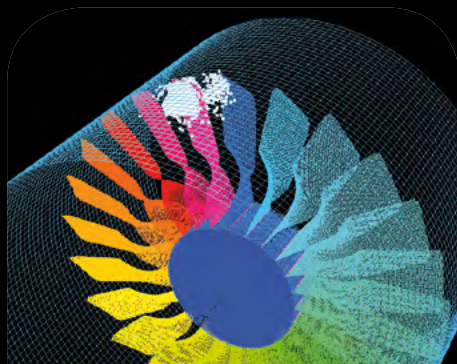
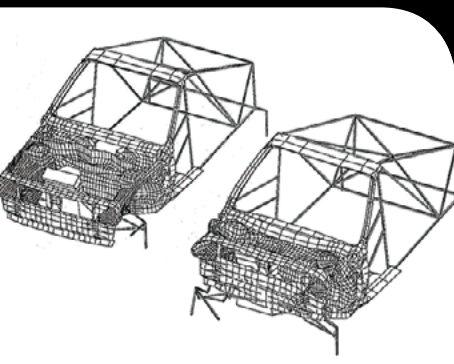


special report

Celebrating 40 years of Industrial Innovation

1973 - 2013

40 YEARS OF INNOVATION



Hyundai Motor Company develops
a dummy model to virtually test seat
vibrations with ESI's Virtual Seat Solution

Joint Venture Contract
signed with AVIC-BIAM
in China

Finite Element Models

an important piece of the puzzle

www.humaneticsatd.com



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Executive Editor: Amy de Rouvray
Editor-in-Chief: Celine Gallerne - celine.gallerne@esi-group.com
ESI Group Marketing
Parc d'Affaires SILIC
99, rue des Solets - BP 80112
94513 Rungis Cedex - FRANCE
Tel: +33 (0) 1 41 73 58 00 - Fax: +33 (0) 1 46 87 72 02
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editorial



Alain de Rouvray, Chairman and CEO

It has been 40 years since Jacques Dubois, Iraj Farhooman, Eberhard Haug and I, four PhD graduates from UC Berkeley, created ESI. Originally a consulting company, developing simulation techniques based on Finite Element Analysis, ESI carried out its first studies for the defense, aerospace and energy sectors. We were far from knowing what would come next, from our first virtual car crash in 1985, up until today...

With over 1000 employees in 44 countries, ESI delivers Virtual Product Engineering solutions to our customers across many industry sectors, including automotive, heavy industries, aerospace, defense, energy, electronics, consumer goods, healthcare, education and more. ESI empowers manufacturing industries to face the greatest industrial challenge: to deliver innovative products at lower cost, faster, and with increased reliability.

It has taken ESI 40 years to develop the scientific expertise that today enables our customers to virtually manufacture and assemble, part by part and end-to-end, physically realistic virtual products and components, long before their physical prototypes can be tested. The technical, financial, time-related gains we can bring are huge.

As competition has become global, and as the new mantra for the most industrialized countries is 'outcompute to out-compete', the concretization of ESI's efforts comes at the right time. ESI's thorough expertise is increasingly renowned, identified as valuable and sometimes critical, in order to generate the technologies that will help our customers build innovation gaps that create competitive advantage.

Yesterday, today, and tomorrow, one thing remains unchanged: ESI's enthusiasm, commitment, and ability to help our customers get their products and processes right – robust, innovative, for the right cost and at the right time.

I hope you will enjoy getting to know us a little bit more by reading this Special Issue of our magazine, celebrating our 40th anniversary. On this unique occasion, some of ESI's engineers have shared with you their best memories, so we can reflect on the technological progresses we have made over the past 40 years. You will also learn what we have been up to lately, enriching our portfolio and teams with expert solutions, bringing answers to industrial challenges that turn into customer successes, and building our future with long-term strategic partnerships.

Celebrating 40 years of Industrial Innovation in the words of ESI employees

ESI's 40th anniversary is the perfect opportunity to ask some of ESI's employees about their most outstanding memories. In this Special Report, you will learn how some of the greatest customer collaborations started, and how they strengthened. Whatever their age, gender, or nationality, the collaborators presented in this article are here as witnesses to a shared company history.



Eberhard Haug,

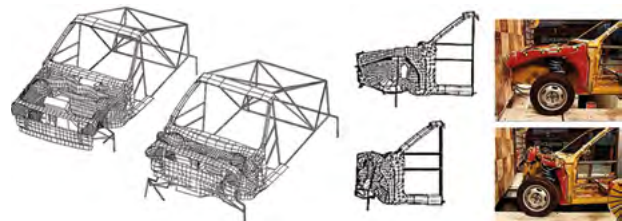
Dipl. Eng., PhD, ESI's Honorary Sc. Director, Co-founder of ESI Group, speaks about the origins of PAM-CRASH, ESI's first flagship software, and recounts tales of ESI's first car crash simulation for Volkswagen, in 1985.

"PAM-CRASH, ESI's first packaged software, originated from research aimed at simulating aerospace and nuclear applications. At a meeting organized by VDI (Verein Deutscher Ingenieure) in Stuttgart on May 30, 1978, we presented the simulation of the accidental crash of a military fighter plane into a nuclear power plant. German automobile manufacturers became alerted to the possibility of using this technology for the simulation of destructive car crash tests.

In the following years, German car makers produced more complex crash simulation studies, simulating the crash behavior of individual car body components, component assemblies, and quarters or halves of the car body-in-white (BIW). These experiments culminated in a joint project by the Forschungsgemeinschaft Automobil-Technik (FAT), a conglomerate of all seven German car makers (Audi, BMW, Ford, Mercedes-Benz, Opel, Porsche, and Volkswagen), which tested the applicability of two emerging commercial crash simulation codes. One of them later became ESI's PAM-CRASH, a solution that has since evolved to become ESI's Virtual Performance Solution (VPS), covering crash, impact and occupant safety, linear & nonlinear statics & dynamics, strength & thermal, NVH (noise, vibration and harshness) as well as interior acoustics and seat prototyping.

By 1986, we achieved the objective of recreating a frontal impact of a full passenger car structure, running the simulation on a computer overnight. Now that turn-around time between two consecutive computer runs did not exceed one day, engineers were able to make efficient and progressive improvements of the crash behavior of the analyzed car body structure.

At the time of the first Volkswagen Polo car crash simulation, in 1986, the car meshing was only composed of 5555 shells, 106 beams and 5100 nodes. Today, car manufacturers work with numbers of elements exceeding millions of elements."



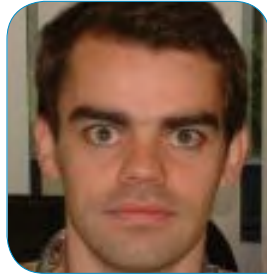
Volkswagen Polo crash simulation (1985); side views of simulation (1985) & real crash tests (1984).

TODAY...

"At Volkswagen, we have been using Virtual Performance Solution for several years now, and recently, in collaboration with ESI, we improved the simulation of a head impact on a windscreen. Using a new non-local failure criterion for laminated glass in Virtual Performance Solution, we could calibrate

one criterion and evaluate its accuracy by comparing with several experimental results. We confirm its use at an industrial level as the criterion works very well for multiple load cases"

Dr. Helge Liebertz,
Project Engineer, Volkswagen AG (Germany).



.....
Carole Michel and Pierre Viossat,
Aix-en-Provence, France,
speak of their experiences as Project Managers for Virtual Seat Solution.
.....

"In 15 years at ESI, one of the most exciting projects in which we have participated has been the development of the software solution dedicated to predict seat comfort. When we started, seat comfort was only evaluated by using test on real prototypes. Partnering with Renault, we set out to reduce cost and time, and to ensure objective evaluation of seat comfort, by developing a numerical tool to predict comfort very early in the design process; before any physical prototype was made available.

Renault and ESI teams embarked on a co-creation process. Firstly, Renault teams defined their needs and provided real seat measurements to be used to validate the project achievement. From our side, we developed solver capabilities for an accurate comfort prediction and a graphical user interface dedicated to the seat and how it needs to be modeled. Iterations between Renault and ESI allowed us to assess the value of our solution for Renault cases. Renault's feedback then helped us to fine tune our solution, before we supported its deployment on an industrial scale within Renault's development process.

Working on such innovative projects is not only interesting because of the technical challenges: it is also an opportunity to interact with industrial partners and a chance to understand customer processes and workflows. These are absolute pre-requisites in order to later build truly innovative solutions and further help our customers optimize their product development processes.

This project has reinforced a long-term collaboration with Renault, who continues to be one of our major OEM partners in the Car Industry. Building on early experience, we have moved ahead to develop a full Virtual Seat Solution, which

now enables complete chaining from seat manufacturing to seat performance. By taking into account the manufacturing history of the seat, through the simulation of each step of the manufacturing processes, internal stresses and other consequences of manufacturing and assembly are now added to the seat models. Virtual tests, like a whiplash test for example, have consequently become sufficiently reliable for manufacturers to certify the seat at first try-out. In our Virtual Seat Solution, we have also worked to capture standard protocols (EuroNCAP, JapanNCAP, IIHS...) in an end-to-end virtual process that makes virtual certification of each design iteration easier and more affordable.

Without the challenges inherent in co-creating a new solution with an industrial partner, we would never have achieved the level of innovation evident in our Virtual Seat Solution."

TODAY...

Over the past years, Renault and ESI's co-creative approach has given birth to some of ESI's commercially available software solutions, including its passenger comfort software suite ; now part of Virtual Seat Solution.

"Using Virtual Seat Solution, within a short period of time and with few resources, we were able to deliver a new seat design meeting our objectives."

Jérôme Makala, Head of Comfort and Safety Research
Department, Renault Group (France).



Yasuhiro Matsuoka,
COO of ESI Japan, commenting on the invaluable contribution
of Nissan and Honda to the development of ESI's Virtual Performance Solution.

"Rome was not built in a day ; and the same goes for any co-creation project.

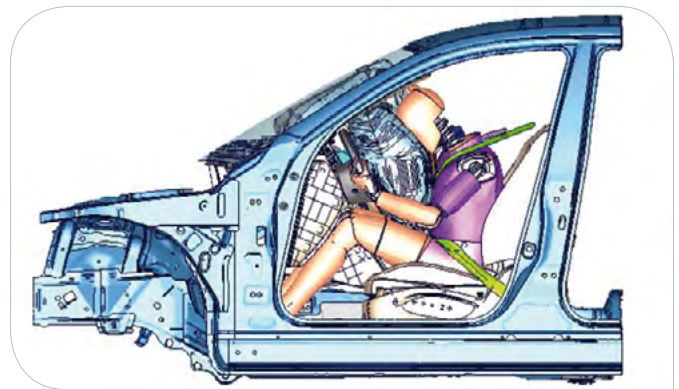
All ESI customers in Japan have greatly contributed in extending our knowledge, but today I would like to highlight the exceptional contribution of Nissan and Honda: two extremely innovative companies. Our collaboration with both companies started in the 1990's around PAM-CRASH, ESI's renowned virtual crash test solution. Today, Nissan and Honda are two of ESI's most important clients and use our Virtual Performance Solution along with other ESI products and services.

Nissan and Honda are both noted for manufacturing innovation and have excelled in their ability to identify and deploy the right hardware and software solutions to support disruptive and bold advances. Ten years ago, when upgrading their hardware to deliver scalable calculations, Nissan conducted a large benchmark exercise. ESI's central support and development team assisted them directly throughout the project; providing opportunity to demonstrate capabilities and gain mutual trust. Subsequently, Nissan invited us to help them address new challenges such as Stamp-Crash coupling, full vehicle simulation including occupant dummies for accurate injuries index prediction, and managing multi-domain optimization. Breakthrough numerical simulation solutions such as Fast DMP (Distributed Memory Parallel Processing), Visual-Process, the Implicit solver, FPM (Finite Pointset Method) and Sim-Folder contributed effectively.

Meanwhile, we initiated a working relationship with Honda, focusing on pedestrian safety, crash compatibility and full car driving mode simulation for durability. We were successful in proving we were the right solution provider to meet these needs. Shortly after, Honda sought to build complete End-to-End Virtual Prototypes that include all the effects of real manufacturing and assembly processes to realistically predict fatigue life. Honda retained an ESI expert to pilot the project: their objective is to be able to achieve product pre-certification in the early design stages and thereby to reduce iterations later in the development phase.

Thanks to our appreciation of our customers' requirements - for example in relation to the need to understand the influence of manufacturing processes on the durability of a vehicle and its

components - we have been able to offer engineering services that enable them to achieve their goals. A critical success factor has been the constant support of what we call "One ESI": our network of 1000 experts around the world. Locally, our greatest asset remains ESI Japan's remarkable team of technically well trained engineers, working in the office or at the customer site to build a close collaboration with our clients and enable them to realize full benefit from their investment in CAE and virtual prototyping."



Frontal Impact with one dummy model.

TODAY...

"Ten years ago, Nissan conducted a large scaled benchmark to find a good solution for a common vehicle platform development with Renault and to develop a new virtual prototyping process, named V-3P. Choosing ESI was an important milestone: ESI is a company capable of fostering innovation in V-3P, not to mention their high-tech products and support capabilities, to accompany Nissan's projects. In V-3P and subsequent challenges in my team, we achieved substantial innovations of high value for Nissan."

Dr. Toshihiro Araki,
General Manager, Integrated CAE Department,
NISSAN MOTOR CO. LTD (Japan).



Eric Daubourg,
COO of ESI France, recalls the history of the relationship with AREVA.

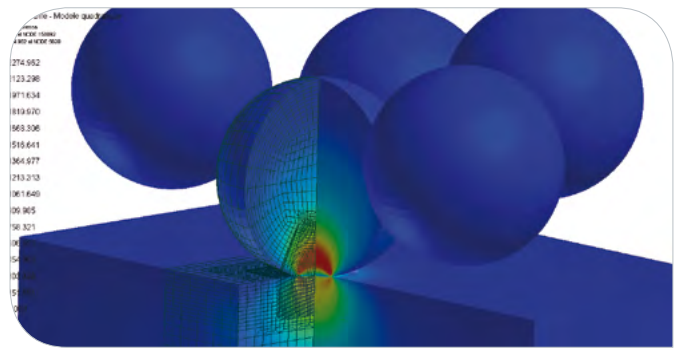
"Our story starts when AREVA decided to deepen their know-how in numerical simulation for thermomechanics. In this domain, fracture mechanics holds a central place, because of its importance to safety studies of components in nuclear power plants. Fracture had always been one of ESI's technological focuses, driven by experience in the automotive sector that had caused us to become experts at fracture mechanics for sheet metal and spotwelds, and had motivated the development of the ESI-Wilkins-Kamoulakos fracture criteria (EWK).

In these circumstances, AREVA and ESI France quite naturally initiated a collaboration to support multi-year projects related to the extension of the French nuclear network, with the 3rd generation European Pressurized Reactor projects, and the development of new 4th generation nuclear reactors.

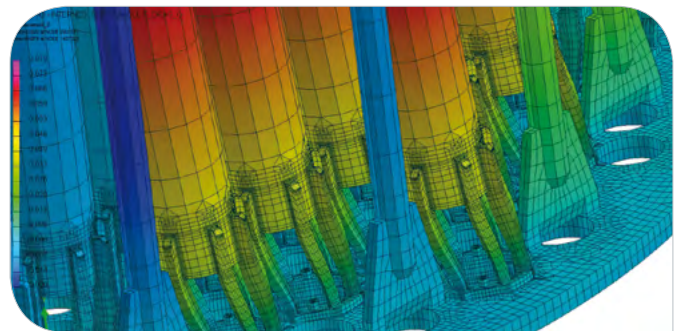
A team of experts, led by Philippe Gilles, was formed to develop and validate new damage and fracture models. Specific contributions of Professors Jean-Baptiste Leblond (member of the French Sciences Academy) and Jean-Michel Bergheau (from ENISE, the Engineering Highschool of Saint Etienne), and ESI experts, including Josette Devaux, are to be recognized. Fruits of this collaboration include models, celebrated by many scientific publications, that are now part of ESI software solutions SYSTUS and SYSWELD and provide ESI a technological advantage on the energy market.

ESI's software tools dedicated to nuclear power plant components were subsequently developed following Quality Assurance processes, in order to deliver highly reliable and sustainable solutions based on our damage and fracture models.

Today, these software solutions are used by AREVA, either in-house or by ESI engineers, for regulatory studies and advanced studies that investigate validity of the safety margins the industry currently uses. We continue to work hand in hand. Indeed, following the request of our strategic partner, AREVA, ESI has created special collaborative project teams that are dedicated to meeting specific challenges that the nuclear industry faces."



Mechanical surface treatment (2 million nodes).



Large model of reactor vessel's upper internals from AREVA.
(Simulation case using unrealistic loads).

TODAY...

"ESI studies have an excellent quality level and constitute a reliable basis for solving our problems. The team's 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,
International Expert in structures and materials,
AREVA (France).



Michael Bloor,
COO of ESI North America, highlights the development
of ESI vibro-acoustic solutions based on works for NASA.

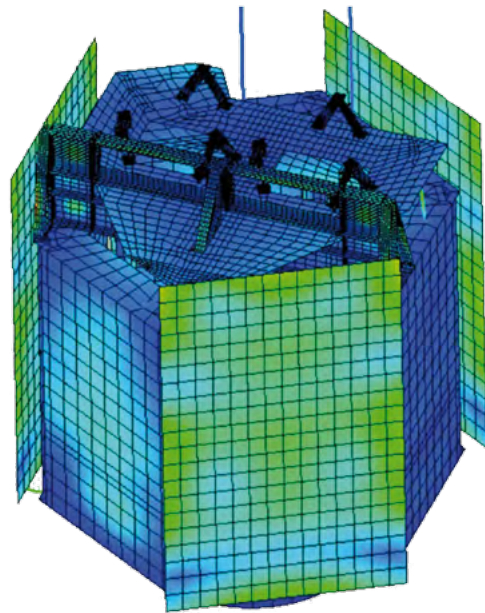
"One of the exciting things about working for ESI is the sense of contributing to achieving the grand visions of our customers. A great example is NASA, who state their vision as: "To reach for new heights and reveal the unknown so that what we do and learn will benefit all humankind."

This vision leads NASA to strive for advancements in everything they do, which includes Aeronautics, Human Exploration and Operations in Space, Science, and Space Technology. Their drive to stretch boundaries leads them to partner with commercial companies, who help them achieve their goals in a shortened time frame. In the 1990s, NASA strongly supported the development of ESI's vibro-acoustic solution, VA One, notably through Small Business Innovation Research (SBIR) Programs. At the time, NASA's aim was to more accurately understand the effect of vibro-acoustic launch loads on vehicle and payload and also the vibro-acoustic environment of satellites in service. Thanks in large to our strong collaboration and the successful development of solutions that met the specific needs of NASA, VA One is now recognized worldwide as the standard solution for this market segment.

Today, NASA is our largest customer for VA One and they continue to support further software developments and foster the education of the community on the advanced applications of vibro-acoustic simulation.

While much of the involvement with NASA of the past 40 years has been focused on vibro-acoustics, we have recently partnered with their Space Technology organization to address advanced manufacturing requirements. Welding and the manufacture of composites in space are among the interesting challenges. NASA Marshall Space Flight Center has benefited from the use of Vdot™, ESI's Integrated Platform for Project Planning, Execution and Management, to manage complex, multi-discipline projects important to the success of the International Space Station ; and since ESI acquired OpenCFD last year, we have been assisting their investigation of OpenFOAM, the open source computational fluid dynamics software, by undertaking custom development and providing training.

We are proud of the outcomes from our co-creation endeavors with NASA, and we truly look forward to greater partnering on the endless challenges they face by stretching the boundaries of space."



VA One model of Spacecraft.

TODAY...

"Vdot™ supports management's ability to quickly assess problem areas and greatly reduces the uncertainty of who is directly responsible for work accomplished at any point in the project life cycle. Vdot™ was invaluable in managing a development project with a very distributed engineering team, spread across several disciplines and development tools"

Roger Herdy,
Qualis Corporation, Program Manager,
NASA Marshall Space Flight Center (USA).

3 questions for Dr. Ralph Sundermeier, Volkswagen



Dr. Ralph Sundermeier,
Head of Functional Calculation Interior and Methods at Volkswagen AG.

What will be the importance of Virtual Prototyping at Volkswagen in the coming years?

“Volkswagen’s world is growing: we are delivering more and more car models, in different markets worldwide, and we are able to do so because we have implemented a modular platform strategy. This strategy consists of using a core vehicle architecture based around common key components, and a common engine. As a result, we need less time and resources to develop a new vehicle and we are able to place more derivate products on the market.

This whole strategy can only work if we increase our use of Virtual Prototyping; which we are.

Virtual Prototyping directly benefits our car buyers and drivers since it allows us to place new car models on the market at a reasonable price. What’s more, to satisfy the appetite of these drivers, Virtual Prototyping enables us to continuously offer them technical innovations and new designs at a faster pace.”

...

What is the highlight of ESI and Volkswagen’s relationship over the past 25 years?

“Volkswagen and ESI have reciprocally benefited from a development partnership, focused on the prosperous development of both parties. With this partnership, both companies have sought long-term benefits, allowing us both to grow steadily and continuously.

In the last few years of this partnership, we have set new goals, covering new domains, developing new models and implementing new materials. Today, Volkswagen and ESI’s

common technical capabilities in the field of simulation can be seen as the achievement of our continuous development partnership. The real highlight is yet to come: jointly looking into the future and strengthening our development partnership.”

...

What’s the place of OpenFOAM® (ESI’s open source CFD software) at Volkswagen today and in the future?

“Today, in the Volkswagen world, OpenFOAM® is used as a predesign tool for exterior aerodynamics, and as a design tool for example in lab design, or in some cases for interior CFD computation.

In the future, I expect OpenFOAM® to be the tool for the whole exterior aerodynamics design process.”



Dr Ralph Sundermeier delivers his Keynote presentation “OpenFOAM®, in the fast lane” at the first OpenFOAM® User Conference, April 24, 2013 in Frankfurt, Germany.

Tauring Group drastically cuts development time by swapping trial and error for simulation



Opening new doors to improve bending processes for highly complex profiles of various materials

Tauring Group, producer of high tech bending machinery, specializes in the bending of complex profiles. Despite its extensive in-house experience and expertise, reaching the complex shapes requested by its customers became more and more challenging. The development time for new parts was increasing, so were the costs... Tauring Group therefore searched for an innovative way to provide its customer with increasingly competitive products and services.

By introducing Finite Element Method (FEM) simulation, Tauring Group aimed at simulating cold bending production processes, in less time and at less cost than usually required by empirical research methods.

There was no doubt that FEM simulation could accelerate the usually lengthy process. However, there were some hesitations due to the fact that FEM simulation is a scientific approach which relies on characterization of materials, kinematics and other data not always readily available to the customer.

Tauring first ran a trial to establish whether defects on a bent part would be visible using simulation. As the test results were very promising, Tauring then decided to try using simulation to predict and to eliminate defects virtually, before the first physical try-

out. The team ran a freeform bending test on thin-walled aluminum profile, a material which frequently produces wrinkles when bent.

Tauring used PAM-STAMP 2G to propose modified kinematics for the tools, and to introduce the usage of compressed sand inside the profile cavities. Thanks to simulation, the engineers found the best combination of parameters. In the end, the new tooling and process setup led to a good quality part.

Project findings confirmed the accuracy of simulation, while offering significant cost reduction for complex applications. However, considering the effort needed to gather the necessary simulation data, Tauring engineers judged that simulation was not the best option for standard parts, for which in-house experience was enough to make the right decisions.

FEM simulation becomes almost mandatory when it comes to mastering complex bending processes. It effectively extends the range of products that can be manufactured without defects, whilst saving time and money. Knowing this, running FEM simulations with PAM-STAMP 2G has become a core competency and a pillar for continuous process and product improvement at Tauring Group.

“Using FEM simulation allowed us to make a critical step towards process improvements and to strengthen Tauring Group's technology leadership on profile bending. PAM-STAMP 2G met project expectations. Moreover, ESI's skills and best practices were a major help in minimizing the learning curve and optimizing results.”

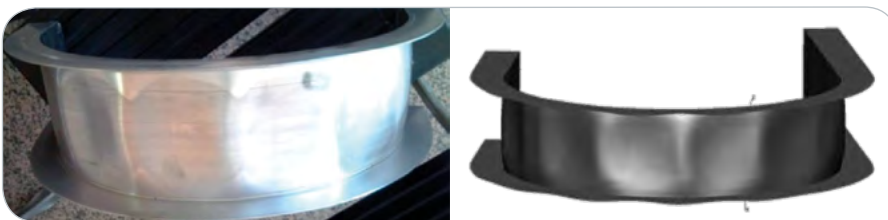
Tommaso Beccuti,
Chief Operating Officer, Tauring SpA (Italy).

ABOUT TAURING GROUP

Tauring Group is an SME whose parent company (Tauring SpA) was founded in the early 1950s and produces cold forming industrial machinery - Roll and Plate Bending. Tauring Group is a technology leader in profile, tube and pipe bending processes - consolidated through the union of Tauring, Roccia, and Saf brands. The group builds high-tech bending machines whose high degree of reliability, accuracy and ease of use provide customers with a high return in terms of quality and costs. Its wide range of products such as angle rolls and pipe bends as well as applications such as pipe and copper pipe benders, square tube bending machines..., together with its distributed sales and customer service networks, meet a wide range of technical and commercial needs.

► for more information:

www.tauringroup.com



Reality vs. simulation with PAM-STAMP 2G on an extreme bending case.
The simulation properly forecasted defects.

BioMx Consulting solves complex legal cases with ESI's Visual Platform



BioMx Consulting helps its clients involved in criminal cases by recreating accidents virtually, applying biomechanical and structural analysis principles

To solve one of its cases, BioMx Consulting had to identify the exact location of a pedestrian hit by a truck at night, in the countryside. Their client, a truck company, sought to scientifically determine their responsibility in this fatal accident, with the hope that identifying precisely the cause of this accident would avoid them a long and costly lawsuit (\$2-3 millions).

BioMx Consulting had to recreate the accident scenario taking into account the physics model for the truck, the human model and the road topography, and to analyze the cause of the accident, while being fair to both parties.

Reconstructing the accident scene

BioMx Consulting used Visual-Safe MAD to recreate the accident scenario, starting with the road profile and its topography. They then imported a human dummy model, matching the pedestrian's dimensions, from a third-party software. The Computer Aided Design (CAD) model of the truck was converted into a physics model, as BioMx imported the matching material properties for fiber, composite and steel parts of the truck, and built a Finite Element model. The front of the truck, the fender, headlights, mirrors and bumpers were

modeled directly using Visual-Safe MAD. With all the elements in place, BioMx Consulting started investigating different scenarios and analyzed the vehicle navigation and pedestrian trajectory.

Simulating the trajectory

The trajectory after impact was retraced by creating a contact between the truck and the human dummy model, at the standard speed of 60-65 mph. The trajectory was recorded for two different cases:

1. The truck hitting the pedestrian on the side of the road;
2. The truck hitting the pedestrian in the middle of the road.

The results of these simulations were recorded and compared to the actual accident site and the trajectory of the pedestrian after being hit by the actual truck.

This simulation demonstrated that the pedestrian was in the middle of the road at the time of the impact. All the graphics, the motion, the results, the outputs, the head acceleration were completed within Visual-Safe MAD.

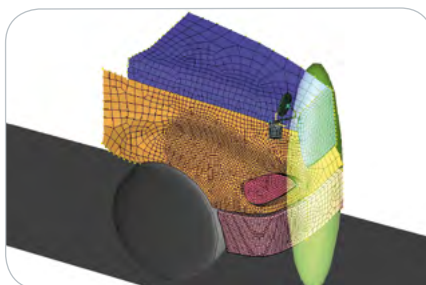
“It's easy to bring a CAD model into Visual-Safe MAD and mesh it, to bring in a topography and map it, or to bring in a dummy and see it. They can be placed all together and integrated in one environment, which helps solve the case.”

Dr. Sebastian Bawab,
Mechanical Engineer BioMx Consulting,
and Professor at Old Dominion
University (USA).

ABOUT BIOMX CONSULTING

BioMx Consulting offers a wide range of bio-mechanical services related to injury mechanisms including medical file review and analysis, physical injury analysis and causation, two and three-dimensional modeling and simulation, as well as providing concise verbal and written reports. BioMx Consulting also provides independent peer review of scientific papers and analytical reports pertaining to the origin and cause of physical injury. BioMx Consulting is a privately held independent research and consultation firm with specific expertise in computational biomechanics. The BioMx Consulting principals and technical staff are composed of engineers and scientists with specific expertise in analysis, modeling and simulation of human biomechanical and physiological responses to injury.

► for more information:
www.biomxconsulting.com



The truck and its simulation in Visual-Safe MAD.

Gabler accelerates the planning of their manufacturing lines using Virtual Reality Solution IC.IDO



Reducing development time by approximately 15%

German company Gabler develops and manufactures production lines for their customers in food and pharmaceuticals. To increase their competitive advantage in global markets, Gabler decided to supplement their existing processing solutions with ESI's Virtual Reality solution IC.IDO. The ability of IC.IDO to deliver real-time real-size presentations and enable accurate engineering reviews very early in the process has helped Gabler to make faster and more accurate decisions.

"Today we create our 3D data and upload them into IC.IDO to get a better insight of what a production line will look like and how it will be operated. Some of them are over 60 meters long, with complex machines responding to complex processes. With IC.IDO we can check every single corner of the manufacturing line, remove any piece of the machine, replace it by another. Thus, we are able to check manufacturing feasibility and serviceability from the earliest steps of the product lifecycle management," declares Patrick Gabler, Engineering Project Manager.

Gabler uses IC.IDO starting from pre-sales all the way up to delivering their customer's production line. "When a potential client has a very old manufacturing line, all we need to do is show him within IC.IDO how he would benefit from a new generation manufacturing line from Gabler. This is a very powerful demonstration tool," adds Patrick Gabler.

One of Gabler's recent projects required engineering a new chewing-gum manufacturing line in only two weeks, working jointly with their customer. It was a fixed price project – no changes would be paid for. In Gabler's view, the best way to meet this two weeks deadline was to ensure the most efficient communication between Gabler's engineering teams and the client's Food Process Engineers. To this aim, all meetings were held in Gabler's facility in their IC.IDO virtual project room.

The common goals of these reviews were to conduct a risk assessment while ensuring adequate safety and hygiene for the workers. Gabler discussed all critical topics with their customer using the IC.IDO Virtual Reality-based

system, enhancing collaboration, reducing errors and improving process quality.

Gabler estimates that IC.IDO has enabled them to reduce development time by 15%. Using Virtual Reality also assists Gabler in understanding in detail their clients' requirements and imperatives, empowering them to serve different industries and organizations.

"IC.IDO is a great tool to communicate technical content with every person involved in the decision-making process, crossing borders internally and externally."

Tilo Gabler,
CEO of GABLER (Germany).

ABOUT GABLER

Gabler is a small innovative company in the manufacturing industry supplying complete solutions to an international clientele. GABLER headquarter is located in Germany close to Karlsruhe and have 60 employees. They differentiate themselves with expertise in their field: the design, development and building of production lines for chewing and bubble gum, chewy candy, pharmaceutical pellets, dragees and many other products. Their customers include Abbott, Brandt, Ferrero, Hershey, Lindt & Sprüngli, Lotte, Mepha, Mondelez International, Novartis, Perfetti, Reckitt Benckiser, Roche, Südzucker, Storck, Tootsie Roll, and Watson Pharmaceutical.

► for more information:
www.gabler-kg.de



Gabler performs an engineering review of their customer's production line.

Hyundai Motor Company develops a dummy model to virtually test seat vibrations



Using Virtual Seat Solution early in the development process allows Hyundai to achieve greater seat comfort, to optimize seat designs faster and at controlled cost

After driving for two to three hours, a car seat occupant feels an increase in muscle fatigue that can be attributed to vibrations. An important objective for Hyundai Motor Company seat engineers is to develop improved designs that reduce seat vibrations and minimize vibration fatigue.

To ensure maximum comfort, a seat must be designed in such a way that the vibrations associated with the natural frequency of the seat (or Eigen frequency) are damped and transferred to less sensitive area of the human body. In particular, seating materials must be chosen so that transmissibility for vibration at the natural frequency is reduced and that transmissibility for the 8-30Hz range, which is related to long-term driving fatigue, is minimized as much as possible.

Difficulties with seat vibration testing

Tests performed with human volunteers are subjective and provide poor repeatability of measurement, since each human body has a particular response. Also every individual positions themselves differently in a seat and thereby influences the dynamic response. To improve the quality of testing, Hyundai engineers decided to use a dedicated vibration test dummy and measure more objectively the dynamic comfort of the seat. This vibration test dummy uses a moving mass and actuator system to present the characteristic response of a human body.

Development of a Finite Element model of the dummy

To begin with, the geometry of the solid parts of the test dummy was meshed and a virtual spring-mass system with multiple degrees of

freedom was developed. The transfer function was measured for each sub-component of the real test dummy, before tuning the Finite Element model to match. The springs' stiffnesses were adjusted according to the natural frequency, and the damping coefficients were adapted in line with the amplitude of the transfer function at natural frequency. The Finite Element dummy model and the transfer function of each sub-component were then validated by comparing results between real and virtual tests. Comparisons were performed based on three dummy sizes: female 5th percentile, male 50th percentile and male 95th percentile.

Validation on industrial seat

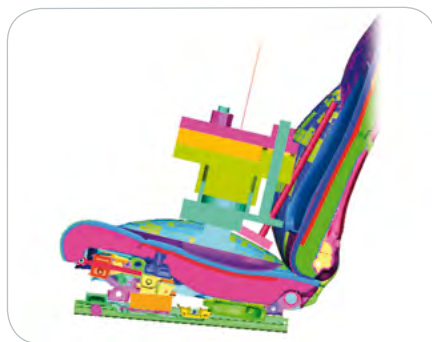
After having correctly defined the system modeling for the Finite Element dummy and compared its dynamic response to that of the physical dummy, Hyundai engineers initiated the validation on an industrial seat. As shown on the image below, the first step of this validation was placing the dummy in the seat. This stage was mandatory as it set the right pre-loading conditions for the foam of the seat and assured

that the correct dynamic properties would be used in the subsequent simulation. This second step reproduced the actual vibrations test with the seated dummy. Thanks to the chaining of the set up and testing conditions, the computed transfer function correlated well with the results of physical prototyping.

Hyundai concluded that the virtual vibration test is sufficiently predictive and can now replace some of the physical prototypes.

“Since seats contain lots of components, it's very difficult to find the factors that influence the dynamic comfort of the seat. We tried to figure this out using Virtual Seat Solution and reached our goal. This new way of working will help us save money and time effectively.”

Han Ji Won,
Body & Trim development team
(South Korea).



Seat and Dummy model (M95,E2).

ABOUT HYUNDAI MOTOR COMPANY

Hyundai Motor Company is a South Korean automotive company founded in 1967. The company employs about 75,000 persons worldwide and sells vehicles throughout 193 countries.

► for more information:
worldwide.hyundai.com

Drexel University improves the performance of a new design of cryocoolers



Reducing cost and production time by up to 50%, thanks to ESI's multiphysics solution ACE+ Suite

Cryocoolers are small refrigerating machines that are used to achieve and maintain very low temperatures, typically below 120K (approx. -153°C). Today, cryocoolers are used in various applications in the semiconductor, biotechnology, defense and aerospace industries. However, poor efficiency, low reliability, and high costs of the current cryogenics are limiting their widespread commercialization.

Professor Farouk's team at the Mechanical Engineering and Mechanics Department of Drexel University in Pennsylvania (supported by the US National Science Foundation) conducted extensive research to develop an efficient, reliable and cost effective Orifice Pulse Tube Refrigerator (OPTR), a thermoacoustic cryocooler that does not require any external cryogenic cooling.

One of the key challenges was to better understand the complex cryogenic physics and come up with a prototype with minimum physical experiments. The Drexel research team decided to use ESI's ACE+ Suite to perform simulations and improve the product design at low costs.

To simulate the cryocoolers, Drexel research team had to first create a complex 3D geometry that included various moving components. The researchers were able to quickly reproduce the geometry using the hybrid mesher CFD-GEOM. The coupled flow and heat transfer phenomena were then modeled using ACE+ solver, a CFD/ Multiphysics solver available within ESI's ACE+ Suite.

After validating the ACE+ model against experimental data, the research team simulated multiple design prototypes and successfully determined the optimal operating parameters for each design. Professor Farouk's team were able to identify a major design issue: fluids from the hot and cold ends were mixing, thereby reducing the effectiveness of the cryocooler. Based on the insights obtained, the team made design changes that created a thermal buffer zone at the center of the pulse tube, and separated the cold and hot ends of the pulse tube, improving the efficiency of the cryocooler.

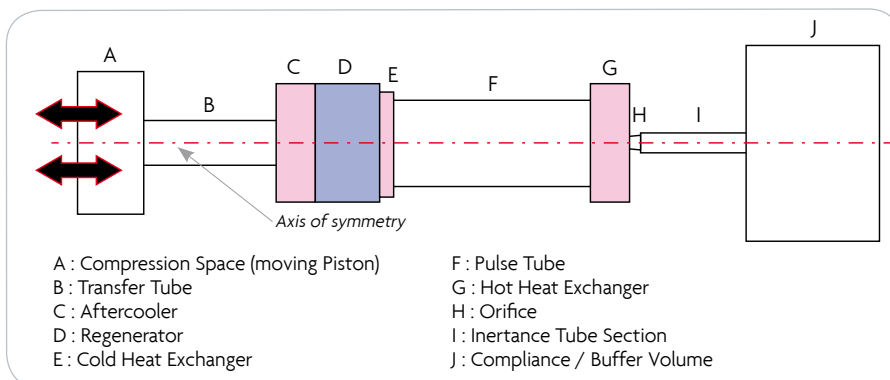


Example of a cryocooler.

Professor Farouk's team has estimated that using ESI's simulation solutions reduced the design time by 50% and the product development cost by 40%. The new design will be used by government and commercial organizations, and will significantly contribute in improving the commercial viability of cryocoolers. The Drexel team continues to use ACE+ Suite for ongoing research.

“While the application areas of cryocoolers are exciting, the underlying physics and computational tools required for simulating the systems are complex. The features available in ACE+ Suite allowed us to overcome the demands and develop realistic models for improving the performance of a novel design of cryocoolers.”

Dr. Bakhtier Farouk,
Professor of Mechanical Engineering,
Drexel University (USA).



Model geometry of the Orifice Pulse Tube Refrigerator (OPTR).

► for more information:
www.drexel.edu

Metalcast improves Investment Casting using computer simulation

Successfully reducing the number of casting rejects from 25% to only 3%

Metalcast S.A. de C.V. is an investment casting company in Puebla, Mexico, that is casting increasingly complex parts in more challenging alloys. Stefan Plotz, an engineering consultant, worked with Metalcast engineers to reduce the proportion of rejects in the production of a valve body.

In the past, Metalcast engineers designed molds according to experience, and produced wax models via manual machining. Plotz worked with them to implement CNC machining that improved the accuracy of the models, leading to closer-tolerance finished parts.

He identified ESI Group's ProCAST as a tool that addresses the specific needs of investment casting foundries. They ran the simulation based on the existing production conditions, and ProCAST then predicted the metal flow inside the mold.

The engineers saw several areas where air pockets formed without any escape path, and where feeder diameters were too small to feed the part properly during solidification. These pockets led to gas porosity defects in the final

part. Engineers adjusted several simulation parameters, including the heat transfer coefficients and melt temperature. After these adjustments were made, the simulation results matched the production conditions very well, including showing the same location and amount of shrinkage porosity. Next, they began making changes to the simulation model to eliminate porosity.

In all, they simulated approximately 20 different mold design iterations, adding and reducing the number of parts per tree to see if it would be possible to reduce production costs. They arrived at plan for a clean part without porosity, keeping the number of parts on the tree the same in order to avoid increasing production costs.

Extract from article published in FOUNDRY MANAGEMENT & TECHNOLOGY, December 2012.

► for more information:
www.metalcast.com.mx

“Computer simulation of the casting process helps understand the root cause of defects and evaluate the performance of modified designs without having to build tooling. The result is a substantial reduction in rejects, from 25% to 3%, which has helped improve Metalcast's competitive position.”

Stefan Plotz,
Engineering Consultant (Mexico).



ProCAST

Mold design with ProCAST.



Physical tree of valve component.

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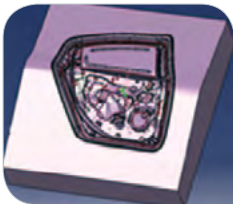
ESI & PSA Peugeot Citroën's 3-year results of Simendo & EMOA collaborative projects

ESI Group decided 3 years ago to intensify their collaboration with PSA Peugeot Citroën in multiple sheet metal forming areas, to implement a full virtual manufacturing chain and optimization, providing the basis for effective decision making within tight lead times and cost-effective solutions

PAM-DIEMAKER for CATIA V5

ESI has been partnering with PSA Peugeot Citroën to provide convenient and rapid die face design, directly inside CATIA :

- Dedicated press tool design functions for blank holders, addendum, gainers, u-ends, and analysis tools, for draw depth, undercut, trimming angles, etc.
- Fast modification of the Die design as a result of changes in the product design.
- High quality surface for machining
- Preserves full compatibility with other CATIA V5 workbenches.
- High fidelity simulation for Early Process Feasibility



Door tooling created in PAM-DIEMAKER for CATIA V5.

PAM-STAMP 2G for rollhemming simulations

"The most significant state-of-the-art physical parameters identified by PSA's hemming specialists were integrated into PAM-STAMP 2G. Validated through real-life industrial cases, this new tool has quickly become essential to guarantee successful product definition and process reliability."

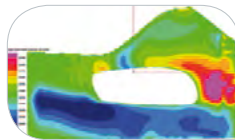
Patrice Auger, R&D Manager for Assembly Processes, PSA Peugeot Citroën



Rollhemming of a door

PAM-STAMP 2G for detection of cosmetic defects

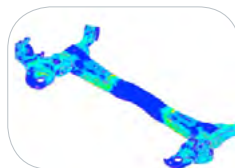
PAM-STAMP 2G is used by PSA Peugeot Citroën to work on common cosmetic defects in order to allow engineers to go beyond the feasibility of the part and look into high-level quality aspects, identifying even small cosmetic defects on outer parts. In the past this could only be done physically, on a control table and by stoning or sensing physical parts. Based on virtual geometry control at every stage in the process, fully automated built-in tools are available to loop back and to compensate and/or modify the most relevant forming dies in order to reach the expected end result.



PAM-STAMP 2G enables an accurate prediction of cosmetic defects, detected by stoning contour.

SYSWELD for welding effect in fatigue strength prediction

SYSWELD simulation is used by PSA Peugeot Citroën to predict the effects of manufacturing processes on fatigue strength by integrating residual welding distortions, stresses, and metallurgical transformations.



Example of Crossmember made up of 20 individual stamped components welded together with 84 MAG welding joints adding up to a total welding distance of 5 meters.

Collaboration of ESI and PSA Peugeot Citroën within the EMOA project



'Excellence dans la maîtrise de l'Ouvrant Automobile'

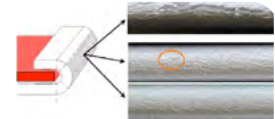
Collaborative work involved the evolution of PAM-STAMP 2G to answer the project's requirements.

EMOA project of the competitiveness cluster ID4CAR is funded by the French Ministry of Industry. This project involves seven industrial partners and five academic partners. The goal the EMOA project is to improve the quality of stamped parts of car bodies following two major axes for improvement:

- Mastering the whole chain of sheet metal forming and hemming processes
- Innovative conception of stamping tools.



Collaboration of ESI and PSA Peugeot Citroën within the Simendo project



N.Le Maoût, S.Thuillier, P.Y.Manach, Engineering Fracture Mechanics 76 (2009), 1202-1214

High precision Virtual Prototype for hemming.

Multi-year collaboration agreement with Astrium

A strategic step to expand Virtual Product Engineering in the space sector

ESI has signed a protocol for a multi-year strategic collaboration agreement with Astrium, Europe's leading space technology company. This agreement aims at developing Virtual Prototyping technologies and promoting Virtual Engineering in the space domain.

Astrium and ESI Group have implemented this long-term collaboration agreement with the intent to jointly "co-create" new and innovative technologies, processes, and development methodologies for the space industry and its next generation launchers. The objective of this collaboration is to enable the space industry to rapidly build robust virtual prototypes of components, subsystems and systems of the new and improved launchers at various and early stages of the design and development cycle.

At the signing ceremony held in Paris on November 16, Hervé Gilibert, CTO and CQO of Astrium Space Transportation, described the collaborative intent of this agreement:

"The relationship of Astrium with ESI dates back to the 70's before the creation of the EADS group, when ESI successfully accompanied the development of numerical simulation in the aerospace and aeronautical industry with the European Space Agency ESA/ESTEC.

Today both parties are convinced that a joint collaborative effort between Astrium and ESI is the best partnership solution to address the new global challenges of the space industry. We're setting the scene for the next generation of space vehicles and technologies, while promoting Virtual Prototyping and Virtual Engineering."

Eric Daubourg, COO of ESI France added: *"Under this multi-year agreement, ESI is*



Hervé Gilibert, CTO and CQO, Astrium Space Transportation (center), Vincent Chaillou, COO, ESI Group (left), and Eric Daubourg, Chief Operating Officer, ESI France (right), at the signing ceremony held in Paris on November 16, 2012.

fully committed to supporting Astrium-ST in its quest for new methodologies in Virtual Prototyping that address the specific requirements of advanced space technologies. Our partnership with Astrium and the space community will enhance the national and international recognition of launcher and space technologies developed in Europe."

Despite being at the forefront of technology, the European space industry faces global challenges that increase with the arrival of new international players. In this environment, the overall performance of launchers and their modularity and flexibility to accommodate customers' needs must keep improving while manufacturing and operating costs must be drastically reduced. New designs, new manufacturing processes, and new multi material solutions have to be invented, tested, validated, and certified in record time.

Vincent Chaillou, COO, ESI Group concluded: *"Such an evolution cannot be conducted using the traditional approach of trial and error on increasingly expensive 'real' physical prototypes. Virtual Prototyping enables the mandatory early evaluation of design and fabrication alternatives, and allows the rapid corrections of identified deficiencies."*

"For Astrium, today's agreement with ESI Group sets a new standard in how we collaborate with our key industrial partners. Our intent is to align objectives and join forces to drive Astrium and its partners to the leading edge of global innovation, in order to maintain and reinforce the European leadership of Ariane in the global commercial launch services market."

Hervé Gilibert,
CTO and CQO of Astrium Space Transportation.

ABOUT ASTRIUM

Astrium is the number one company in Europe for space technologies and the third in the world. Astrium is a wholly owned subsidiary of EADS, a global leader in aerospace, defence and related services. In 2011, the EADS – comprising Airbus, Astrium, Cassidian and Eurocopter – generated revenues of €49.1 billion and employed a workforce of over 133,000.

► for more information:
www.astrium.eads.net

Renault and ESI sign a framework agreement for strategic collaboration

To accelerate innovation with Virtual Prototyping

The agreement aims at supporting Renault's new strategic plan "Renault 2016 – Drive the Change", founded on Renault's ambition to make sustainable mobility accessible to all. The industrial challenge Renault faces is to improve the quality of its vehicles, while lowering prices and complying with new regulations aimed at reducing their environmental impact, especially CO2 emissions. This translates into a compelling need to accelerate innovation, necessitating the introduction of new materials and processes that have impacts that must be evaluated and tested quickly and reliably.

To this aim, as well as to generally enhance the processes that support innovation, Renault has implemented a Virtual Prototyping methodology. Virtual Prototyping helps Renault assess numerous options rapidly ; eliminating the need for physical prototypes and providing a powerful decision-making tool that enlarges the field of innovative possibilities and accelerates the identification of high value-added innovations.

Renault started using ESI solutions in the early 90's, to perform accurate and predictive manufacturing simulations and conduct virtual performance tests on its vehicles, prior to real tests.

In 2011, following the signature of a framework agreement for licences with ESI, Renault then adopted ESI's Virtual Performance Solution (VPS). Providing performance engineering and optimization across multiple domains, including crash, impact and occupant safety, as well as interior acoustics and seat prototyping, VPS works on a single core model and as a single software solution. Using VPS, Renault teams are able to predict the effect of manufacturing processes and material properties on a product's performance and reduce the need for



Jean-Loup HUET, Director of Performance and Engineering Methods, Renault,
and Alain de Rouvray, CEO, ESI Group,
on January 24, 2013 at the Renault Technocenter in Guyancourt, near Paris.

physical prototypes; saving cost and time and assuring the quality of their products.

Over the past years, Renault and ESI's co-creative approach has given birth to some of ESI's commercially available software solutions, including its passenger comfort software suite, now part of Virtual Seat Solution. Aimed at providing end-to-end Virtual Prototyping for seats, this solution enables engineers to perform multi-domain simulations related to seat manufacturing and performance, and provides a basis for optimizing seat design collaboratively using a single core model.

The framework collaboration agreement between Renault and ESI aims to strengthen the existing relationship and bring an increasing number of opportunities for further co-creation around ESI solutions.

During the agreement signing ceremony, held on January 24th, 2013 in Guyancourt, near Paris, Alain de Rouvray, ESI Group's Chairman and CEO, commented "ESI will aim at providing solutions

leading Renault to go beyond their standard objectives and to implement disruptive innovations. By helping Renault meet its cost, performance, lead times, and most importantly, its innovation targets, ESI will demonstrate the value of its co-creative approach in delivering substantial, tangible gains in competitiveness."

“Renault is pleased to strengthen its collaboration with ESI, a strategic partner for end-to-end Virtual Prototyping. In alignment with our corporate strategy, our close collaboration with ESI will enable Renault to anticipate the needs for new technologies, and to pro-actively manage the innovations required to supply the competitive global automotive markets.”

Jean-Loup HUET,
Director of Engineering Performance and
Methods at Renault

Joint Venture Contract signed with AVIC-BIAM

A joint mission to “co-create up-to-date solutions based on innovative materials and digital prototyping”



Dai Sheng Long, President of BIAM and Alain de Rouvray, CEO, ESI Group.

On May 28, 2013, ESI has signed a Joint Venture contract with BIAM, the Beijing Institute of Aeronautical Materials. Under the terms of the contract the parties agree to establish and operate the Joint Venture company “AVIC-ESI (Beijing) Technology Co. Ltd.” to address the important needs of China’s aerospace and astronautics industries for Virtual Engineering. Signature of this contract completes actions initiated by a strategic partnership agreement in June 2011 and the signature of a Joint Venture framework agreement in November 2012.

BIAM, a core scientific Research Center of AVIC (the Aviation Industry Corporation of China), is China’s only institute for research in advanced materials and manufacturing technologies for aeronautical applications. Through its subsidiary BAIMTEC Material Co. Ltd it is also an important supplier of titanium castings and other manufactured components to global companies including Airbus, Boeing and Safran-Snecma.

Within the frame of the Joint Venture, BIAM’s expertise in the manufacturing, testing and characterization of advanced materials and components will complement ESI’s strengths in Virtual Manufacturing and Virtual Testing, to support the enhancement and effective deployment of Virtual Prototyping.

Stated ambitions of the Joint Venture include providing leadership in the application of Virtual Engineering for innovative product development and serving as an example to other Chinese high technology enterprises.

During the contract signing ceremony, Dr. Dai ShengLong, President of BIAM, reviewed the evolution of the collaboration over the past two years and emphasized the mission to “co-create up-to-date solutions based on innovative materials and digital prototyping” and to “continuously generate new IP with commercial potential”. The purpose of the joint venture is not only to catch up but “to leap ahead, propelled by virtual technology”.

Dr. Alain de Rouvray, Chairman and CEO of ESI Group added, “Our commitment is to apply our expertise and global resources to achieve a world leading position in delivering innovative digital based solutions, enabling China’s aviation sector to benefit from the best in class digital engineering and then gradually influencing other industry sectors as needs emerge”.

Subject to final approval of the relevant Chinese authorities, the business of this new Chinese Joint Venture company, AVIC-ESI (Beijing) Technology Co. Ltd. will include the commercial distribution of ESI’s Virtual Engineering standard software solutions; associated hardware for computation and immersive visualization; related technical support services and validation engineering studies.

► for more information:
www.biam.ac.cn

ESI launches its web-based Customer Portal “myESI”

Dedicated to ESI licensed users in the field of Virtual Manufacturing, myESI portal delivers valuable content directly to the end-user and enables two-way communication between ESI and its customers.

myesi.esi-group.com provides instant access to a wide range of documentation downloads, training information, and also tips & tricks that provide added value for members of the ESI community and enable them to gain efficiency in their software usage. Today the portal features content dedicated to ESI's Virtual Manufacturing applications, including: the Casting Simulation Suite - ProCAST and QuikCAST; the Sheet Metal Forming Simulation Suite - PAM-STAMP 2G; and, the Welding &

Assembly Simulation Suite. ESI support teams are working on rolling out this portal for other ESI software solutions and adding new features for collaboration and information sharing.

“ESI's Support Teams around the world contribute daily to the success of our customers' industrial projects. Now, with myESI, our customers can access valuable information 24/7. We hope that by leveraging ESI's knowledge of best practices online, we can help our customers speed up their Virtual Product Engineering processes and find the right answers to their challenges at the right time,” says Hervé Charlier, Customer Support Director, ESI Group.



New offices on the Ter@tec Campus, a site dedicated to simulation and High Performance Computing

ESI opens new offices just outside Paris on the Ter@tec Campus, the largest computing center in Europe. This new location will bring proximity to work hand in hand with industrial and R&D companies in the field of High Performance Computing (HPC); contributing to the development of HPC technologies.

The Ter@tec Campus has already attracted

major industrial and R&D companies, of small and large sizes. BULL and the French Atomic Energy Committee (or CEA) have set up a Laboratory for Extreme Computing, while Intel, Genci, the University of Versailles and the CEA have opened an Exascale Computing Research center. The Ter@tec Campus is also home to the CEA's Très Grand Centre de Calcul (Very Large Computing Center), an essential tool for

conducting research in the fields of computing and simulation.

Today, ESI is actively involved in several collaborative supercomputing projects, hosted by IRT System X and based at the Ter@tec Campus.

Vincent Chaillou, COO, ESI Group, explains the importance of supporting HPC technologies in order to enable Big Data simulations: *“Building realistic end-to-end Virtual Prototypes allows ESI clients to enter an optimization strategy, as they seek to improve product performance while reducing risks and costs. This optimization phase involves increasingly large models and consequentially larger calculations! The rapid evolution of High Performance Computing is key to support the development of Virtual Product Engineering.”*



Latest version of Virtual Performance Solution

Virtual Performance Solution (VPS) enables ESI's customers to virtually assess and optimize the overall performance of a future product at a very early stage of the design process.

Virtual Performance Solution ensures leading-edge functional standards, including safety, comfort, NVH (noise, vibration and harshness), acoustics, stiffness and durability. VPS also allows engineers to handle interactions across multiple – and sometimes conflicting – domains efficiently. Best-in-class accuracy is achieved in each domain by accounting fully for non-linear physics and manufacturing effects.

Exploiting a single-core model for all domains of performance, and able to run all load cases

on a single cluster, VPS reduces drastically model conversion tasks and errors, when addressing performance in different domains.



Dynamic Stresses in a suspension component ; detail from a Virtual Prototype of a full vehicle

“At ŠKODA Auto we have been using Virtual Performance Solution (VPS) for several years. Thanks to VPS we may be more efficient, using the same core model for crash, safety and linear statics. The One core model approach allows us to make better decisions about design changes in a reduced time cycle.”

Tomáš Kubr,
CAE Manager ŠKODA Auto
(Czech Republic).

ESI consolidates its offer in Computational Electromagnetics with CEM Solutions 2013

A fully-integrated solution to address all aspects of Computational Electromagnetics (CEM) within a unified GUI environment, CEM Solutions 2013 is dedicated to all engineers involved in the safe electromagnetic design of products.

CEM Solutions 2013 promotes coupling and hybrid techniques to handle fully realistic Virtual Prototypes. The solution has been particularly tailored for EMC experts (internal cabling & electronic equipment) in all industries, active safety (RADAR devices) and infotainment engineers in the automotive industry, and stealth design engineers in the aeronautics and defense sectors.

The solution includes PAM-CEM Simulation Suite, ESI's advanced 3D explicit software, allowing the fast investigation of electromagnetic phenomena and developed from the widely used Finite-Difference Time-Domain method. Its simulation capabilities range from Electromagnetic Compatibility (EMC) to Electromagnetic Interference (EMI), Electromagnetic Radiation (EMR) and Electromagnetic Susceptibility (EMS) of electronic systems or products. PAM-CEM

offers unique coupling capabilities, allowing multi-scale electromagnetic phenomena assessment in the middle and high frequency ranges.

CEM Solutions 2013 also includes Efield Solutions, a unified modeling environment for time and frequency domains that supports antenna design and integration (within automotive vehicles, aircraft or marine ships), microwave design, RADAR signature of military vehicles and ships, stealth, hardening and shielding.

The new CEM Solutions 2013 has been enriched with key improvements for aerospace and defense applications. A very significant CPU time decrease through use of MLFMM (Multi Level Fast Multipole Method) parallelization is highly beneficial for large scale applications, such as RADAR signature and antenna coupling. The new version also introduces enhanced modeling of antenna arrays for aeronautics, meshless formalism for high frequency studies, and advanced modeling for shielded and over shielded cables.

ESI envisions future developments for stealth applications, related to thin plastic coatings and radar absorbing materials. Major upcoming features for automotive will focus on radio noise from electronic equipment, and hybrid solutions for Long Radar Range (LRR) used in Active Safety.



Simulation of Radar Cross Section of a jet fighter airplane at 3GHz with Efield® MLFMM with more than 106 unknowns

Save the date!



ESI Global Forum 2014

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Join us for ESI's global conference & exhibition
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Sign up today and register at www.esi-group.com/EGF2014



Sep 4, 2013	ESI India Forum 2013	ESI's Indian User Forum on Virtual Product Engineering	Chennai (Madras), India
Sep 10, 2013	Know More About OpenFOAM	Complimentary OpenFOAM® seminar during which our experts will share with you their knowledge and experience of OpenFOAM®	Oslo, Norway
Sep 11, 2013	Know More About OpenFOAM	Complimentary OpenFOAM® seminar during which our experts will share with you their knowledge and experience of OpenFOAM®.	Stockholm, Sweden
Sep 11, 2013	ACCE	Automotive Composites Conference and exhibition	Novi, MI, USA
Sep 12, 2013	OpenFOAM Seminar	OpenFOAM Seminar and Lessons in OpenFOAM	Troy, MI, USA
Sep 15, 2013	Internoise 2013	ESI will attend this congress on Noise Control for Quality of Life	Innsbruck, Austria
Sep 24, 2013	International Marine Exhibition - NEVA 2013	NEVA Exhibition Programs	St Petersburg, Russia
Sep 25, 2013	LS-DYNA Forum 2013	ESI presentations on using ESI's Visual-Environment with nonlinear analysis from LS-DYNA	Filderstadt, Germany
Sep 25, 2013	Forming in Car Body Engineering 2013	Progress in car body part production	Bad Nauheim, Germany
Oct 15, 2013	Simulationsforum 2013 - Schweißen und Wärmebehandlung	Simulation forum - Welding & Heat Treatment	Weimar, Germany
Oct 16, 2013	9th International Congress for Composites	Composites in Automotive and Aerospace	München, Germany
Oct 17, 2013	ESI Russia Forum 2013	ESI's Russian User Forum on Virtual Product Engineering	Moscow, Russia
Oct 21, 2013	SAMPE 2013	Conference and exhibition for advanced materials and processes	Wichita, KS, USA
Oct 29, 2013	IABC 2013	International Automotive Body Congress	Troy, MI, USA
Oct 31, 2013	ESI Japan Forum 2013 (PUCA)	ESI's Japanese User Forum on Virtual Product Engineering	Tokyo, Japan
Nov 5, 2013	ESI DACH Forum 2013	ESI's German User Forum on Virtual Product Engineering	Niedernhausen/ Wiesbaden, Germany
Nov 5, 2013	ESI Korea Forum 2013	ESI's Korean User Forum on Virtual Product Engineering	Seoul, Korea
Nov 7, 2013	ESI China Forum 2013	ESI's Chinese User Forum on Virtual Product Engineering	Shanghai, China

First OpenFOAM User Conference & upcoming seminar in September in the USA



Following the acquisition of OpenCFD Ltd. last year, ESI held the first OpenFOAM User Conference, April 24-26, 2013 in Frankfurt, Germany. The event gathered over 250 users of OpenFOAM, the leading open source Computational Fluid Dynamics (CFD) software suite.

Featuring keynotes from Dr Ralf Sundermeier of Volkswagen, and Dr Georg Skillas from Evonik Industries, the event covered the use of OpenFOAM in different industries.

The event also provided an opportunity for ESI-OpenCFD to showcase OpenFOAM Version 2.2, released on March 6, 2013. Some of the new features were explained during "Lessons in OpenFOAM", a session delivered by the ESI-OpenCFD Development and Training teams.

Here are some impressions from conference attendees:

"It was the perfect occasion to meet the OpenFOAM community leaders along with other users to exchange great ideas for the future of CFD."

"A great opportunity to meet colleagues and interact with the ESI-OpenCFD team."



MARK YOUR CALENDAR FOR OUR NEXT OPENFOAM EVENT IN THE US!

An OpenFOAM seminar, including a full day of Lessons in OpenFOAM, will take place at the MSU Management Center in Troy, MI, USA, on September 11-12, 2013.

For more info, please visit
www.esi-group.com/events

Revenue growth for the 1st quarter of 2013/14: +2.0% to €21.6 million (+6.2% at constant currency)

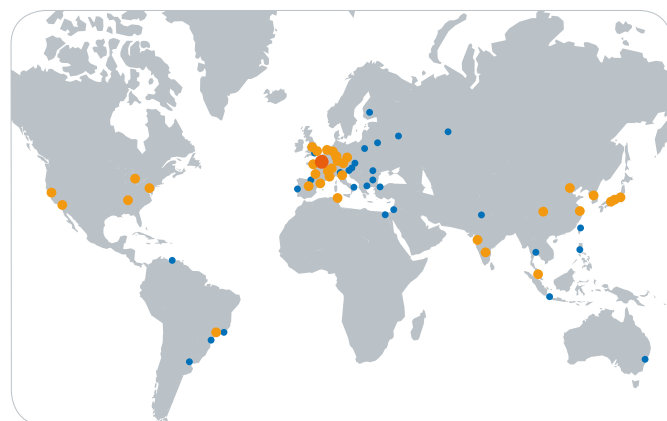
Alain de Rouvray, ESI Group's Chairman and CEO, comments:

"ESI Group has delivered a solid first quarter in terms of revenue growth, despite a negative base effect associated with the depreciation of the Japanese yen and exceptional elements recorded over the first quarter of 2012/13. This positive trend is notably reflected through the success of our offer in BRIC countries, as illustrated by the recent signing of a remarkable Joint Venture contract with AVIC-BIAM in China. This very positive trend in terms of activity in emerging countries lays witness to the relevance of the Group's strategy to support their transition towards end-to-end virtual prototyping. These factors are reassuring in the context of a macroeconomic situation that has become more difficult again, whilst the increasing complexity associated with globalization requires the Group's internal reporting structure and processes to be adapted."

The product mix remained stable compared to last year, with 67% of revenue coming from Licenses and 33% from Services. The substantial increase in activity in BRIC countries (+20%) has continued, with 15.6% of orders over the quarter coming from these countries, versus 13.5% over the 1st quarter of 2012/13. Especially, sales activity in Brazil was up sharply compared to the same period of 2012/13.

Licenses revenues in actual terms totaled €14.6 million, up +1.3%. Although negatively impacted by exchange rates, the level of Licenses repeat business remained high at 82% of Licenses revenue. Services revenue in actual terms recorded a growth of +3.4% to €7.1 million.

The geographical split in activity edged towards the Americas (20% of revenue) and Europe (41%), whilst the weight of the Asian region (39%) was pushed down by the substantial depreciation of the Japanese yen. In the American region, activity recorded a buoyant increase of +14.9% in actual terms, reflecting a good base level of activity as well as a slight catch-up effect for Licenses following the slowdown observed over the first quarter of the previous fiscal year.



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