	SAE yearly Automotive Technology event	Detroit, Michigan, USA
Apr 25-30, 2010	Solidification Course	Dedicated to metallurgists and foundry engineers, this course is on the application of solidification theories to industrial casting processes.	Les Diablerets, Switzerland
May 13-14, 2010	Occupant safety simulation with PAM SAFE	Training on practical applications of PAM-SAFE software to simulate the effect of restraint systems and occupants in a crashed vehicle.	Plzen, Czech Republic
May 19-20, 2010	ESI Global Forum 2010	The 1st Global Conference and Exhibition on Virtual Prototyping	Munich, Germany
May 30 - Jun 04, 2010	FISITA 2010 World Automotive Congress	33rd FISITA Congress on Automobiles and Sustainable Mobility	Budapest, Hungary

20th Anniversary of PUCA

The 20th anniversary of ESI's Asian users' conference and exhibition on Simulation-Based Design and Virtual Prototyping, took place on October 29-30, 2009 in Tokyo, Japan. To celebrate, ESI offered free attendance to customers.

The theme of the conference, "Get it Right at the Right Time", addressed not only the supporting digital simulation technology but also the methodology and processes needed to get the virtual job done 'at the right time'. "ESI promotes Innovation with Simulation-Based Design. What distinguishes ESI from other MCAE vendors is our overarching vision where simulation starts immediately in the preliminary design phase, well before the first physical prototype", reported **Isao Yumoto**, Managing Director of Nihon ESI. "That vision is only achievable if it is possible to build the virtual prototype that properly accounts for how a product – such as a car, cell phone, or aircraft – is actually manufactured and then tested virtually in a realistic environment. This is where ESI excels", he continued.

The conference brought together experts, senior practitioners and decision-makers representing the automotive, energy, aerospace, electronics and other manufacturing industries, as well as prestigious universities.

Customers delivered keynote speeches during the plenary session of the conference (Nissan Motor Co., Samsung Electronics Co. Ltd. and SEAT.S.A) and several other contributions came from Mitsubishi Motors Co., Honda Motor Co., Nippon Steel Co., Mazda Motor Co., Hitachi Co., Mizuno Co., Japan Atomic Energy Agency, among others.

"PUCA 2009 is our customers' conference for Simulation-Based Design, and we are happy to celebrate its 20th anniversary," said Dr. **Alain de Rouvray**, Chairman and CEO of ESI Group. "This demonstrates ESI's long experience and also our company's commitment to listen to our customers' issues and challenges, to examine ways to further enhance software solutions and advanced engineering services worldwide, to nurture our global partnerships, and in general to accelerate the evolution towards End-to-End Virtual Prototyping," he concluded.

ESI's next user conference and exhibition on Virtual Prototyping will take place on May 19-20, 2010 in Munich, Germany and will attract visitors from across the world.

► **for more information:**
www.esi-group.com/globalforum2010

Financial news

2009/2010 First half sales: €31.2M

ESI Group's 2009/10 first half sales totalled 31.2 million euros, up + 6.4 in actual terms compared to the previous year.

Fine resistance of the Licensing recurrent installed base

Licence sales for the first half came to 20.7 million euros, down -2.7%. Nevertheless, the rate of repeat business for Licences remained high over the semester, at 80% versus 81% for the first half of 2008, with the installed base up +6.4%. In particular, ESI Group has observed a continuity of orders from its main clients, including the automotive sector. Nevertheless, in this difficult economic situation, some clients such as those involved in steel production have been forced to slow down or even to temporarily stop their activity and therefore postpone their licence renewals.

Services: 34% of first half activity

The product mix has moved significantly towards Services. Sales from Services totalled 10.5 million euros, up +30.9% in actual terms and +27.4% by volume.

Mindware contribution to America

While Asia remained stable at 40% and Europe accounted for 37% of half-year sales, America benefited from the integration of Mindware and increased its contribution to 23%, versus 14% the previous year.

Outlook

"First-half figures show that our activity is resisting well, despite the effect that the negative economic situation is having on some of our clients. Control of our cost structure should limit the impact on our profitability. The maintaining of the high level of our Licences repeat business reflects the persistent confidence that our clients, notably in the automotive industry, have in our innovative solutions. Lastly, the Mindware integration is proceeding in accordance with our execution plan," concluded **Alain de Rouvray**, ESI Group's Chairman and CEO.

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