PAMTALK

NEWS FROM ESI GROUP

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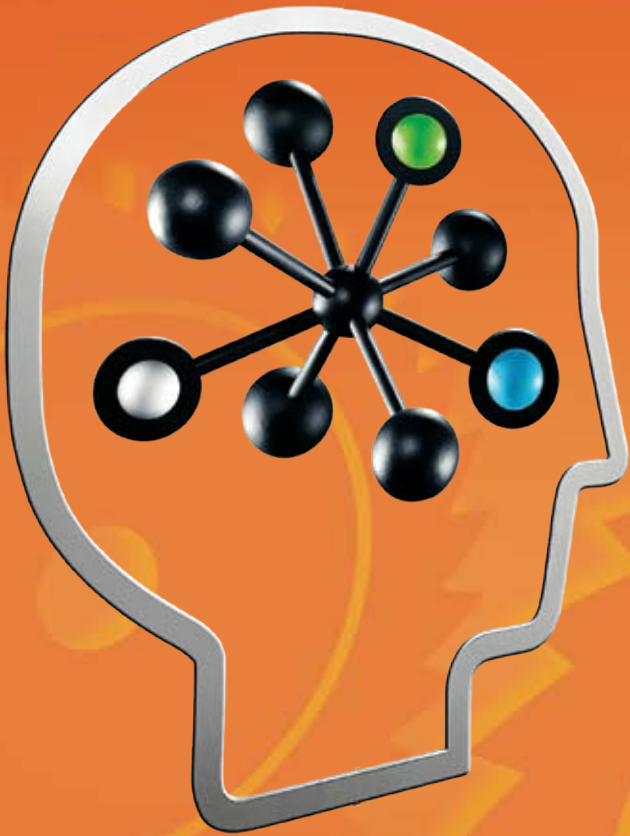## Engineering Simulation in the Academic Community

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ESI GROUP
THE VIRTUAL TRY-OUT SPACE® COMPANY

www.esi-group.com

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PAMTALK

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Learning and Contributing: ESI Group's reach to the academic community

The academic community plays a key role in the lifecycle of ESI Group solutions for Simulation-Based Design: the concepts and theoretical foundations of simulation methods are first and foremost the result of academic research. The early adopters in the industry are generally R&D or Methods departments, who sponsor many applied research programs. Broader industry adoption depends on a complex mix of industrialization projects, focusing on capabilities and usability, and on the availability of engineers mastering the simulation techniques.

The special report on Engineering Simulation in the Academic Community shows how ESI Group is collaborating globally with the academic community in the wide range of engineering disciplines we cover, such as Structural Mechanics, Vibro-Acoustics, Metallurgy, Forming Processes, and Computational Fluid Dynamics.

Undergraduate or Master students can benefit from Education programs: compact versions of the industrial solutions. With these versions, students can learn the fundamental principles and acquire a first practice of the solutions through small-scale simulation projects.

Trainee programs, such as the one developed by ESI Group in the Czech Republic, train dozens of students every year. This benefits both the students, who have easier access to a first professional experience, and industries, who can find knowledgeable candidates.

editorial

Graduate students and PhD Researchers are essential contributors to innovation in virtual product development. ESI collaborates with universities and research institutes through direct partnership programs, as well as through national or international projects: government or EU research programs, international consortia, innovative customer projects. An Innovation-Research program is also being prepared to formalize and facilitate technology upload by research partners.

While industrial projects allow for punctual, focused innovation, associating the academic community to our projects allows a continuous stream of sustained innovation, and the constitution of an ecosystem supporting the industry in the effective implementation of simulation-based design.

Engineers put the best of themselves in the parts and processes they design.

Pierre Culière
*Manager, Crash-Safety Center
of Innovation ESI Group*

Special report on
Engineering Simulation in the Academic Community

Today's students are tomorrow's professionals!
ESI Group supports academic achievement and lifelong learning by helping teachers and institutions provide their students with the simulation tools they need for successful careers.
ESI Group is present in the academic and research communities through active collaborations on research and development projects, and more recently through Educational Programs.

Collaborating with universities allows ESI Group customers to benefit from ever-innovative solutions. Through joint-projects and consortiums, ESI Group is able to push the limits of our solutions. By working even closer with the academic and research communities, ESI Group has built a strong ecosystem to enable sustained innovation. Emerging markets such as China and India are rapidly building their engineering capacities, and universities are training many CAE engineers. In mature markets, research in universities is a key to success in the industry.

Teachers at universities collaborating with ESI Group benefit from a standard package bought at a discounted price negotiated with local subsidiaries. They use the solution during their classes; solution containing the complete version with no codes' limitation. It is a long-term win-win partnership. Indeed, cooperation is attractive to universities as ESI Group projects give them a good reputation among students and the industrial sector; and allow the transfer of know-how from industrial applications.

Education

Research

Industry

The academic usages in some of ESI Group's simulation disciplines are quite high such as Computational Fluid Dynamics (CFD) with collaboration with 55 Universities and Institutions, Casting with 25, Simulation Process Management (SPM) with 20 and Vibro-Acoustics (VA) with 10. The other disciplines do also take advantage of partnerships with universities and in the past few years, some of ESI Group's subsidiaries have actively concentrated their effort on building strong relationships with universities, especially in emerging markets.
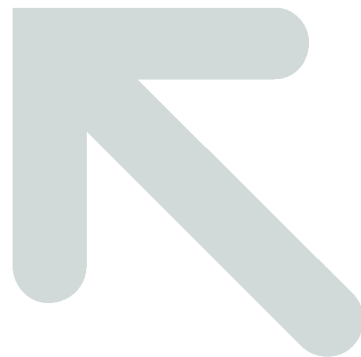
Mecas ESI, ESI Group's subsidiary in the Czech Republic has been cooperating with 6 different universities in Eastern Europe for many years. Each partnership covers a discipline such as metal-forming, welding, casting, composites, biomechanics, safety, and seat comfort.

The University of West Bohemia in Pilsen (New Technologies and Research Center in the Westbohemian region and Department of Mechanics of the Faculty of Applied Sciences) has been in collaboration with ESI Group for 11 years in the field of virtual human body development, validation and application using PAM-CRASH and PAM-SAFE solutions.
One of the main projects in collaboration with the strong biomechanical team from the University since the very beginning is the development of 'a basic articulated rigid body model' named ROBBY. The model consists of rigid bodies (head, fully articulated spine, thorax, abdomen, upper and lower extremities) connected by kinetic joints with non-linear biomechanical response. The ROBBY model is enhanced with a knee model that enables lateral bending and lateral shearing important for the description of the global response after an impact.

From ROBBY, two others were born: ROBINA, a 5%-tile female model and a BOBBY6, a six years old child model. A simple scaling model is now being developed.
The main advantage of human models over dummies in an impact simulation is that they are somehow able to model 'real life'.

All main muscle bunches accommodating muscle activity are modelled using the Hill's muscle model. Considering detailed injury assessment, FEM sub-models are being developed (currently head, thorax and abdomen).
The partnership has helped ESI Group develop human models, validate and test these on the PAM platform.

ESI India's close relationship with universities has brought encouraging results in both Research and Education. Indeed, ESI Group's Indian subsidiary has collaborated with the Indian Institute of Technology in Delhi, Mumbai and Kharagpur and others for many years now.
The Delhi Institute has been using PAM-CRASH 2G for over a decade and has certified numerous Master programs' and PhD students. The Mumbai Institute has been using PAM-STAMP 2G for 6 years and is regularly publishing research papers. Papers are presented yearly at the Numisheet International Conference.

ESI India has also developed a unique partnership with the 'Peoples Education Society Institute of Technology' (PESIT) in Bangalore. In fact, the Department of Mechanical Engineering offers 2 different certificate courses to students of the Bachelor's program in Mechanical Engineering: one in Virtual Manufacturing with teaching and training based on ProCAST, SYSWELD, PAM-STAMP 2G and PAM-CRASH 2G; the other in Computational Fluid Dynamics (CFD).
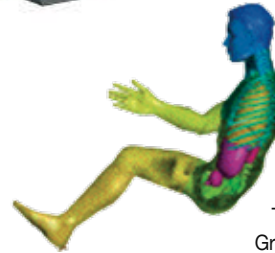The courses include regular eight-week industrial training. Every student takes on an industrial project in the use of any of the modules for which they have had training and submits a detailed report for the satisfactory completion of the certificate course. ESI India coordinators also evaluate the students' performances on their learning path.

PESIT, in close collaboration with ESI India, allows students to be exposed to state-of-the-art learning processes leading to 100% placements and admissions to top post graduate schools across the world. PESIT (Department of Mechanical Engineering) has been, so far, the only institution in the country to be accorded the PACE, standing for 'Partners For Advancement Of Collaborative Engineering Education', recognition status.

PES education for the real world

" Collaborating with universities enables ESI INDIA to produce value-added research and engineers with strong knowledge in Simulation-Based Design. ESI INDIA is committed to its social responsibility of generating quality engineers and meets the demand of R&D sector in the industry. "
Shankar Prakash, India Sales Manager at ESI Group

ESI China has developed a wide network of collaborations to help the fast-developing Chinese industry access the benefits of Simulation-Based Design and Manufacturing.

As China is the largest manufacturing country, ESI Group's Chinese subsidiary has focused its various collaborations on:

- Delivering solutions for the Aerospace industry. Indeed, at Beihang University, Professor Li Dongsheng uses PAM-STAMP for Aeronautics sheet metal forming processes, such as sheet stretch forming or tube forming; and Professor Guan Zhidong uses PAM-CRASH and SYSPLY for research on Aircraft composite strength and impact.

- Improvement of the fabrication processes. At the Manufacturing University of Science and Technology and Tsinghua University in Beijing, Professor Zhang Jiongming and Professor Liu Baicheng use ProCAST for casting simulation research.
- Research for the Transportation industry, such as Automotive and Railway. In fact, at Tsinghua University, while Professor Huang Shilin and Professor Zhang Jinhuan collaborate with ESI on PAM-CRASH and PAM-SAFE to introduce new technologies to the Chinese industry, Professor Zhou Qing collaborates on innovative projects in the field of structural crash and occupant safety. Also, at Dalian Jiaotong University and the Southwest

Jiaotong University, Professor Zhao Wenzhong and Professor Liu Baoshen use respectively PAM-CRASH, SYSWELD and VA ONE for research applied to railroad vehicles, and ProCAST, SYSWELD and PAM-STAMP for research applied to locomotive vehicles.

Collaborations dedicated to the high-tech industry are also in place. At Peking University, Professor Li Zhihong uses CFD-ACE+ for research on Microelectronical Systems (MEMS). At Dalian University of Technology, Professor Guan Zhenqun, uses CFD-ACE+ and PAM-OPT for multiphysics application and optimization.

ESI Group supports universities and research programs

ESI recently signed a scientific and academic agreement with Upper Austria University of Applied Sciences – Wels campus and the company Steinbatz Engineering in Austria to gain significant competitive advantage in mechanism simulation, while offering strong technical experience in cutting-edge technology and solutions.

This expert collaboration aims to improve the simulation of vehicle engine performance using PAM-MEDYSA, an application which evaluates the motion and dynamics of mechanical systems for product real life performance. Indeed, the cooperation focuses on the enhancement of modeling tools with a special emphasis on moving machine parts thanks to the elastic-hydro-dynamic (EHD) model. The efficient EHD model can then be integrated into PAM-MEDYSA, which will deliver a higher accuracy of results for mechanism simulation.

Besides, this agreement includes a close working collaboration and student trainings from ESI Group engineers. Taking advantage of the knowledge and technologies at their disposal, students gain hands-on experience in realistic simulation, which enriches their education and strengthens their technical skills.

" A few years ago we started a master program course named "Mechanical Engineering" with a special focus on virtual prototyping. With ESI Group's collaboration, PAM-MEDYSA will be used as a standard tool in academic workshops for advanced simulation topics. It will help students explore the valuable application of numerical simulation techniques. It will also be used in R&D projects to extend our capabilities of complex system interaction analysis."

FH-Prof. DI Dr. Michael Steinbatz, Professor of Virtual & Rapid Prototyping at the University of Applied Sciences in Wels.

Recently, one of ESI's offices, France, received 19 students undertaking a 'Modeling in Engineering Sciences' module at ENSMSE – Ecole Nationale Superieure des Mines de Saint-Etienne.

Dr. Philippe Conraux, Release Manager of Visual-Environment and SYSTUS Solutions at ESI Group, and Dr. Frederic Boitout, Project Manager for Welding and Assembly Solutions at ESI Group, presented 2 case studies: one on "How to build a software" and one on welding simulation. **At the end, a volunteer student managed to successfully set-up a welding simulation in less than 10 minutes using Visual-Environment Local Model Advisor.**
ESI Group expects to develop a closer relationship with ENSMSE in the coming years.

Some of ESI Group subsidiaries have also put in place a **'Focused Trainee Program'**. **Mecas ESI in the Czech Republic,** has launched the program in 2001. 35 students have been trained who were then hired either by Mecas ESI or ESI customers. The same program was recently initiated by **ESI India** where two students are currently being trained to be recruited by ESI Group or by commercial clients. **ESI India** also works with Renault and Nissan to collaborate with educational institutes in order to train engineers on PAM-CRASH and PAM-STAMP 2G.

In conjunction with its collaboration with universities worldwide, ESI Group has recently launched **Educational Programs**. Indeed, ESI Group has put together an improved Educational offering built on its past success, combining some of its most widely used software solutions. We are developing two different packages to specifically meet the needs of the academic and research communities – Education Package and Innovation & Research Package.

These 2 new academic packages include solutions for Virtual Performance testing including ESI Group's compute model library (crash dummies, human models and barriers), and Visual Environment, an open collaborative engineering framework.

The Education Package is a ready-to-use package addressing the needs of both teachers and students for scalable simulation solutions. It is dedicated to undergraduate and Master students, offering an easy-learning introduction to simulation basics through several applications tutorials, helping them choose their future specialty. It is a limited version of the Virtual Performance Solution.

The Innovation & Program Package is a complete version of the Virtual Performance Solution dedicated to PhD students or Post-Doctoral researchers. It allows them to use state-of-the-art technology while contributing to its evolution by accessing codes in the solver and environment.

ESI Group's next step will be to develop Educational Programs containing Virtual Manufacturing Solutions.

" The general PAM-CRASH explicit/implicit finite element and composites dedicated software packages are an important part of the Institute of Aircraft Design advanced teaching course on numerical methods at the University of Stuttgart. The structured tutorial examples and user friendly, integrated, pre- and post-processor packages quickly allow the students to perform advanced simulations on static, non-linear, impact, crash and a wide range of other flow problems. We have found it to be a very effective teaching aid and research tool."

Dr Anthony Pickett, Scientific Director at ESI Group and Professor at the Institute für Flugzeugbau of Stuttgart

Audi excels in safety standards with ESI Group and HP support

It is crucial for car manufacturers to ensure that their safety standards are always at an optimum to meet the stringent safety requirements of today's automotive industry. Audi, one of the safest vehicle manufacturers, is constantly implementing enhanced technology to optimize the safety of its cars.

Audi has recently invested in hardware and software to build the auto industry's fastest supercomputer. This new system is based on ESI Group's PAM-CRASH simulation software and HP Cluster Platform 3000BL BladeSystem providing 29.18 teraflop/s of computing performance for Audi's crash simulation models. The HP Message Passing Interface (HP-MPI) provides the critical layer of middleware between PAM-CRASH and the InfiniBand fabric.

PAM-CRASH, ESI Group's flagship Simulation-Based Design solution, offers predictive virtual testing across the extended enterprise. Audi's partnership with ESI Group has been primarily aimed at establishing and driving its global vehicle safety projects around the world. **Audi has recognized the unparalleled computing efficiency and ease-of-use of PAM-CRASH and, as a result, the implementation has improved the reliability of its crash, safety and impact simulations.**

The software also helps industrial partners improve their product lifecycle while saving time and money. PAM-CRASH enhancements combined with compact, fast and power-efficient HP hardware have enabled Audi to run its refined models overnight, and thus guaranteeing an effective design process that includes analyzing vehicle safety elements. The latest algorithms in the software have also encouraged Audi to raise its expectations for Simulation-Based Design. For example, airbag models now routinely take into account fluid-structure interactions, leading to realistic interactions of the airbag with structures and occupants. In addition, prediction testing for material rupture, which usually requires high resolution models, can now be treated using a multi-scale approach. **All this helps save days of computing time and unnecessary costs.**

Audi A4: Comfort testing with Dummies

Audi A4: EURONCAP front crash simulation

Courtesy of Audi AG
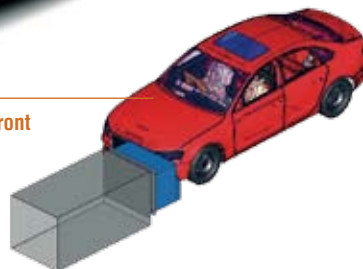
“ ESI Group consistently provides its customers with affordable simulation turnaround time, greater accuracy and increasingly larger simulation models. This versatility allows Audi to find a balance between performance and the increased number of realistically simulated design variations for the complete car range. ”
Peter Ullrich,
Crash, Impact and Safety Product Manager at ESI Group.

“ ESI products at large rely on HP-MPI for their message-passing layer. HP-MPI's performance, reliability and flexibility significantly help ESI deliver best value solutions to our customers. Recently, our flagship product PAM-CRASH set HP-MPI as the default MPI environment, while maintaining the support of others at the same time. ”
Antoine Petitet, PhD, HPC lead of ESI's Computational Structure Mechanics Development Group, ESI Group.

For more information:
www.esi-group.com/crash-impact-safety

HP support has also been essential in implementing technology that would provide enhanced reliability, high server density and computing power required to calculate the tremendous volume of data generated during the simulation process. Audi installed the HP Cluster Platform 3000BL, a system built using 320 nodes based on HP ProLiant BL460c server blades and the InfiniBand cluster interconnect, and the HP MPI, allowing a high performance and production quality implementation of the MPI standard for the HPC server.

With this HPC system, the supercomputer implemented requires a quarter less floor space and consumes a quarter less power than a traditional rack-based configuration. In addition, the blade configuration provides simple hardware maintenance, cabling and system administration and has outstanding scalability.

The combination of ESI Group software and HP hardware has enabled Audi to implement the auto industry's fastest supercomputer and at the same time to maintain its position as one of the safest vehicle manufacturers in the world.

About AUDI AG

AUDI AG is a premium luxury German automobile manufacturer which is part of the Volkswagen Group since 1964. It manufactures exquisite cars – attractive, sophisticated and technically perfect. Audi's corporate tagline worldwide is 'Vorsprung durch Technik', meaning 'Advancement through Technology'.
www.audi.com

About Hewlett-Packard (HP)

HP is a technology company that operates in more than 170 countries around the world. It offers a complete and comprehensive technology product portfolio to consumers from digital photography to digital entertainment and from computing to home printing.
www.hp.com/go/cae

Volkswagen and ESI Group
22 Years of Strategic Collaboration for Virtual Product Performance

Industry leaders are constantly looking for new or more advanced technologies to effectively address industry challenges of accelerating time-to-market and reducing product development costs.

Volkswagen, Europe's largest automobile manufacturer, decided more than two decades ago to collaborate with ESI Group to ensure that it always has the highest technology available in simulation of vehicle crash, safety and structural load cases.

The most recent positive result which has been seen from this strategic partnership is the new ESI Group software release: Virtual Performance Solution 2008. Indeed, with this new solution, Volkswagen has considerably optimized its product performance, optimized by means of significant acceleration in its overall product development process.

With this new version, the process of safety checking and behaviour of structures under operating conditions can be comprehensively simulated in all phases of vehicle development and therefore make the predictive virtual testing much more efficient.

ESI Group's software solutions are constantly developed and validated in conjunction with industry leaders such as Volkswagen Group. This allows ESI Group to underscore its continuing commitment to develop state-of-the art simulation solutions that address the market's needs and thereby strengthen competitiveness in the market.

About the Volkswagen Group

Volkswagen Group is one the world's leading automobile manufacturers and the largest carmaker in Europe. The group is made up of eight brands from six European countries: Volkswagen, Audi, Bentley, Bugatti, Lamborghini, SEAT, Skoda and Volkswagen Commercial Vehicles.
www.volkswagen.com
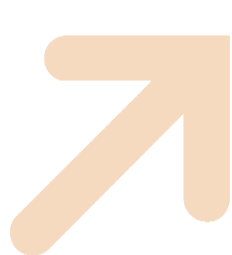
" With this further development of the software suite, ESI Group has achieved a quantum leap in the field of simulations. By being able to utilize a unique mathematical model for both, crash and load testing, we're improving our development efficiency at several stages of a project. Given the ever-shortening development cycles in the automobile sector, this gives us a decisive competitive edge. *"*

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

Courtesy of Volkswagen AG.

Courtesy of Volkswagen AG.

Volkswagen Passat:
Optimized body structure by Virtual Performance Solution for different crash scenario

" Volkswagen has once again shown its trailblazing role in the simulation field by actively supporting the further development of ESI's software suite. It is our very close cooperation that has allowed us to make these great advances. Volkswagen's decision to introduce Virtual Performance Solution in their product development process is therefore also an expression of the strategic partnership that has been forged between our companies in the last two decades. *"*

Vincent Chaillou,
President and COO of ESI Group.

For more information: www.esi-group.com/VirtualPerformanceSolution

ESI Group releases Virtual Performance Solution version 2008
A single simulation model for all performance tests

Version 2008 of Virtual Performance Solution is welcomed by manufacturers and industry leaders as a highly versatile software application package supporting an all-inclusive, scalable simulation solution for linear and nonlinear static load cases. Based on ESI Group's Simulation-Based Design strategy, Virtual Performance Solution allows engineers and industrial users to assess the performance of their products early in the development process.

Virtual Performance Solution comprises of simultaneous implicit and explicit solution schemes, which significantly simplify the simulation process. It combines several applications, technologies, and cutting-edge options to effectively address industry challenges of accelerating time-to-market, reducing product development costs, and meeting quality targets.

Multiple features have been enhanced for version 2008. Indeed, this version enables:

- Impact and crash simulation with predictive virtual testing across the extended enterprise.
- Occupant safety analysis with the optimization of safety simulation from airbag folding and deployment, to seatbelt modeling and dummy impact.
- High velocity impact scenarios analysis by evaluating the dynamic behavior of the product under high speed impact.
- Motion and dynamics simulation with the evaluation of motion and dynamics of mechanical systems for the product real life performance.
- Optimization to accelerate the decision-making by analyzing and optimizing the design simulation process or material data.

It also facilitates:

- High efficiency, Transparency, Traceability for disciplinary Computer-Aided Engineering (CAE) workflows.
- User Flexibility by being open to third-party products.

Version 2008 is user-friendly as it allows running all performance simulations with a single software installation.
It draws on ESI Group's vast compute model library (e.g. crash dummies, human models and barriers) and is empowered by Visual Environment which delivers a powerful open collaborative engineering framework for the simulation. Another step forward for our customers on their path towards a leaner innovative enterprise.

ESI Group, committed to develop and validate each of its solutions with industry leaders, has once again proved its ability to provide a state-of-the art simulation solution that addresses the needs of multiple industries.

KSS and AUDI A.G.

" ESI Group provides the market with the long-expected tool that is able to efficiently generate FE models for any folded airbags. Sim-Folder will help in making a commodity the use of accurately folded airbag, hence allowing very realistic deployment behavior for all the airbag simulations. "
Gerd Scholpp, Director Systems Engineering, Key Safety Systems Deutschland.

" From the beginning our primary objective was to ensure that only one simulation model is needed for both explicit and implicit solution schemes. Meeting this objective, along with the many other enhancements in Virtual Performance Solution 2008, underscores ESI Group's continuing commitment to developing state-of-the-art simulation solutions that address the market's needs for accelerating the overall product development process, thereby strengthening competitiveness in a market requiring ever-shorter development times at lower costs. "
Peter Ullrich, Product Manager, ESI Group

For more information: www.esi-group.com/VirtualPerformanceSolution

ŠKODA AUTO A.S

" ESI Group backed up by local services and engineering simulation software has helped Škoda reach new standards in design and production. "
Miloš Šáfr, Head of FEM Simulations, ŠKODA AUTO a.s

Škoda Superb, frontal impact with deformable barrier, 0°, 40% offset, 64 km/h EuroNCAP

Škoda Superb, side impact with mobile barrier, 50km/h EuroNCAP

Folded airbag by Sim-folder enables FPM deployment simulation considering gas dynamic effects

Courtesy of KSS and Audi A.G.

Accelerate innovation with ESI Group consulting teams!

Based on long-term projects within various fields of engineering, ESI Group has an unmatched experience in using various CAE technologies to support its customers with know-how and engineering resources. Working in close cooperation with their customers, ESI Group highly experienced service teams based worldwide integrate and develop methods to virtually test and assess their innovations.

ESI Group confirms its leadership in the engineering services industry as the services activity has recorded buoyant growth in the past two years. The continuing and amplified performance of ESI's Services activity is due to our unique know-how and global coverage that meets growing demands by industrial clients to understand and accelerate the implementation of multi-domain Simulation-Based Design.

From day-to-day assistance to engineering projects, ESI Group's teams offer immediate and expert support for fast problem solving.
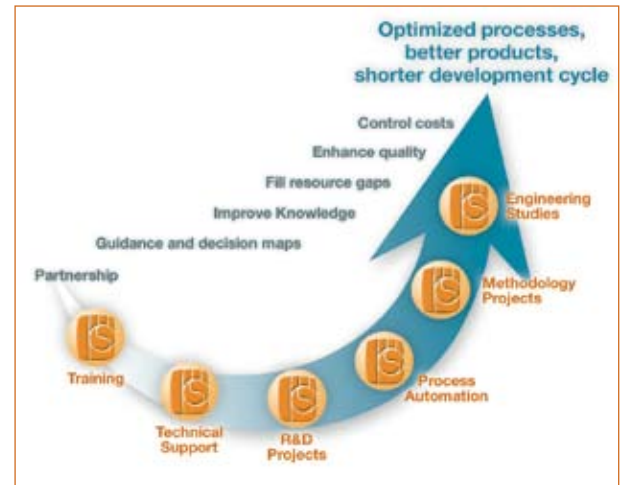
Training

ESI's training classes can be taught at ESI learning centers by experienced engineers or on client-site, with flexible training times, content, duration, and location. Engineers are trained to become proficient users thanks to our rapid and effective method of knowledge transfer. Some classes are also taught live on-line by an instructor.

**E S I   G R O U P
Learning Solutions**

For further information about ESI's training, visit:
www.esi-group.com/training

Research & Development Projects

R&D projects are carried out by ESI Group engineers jointly with academic and industrial partners, or a consortium. The goal is to test the applicability to industrial cases of a new modelling technique, new algorithm, or similar result from research produced outside ESI Group. These projects are usually co-funded by public organizations.

ITOOL EC project

The ITOOL project is aimed at providing the basis of a standard for the design, analysis and testing of textile preformed composites in

Europe. In this project, ESI Group is working on the development of an adequate integrated simulation tool for textile performing technologies for injection and for virtual performance.

Courtesy: ITOOL
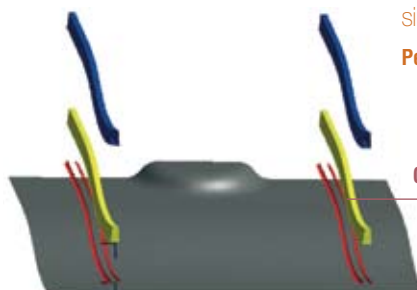
" The multi-disciplinary competencies found in the consortium and the true team work lead to sound foundations for realistic composite simulations. The three keys to success are: multi-scale approach, accounting for manufacturing in mechanical analysis and efficient management of material and simulation data. "
Peter Middendorf, Senior Expert at EADS Innovation Works.

For more information:
www.itool.eu

Process automation and integration

The objective of process automation and integration is to optimize the customers' CAE workflows and processes. Significant quality improvements, shorter project durations, and ultimately overall reduced engineering costs can be achieved through Visual*DSS* process automation or similar available technology.

Simulation-Based Airbag Folding

ESI Group offers a fast and accurate airbag folding service. The service is based on automated simulation of the industrial folding process. Projects carried out by ESI teams have shown the value of simulation-based folding: the folding patterns are more realistic than those obtained by geometric folding methods. Models become more predictive, and automation makes it more productive.
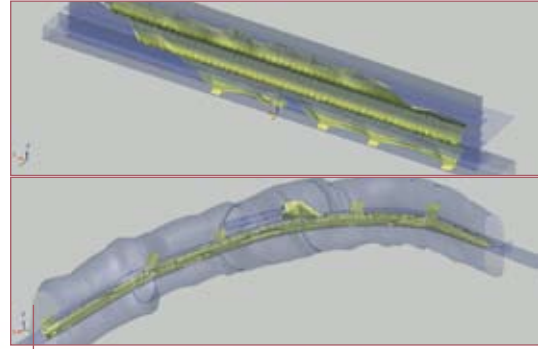

Curtain airbag folding.   Courtesy: KSS and Audi A.G.

Methodology Projects

Methodology Projects are usually carried out in joint collaboration with industrial customers. The purpose is to provide a Proof-of-Value by tuning to a specific application case the different steps of a simulation project. These projects are performed to validate specific new simulation methodologies, and also prove effective at transferring know-how to the industry.

Multi-pass Welding project with AREVA

AREVA, world leader in the electro-nuclear engineering field, and ESI Group have established a strong technical cooperation over the years. This partnership includes detailed analyses of components behaviors, studies on fracture mechanics and the development of numerical simulation tools.
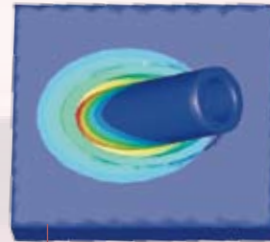

Courtesy: Areva

In addition, ESI Group provides assistance to AREVA for the simulation of components welded on a large pressure vessel. This work is carried out within the MUSICA Project involving CEA, AREVA, Institut de Soudure, CETIM and ESI Group for the development and commercialization of simulation software for welding enabling better prediction of induced physical phenomena.

For more information: www.areva.com

Engineering Studies

ESI Group worldwide service teams deliver results across various ESI Group solutions and across a wide range of industries such as Defense, Nuclear, Automotive, Transportation, Energy, Aerospace, Heavy Industry, Medical and Sports.

Our unmatched experience in the field of engineering studies helps ESI Group to better understand customer requirements and demands to develop "best in class" products.
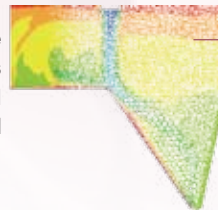
Thermo-hydraulic analysis in the water downcomer

Courtesy: Comex Nucleaire

3D Mesh of a Steam generator's bottom part
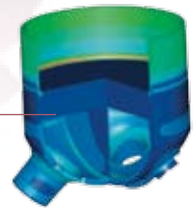
Structural Mechanics in the Nuclear industry: COMEX NUCLEAIRE

" COMEX NUCLEAIRE completed in collaboration with ESI the Behavior Analysis Report for Replacement Steam Generators (RSG) provided by Mitsubishi Heavy Industries, Ltd. (MHI) for EDF French nuclear power plants. 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 Group with its well-trained and experienced engineering service team is a substantial part of enabling Simulation-Based Design for our customers. Today's business environment needs not only products, but solutions consisting of software and services to bring the highest benefit. ESI has proven records in delivering world-class engineering services within the agreed budget and offering high flexibility and competitive costs due to its worldwide presence. "

Thomas Weninger, Services Sales & Marketing Director Worldwide Operation at ESI Group.

For more information: www.comex-nucleaire.com/en/

ESI Group releases VA One 2008.0
Significant Breakthrough for Low Frequency Vibro-Acoustic Analysis

ESI Group's VA One, a complete solution for simulating the response of vibro-acoustic systems across the full frequency range, includes the required methods to diagnose potential noise and vibration problems up front in the development process. With two major releases of VA One in 2008, ESI Group continues to provide its customers with the state-of-the-art in vibro-acoustic simulation.

VA One 2008.0, the latest release, raises the bar for full-frequency vibro-acoustic analysis and design by containing over 50 enhancements across all modules and including a new fully-integrated Fast Multipole Boundary Element Solver. This enables Boundary Element Models (BEM), with a million degrees of freedom, to be solved in a matter of hours using only a standard PC. It also opens up an extensive array of new applications including: improved models of pass-by noise and definition of exterior loads in system level SEA models.
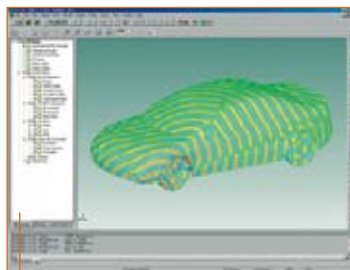
VA One FMM model of exterior sound pressure at 1.5 kHz due to excitation at front tire.

Courtesy: ATA Engineering Inc.

For more about VA One, visit:
www.esi-group.com /va-one

"VA One 2008.0 continues ESI Group's commitment to providing our customers with the state-of-the-art in Vibro-Acoustic analysis methods. With the introduction of Fast Multipole Methods, our customers can now easily simulate the low frequency response of systems that were previously too large to be analyzed with traditional Boundary Element methods. Furthermore, by combining Fast Multipole with other analysis methods in VA One, our customers can now create more accurate 'system level' models of noise and vibration across the full frequency range."
Dr. Phil Shorter, Director of Vibro-Acoustic Product Operations at ESI Group

"At ATA Engineering our clients count on us to deliver accurate solutions to challenging vibro-acoustics problems, under tight schedule and cost constraints. The core SEA capability in VA One has played a key role in our analysis solutions for a number of years, but the recent advances in FEM, BEM and Hybrid capabilities have allowed us to tackle a whole new range of problems. We can now provide accurate force and stress as well as acceleration results across a broad frequency spectrum. The ability to model the same problem in multiple different ways, mixing BEM and FEM as well as SEA also gives us the ability to better understand the response of very complex systems"
Dr.Paul Blelloch, Vice President of Aerospace Analysis at ATA Engineering Inc.

PAM-STAMP 2G and PAM-TUBE 2G Version 2008
Integration into a single software suite

The latest release of PAM-STAMP 2G directly addresses the changing market's demand with significant enhancements and new features to this unique and complete industrial streamlined scalable virtual stamping solution.

The major development of version 2008 is the full integration of PAM-TUBE 2G into PAM-STAMP 2G. PAM-TUBE 2G solution is a breakthrough for streamlining the full forming process.

PAM-STAMP 2G v2008 also beneficiates from an increase in user-friendliness and comfort of use, as well as increased performance, which provides more advanced and faster solutions with the necessary level of accuracy. It comprises fully integrated new material options such as:

■ The ESI proprietary rupture model "EWK" which offers improved crack propagation prediction;

■ The new "Corus Vegter Lite" material model resulting from ESI Group's collaboration with Corus.

Enhancement in springback solver functions allow for a simpler setup, by offering an automatic locking option, and a new out-of-core solver handles the solving of really large models.

PAM-STAMP 2G v2008 is available as a "professional package" utilizing ESI Group's flexible token licensing system.

Courtesy of hde Solutions Gmbh and Jaguar cars.

"Selecting an advanced material model always involves balancing accuracy with material data requirements and flexibility in the application of the model for different materials. The Corus Vegter Lite model, however, uses fewer parameters than the conventional Vegter model whilst maintaining a surprisingly high degree of accuracy. Corus Vegter Lite is a powerful instrument which makes use of the material knowledge at Corus and the solutions offered by ESI for the simulation of forming and crash."
Dr. Henk Vegter, Scientific Fellow at Corus Research, Development & Technology.

"The enhancements to PAM-STAMP 2G v2008 represent a significant advancement in the software's usability, making it easier for users to learn, and faster to use. These benefits, coupled with significant improvements in our core strength of accurate springback prediction, deliver great value to our customers. Employing ESI's new 'flexible token' licensing program, together with the new integrated PAM-STAMP 2G / PAM-TUBE 2G v2008 software suite, assures users unsurpassed value via maximized hardware & software utilization."
David Ling, Metal Forming Product Manager at ESI Group

For further information, please visit:
www.esi-group.com/metal-forming

Weld Planner
Fast Welding Distortion Evaluation for the production planning

Welding distortion is of particular importance during conceptual planning of production processes and development of prototypes in many industries. At the early stage of conceptual planning, knowledge of welding distortion can considerably reduce time to production and hereby save a part of production costs. If welding distortion is known prior to the stamping of single parts, it can be taken into account in the geometry of stamping tools. Further improvements can be reached by testing virtually the clamping system and the optimal welding sequence.

The assessment of welding distortion in the early stage of production planning has two major restrictions: short simulation time and limited availability of material properties as well as unrefined preliminary welding parameters. To comply with these requirements, the software tool Weld Planner was developed under the direct guidance of INPRO GmbH, Volkswagen AG, DAIMLER AG and ThyssenKrupp Technologies AG.

The new Weld Planner is a milestone in terms of simplicity. The graphical user interface provides access to this tool even for people unfamiliar with the finite element. Training to be operational takes usually less than half a day. The major feature of this software is a clear and straightforward approach to the simulation. This includes fast generation or automatic finding of weld seams between parts, convenient definition of the welding sequence as a robot plan, typical industrial clamping conditions and versatile possibilities for the visualization of the computed distortion.

In the development phase, Weld Planner has been successfully applied by INPRO and its parent companies to evaluate the welding distortion of complex automotive parts and part groups.

> " The Weld Planner is an easy to use and fast predictive tool. In the future, it will be integrated in product development at VW in Braunschweig. The Weld Planner has the potential to save one to two experimental loops, meaning 10 to 20k€ per part. "
>
> **Hans-Werner Scholz from the Development department at Volkswagen Braunschweig**

Distorsion Engineering in 1 Hour - The New Weld Planner!

Weld Planner is now commercially available. Seize the opportunity to subscribe to a one-day certifying training course to perform simulation-based welding distortion engineering. Together with the training comes a one-month trial license that can be used in production mode from the very first day.

www.esi-group.com/welding

Updates of ESI Group's Visual-Environment latest release

Visual-Environment helps engineers get the job done in the easiest and fastest possible way by offering an innovative open collaborative engineering framework where new applications and interfaces with multi-domain solutions can be easily implemented.

Visual-Environment is constantly evolving to address various disciplines and existing servers. The latest Visual-Environment releases focus on major features enhancement. While version 4.5 benefits from general enhancement such as Performance, Memory and Usability which have improved by 20 to 30 %, version 4.6 concentrates on specific improvements. Safety tools such as Dummies and Seat Positioning are updated in the Pre-Processor application and the Post-Processor application benefits from improved Pre-Structured Motion (PSM) extraction, Section Cut, Templates and Chase Iterations.

Industry-leading simulation experts have experienced improvements in the productivity of model setup and post-processing thanks to the integration of Visual-Environment in their engineering process.

Visual-Environment 5.0 will soon be released including the following new features:

- Flexible Rapid Model Checker
- Bolt Creation
- Preview of Joint Motion
- Simulation-Based Airbag Folder
- Universal Plot Reader
- ERF support: new format of post processing helping users to extract selected results data

> " With the help of Visual-Crash DYNA, Visual-Viewer and Visual-Process modules of Visual-Environment, model setup for LS-DYNA Analysis is quick, comparisons of results from different iterations are fast, simple and clear. Visual-Process allows us to set up customized macros of repeated processes to further improve turnaround time. "
>
> **Jonathan Young and Kyle A. Ott, Engineers at Toyota Technical Center, USA.**

> " With the help of Visual-Safe MAD and Visual-Viewer modules of Visual-Environment, model setup for Madymo Analysis is very quick and comparing the results of different iterations are very fast, simple and clear. Visual-Environment helps us make proper decisions in vehicle safety. This tool is robust and substantially reduces the lead time and improves the productivity. "
>
> **Mahesh Swamy, Manager at Chrysler LLC.**

CHRYSLER GROUP

www.esi-group.com/visual-environment

Nissan CAE Process
Automation Implementation under
ESI Group's Visual*DSS* application

Nissan Technical Center North America (NTCNA) recently faced an important challenge causing the need to implement a CAE Process Automation Solution. NTCNA was indeed challenged by the prediction of an increase in the CAE workload in the coming years which could not be tackled using its CAE system at the time. Indeed, the system was incompatible at different R&D centers and too many standalone automation tools were already developed for local usage.

Hence, NTCNA started to undertake a project with ESI Group using ESI's Visual-Environment solution in order to improve CAE efficiency, which is a function of process automation and CAE data management.

With Visual-Environment, ESI Group delivers the most advanced end-to-end decision support system to further leverage enterprise best practices and increase the value of simulation.

Visual*DSS* and its Visual-Process module provide an advanced CAE environment for process customization and automation, enabling companies to build and manage simulation models for multi-domain usage, automate project workflow, and manage simulation content data.

To implement the necessary tools at NTCNA, three main automated processes were evaluated:
- A Seat Belt Anchorage Analysis Model Setup,
- A Seat Belt Anchorage Analysis Report Generation,
- A Spot Weld Evaluation Report Generation.

Showing successful results, these automations were applied and showed about 85% efficiency improvement.

In terms of CAE data management, the implementation of Visual*DSS* within NTCNA CAE helped upload the catalogue of existing simulation data into the database server, track and propagate down and up-stream design updates to other disciplines, and allowed to keep the scoped functions in validation with NTCNA environment, data server and network.

For more information, visit:
www.esi-group.com/visualdss

Example of process automation with Visual-Process in Visual*DSS*

Courtesy:
Nissan Technical Center, NA
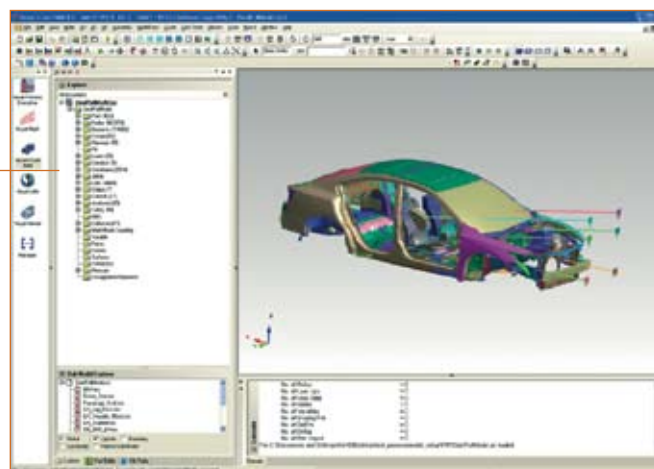
" With the Visual-Process module in Visual*DSS*, developed automation tools on FMVSS 210 Seatbelt Anchorage Analysis gave us not only immediate return on investment but also the confidence to leverage these tools to increase repeatability and reproducibility with substantial lead time and labor cost reduction. "

Mr. Daniel Kim,
Nissan Technical Center, NA.

About NTCNA R&D Center

In North America, Nissan operations include automotive styling, engineering, consumer and corporate financing, sales and marketing, distribution and manufacturing. Nissan markets vehicles under both the Nissan and Infiniti nameplates, and the Nissan North American headquarters is located in Nashville, Tennessee.
www.nissanusa.com

ESI Group, member of QLogic HPCtrack program

QLOGIC™

Companies using Computer-Aided Engineering (CAE) and other digital simulation solutions know the value of having faster and more complete simulations to design new products. This is key to gaining competitive advantage in today's challenging market. The recent alliance between ESI Group and QLogic has for main purpose to provide users with faster 'time-to-solution'.

QLogic customers utilize QLogic High Performance Computing (HPC) interconnect solutions for applications requiring Computational Fluid Dynamics (CFD), Finite Element Analysis (FEA), crash simulation, process modeling and airfoil simulations. Users can now benefit from this alliance by combining QLogic product solutions and ESI Group's simulation applications to achieve better product design and quicker time to market.

Thanks to this program, ESI Group gains access to the resources it needs to create, test and certify its solutions'

interoperability with QLogic storage and high performance clustering technologies and is listed in the QLogic HPC Interoperability Guide. This guide is widely distributed and provides interoperability matrices that, at a glance, enable companies to identify certified HPC products, solutions, and services best suited to their needs.

As for QLogic, the alliance with ESI Group has helped expand its growing HPC ecosystem which now includes more than 50 members and is considered one of the largest worldwide.

" The extremely low latency and high bandwidth of QLogic InfiniBand solutions make it possible for ESI Group customers to benefit from faster 'time-to-solution' with more complex models. The high performance networking infrastructure of the QLogic HPC ecosystem allows users to include significantly more details in their models, minimize assumptions and reduce turnaround time. "

Raymond Ni, Computational Structure Mechanics Development Director at ESI Group

" ESI Group's software suite expands the QLogic HPC ecosystem for manufacturing by providing an entire application suite that realistically simulates a product's behavior during certification testing. This helps companies fine tune their manufacturing processes, and allows them to evaluate the operational or accidental environment's impact on product usage. "

Joe Kimpler, Director of Business alliances at QLogic Corp

About QLogic

QLogic is a leading supplier of high performance storage networking solutions, which include the controller chips, host adapters and fabric switches that are backbone of storage networks for most Global 200 corporations.
www.qlogic.com

ESI Group Training Offers

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Computer Simulation Can Help Meet Catalyst Durability Requirements

Proton Exchange Membrane (PEM) fuel cells continue to be among the most promising alternative energy devices for transportation as well as stationary applications thanks to their key advantages – high efficiency, simple design, low emissions, low operating temperature and low noise.

As power density specifications for PEM fuel cells are nearing target levels, the attention is now turning toward meeting critical durability requirements. While the membrane, electrodes, bipolar plates and seals all must meet durability requirements, one of the most critical challenges is catalyst durability.

Catalysts typically fail through a chain of events starting with fuel starvation which leads to carbon corrosion which in turn degrades the catalyst.

Catalyst Degradation Evaluation

Fuel starvation can occur during start/stop cycles when there is insufficient hydrogen fuel for a short period of time. During start-stop cycles, the fuel electrode may be partially exposed to hydrogen and partially to air. In this situation, the region with the hydrogen drives the cell while the other half of the cell which is hydrogen deficient draws the current and creates reverse-current conditions.

If hydrogen is not available the active sites tend to react with carbon. Carbon has an equilibrium potential of 0.207V at 25°C so it is thermodynamically unstable at typical fuel cell operating conditions. Fortunately, slow kinetics allow the use of carbon supports in fuel cells. But at high electrode potential, carbon corrosion can be a problem. When this occurs, carbon corrodes and the platinum catalyst particles suspended in the carbon move to other areas of the fuel cell. As the catalyst degrades, areas of the fuel cell become permanently disabled and power output is reduced.

The specific amount of catalyst degradation that occurs under these conditions is dependent upon design parameters such as the length, height and width of channels, porosity and permeability of the porous media, the amount and distribution of catalyst and other factors.

In the past, the only way to evaluate the performance of alternative designs in terms of catalyst durability performance was to perform very expensive and time-consuming physical tests. More recently, special purpose computational fluid dynamics (CFD) codes such as ESI Group's CFD-ACE+ have demonstrated the ability to simulate the degradation and durability of catalysts in PEM fuel cells.

Validating the CFD model

These CFD codes have been validated against experimental data and demonstrated to accurately simulate fuel cell operation under a wide range of operating conditions.

Evaluating the CFD model

After validation, the CFD model was used to firstly evaluate corrosion during start/stop cycles.
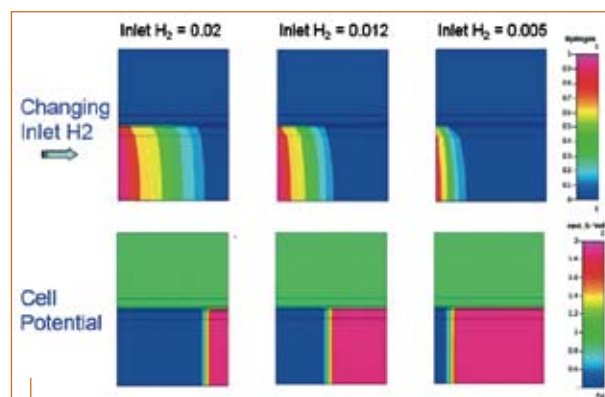
Figure 1: Isocontours of hydrogen mass fraction (normalized) and potential distribution for different stoichiometry values of hydrogen during partial starvation operation. The model is scaled in Y by a factor of 100.
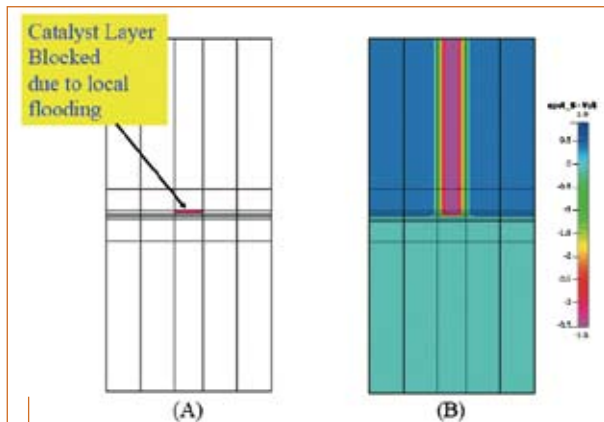
Secondly, the model was use to evaluate local starvation.

Figure 2: Schematic of catalyst blocking (left) and corresponding cell potential distribution (right) during local starvation and carbon corrosion

Finally, the CFD model was used to simulate the reverse-current configuration.
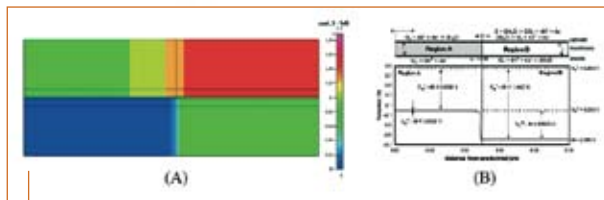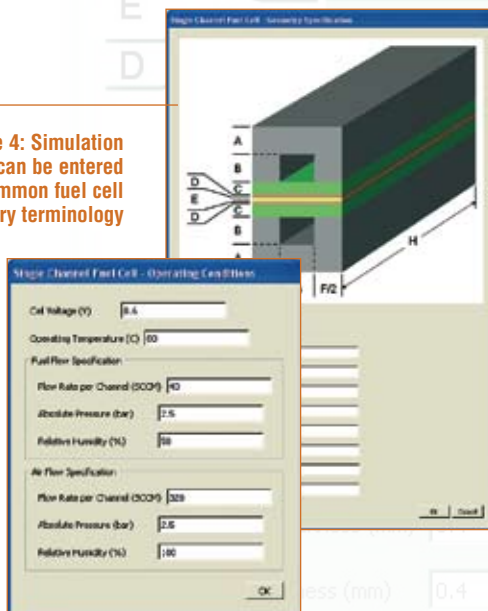

Figure 3: (A) CFD prediction of potential distribution in reverse-current configuration; (B) Potential distributions along anode flow path during reverse current conditions as determined by Reiser et al.

An easy to use design tool

Figure 4: Simulation details can be entered using common fuel cell industry terminology

For the user who wants to get started quickly, the solution is the CFD-ACE+ PEM Fuel Cell Design Toolkit. It uses advanced scripting to setup the model, create the geometry and structured mesh system while not requiring much input from the user. The inputs are given in terms that a fuel cell designer understands. General purpose CFD software forces users to specify bias voltage, mdot or velocity inlets and perform tedious calculations to determine the mixture composition to represent the humidity level which can be quite time consuming. However with the new model the user just inputs geometric parameters, cell voltage, SCCM flow rates, and relative humidity and the script converts all values as necessary and sets up a normal CFD run.
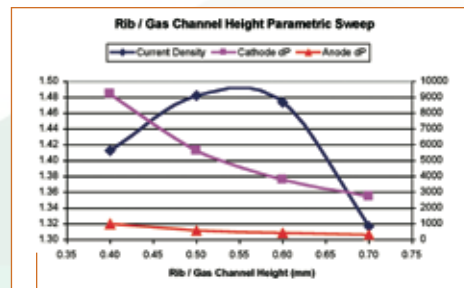
Figure 5: Parametric run results varying the rib / gas channel height

Various results can be collected and studied to determine the effects of design parameter changes. For example changing the height of the ribs or gas channels (parameter "B" in figure 4) affects the cell current density and pressure drop through the cell as shown in Figure 5.

These results show that CFD simulation with ESI Group's CFD-ACE+ can accurately predict the carbon corrosion reactions that result in catalyst degradation when the fuel cell is starved for fuel. CFD simulation can be used to evaluate a wide range of design parameters in a relatively short period of time and determine how they perform from a catalytic durability standpoint. This capability should make it possible to significantly improve the durability performance of the next generation of PEM fuel cells.

For more about CFD-ACE+, visit:
www.esi-group.com/products/
Fluid-Dynamics/cfd-ace

Success of CAST-IT:
Casting training and support program

namtec
national metals technology centre

Collaboration and teamwork are key to helping businesses improve their prototyping and manufacturing process engineering in applied mechanics. Hence, in March 2007, the National Metals Technology Center (NAMTEC), as part of its ongoing support to the United Kingdom's metals and manufacturing industry, launched a training and support program 'CAST-IT' in partnership with ESI Group. The program was to support foundry businesses wishing to assess and adopt the use of casting simulation techniques.

The program was sponsored by Yorkshire Forward and was partly financed by European Regional Development Funding.

CAST-IT was launched to provide training and assistance in the application of Casting Simulation techniques. The CAST-IT business support program comprised of software training, access to software licenses of QuikCAST and ProCAST, technical support and a tips & tricks session to get more from the software tools. Manufacturing companies, who only had to dedicate their time, were able to evaluate the ROI from casting simulation in today's risky environment.

Ultimately CAST-IT is intended to provide guidance into the successful adoption of casting simulation and long-term engineering and business benefits.

QuikCAST and ProCAST, ESI Group's casting simulation solutions are used by a large foundry community worldwide and are the result of more than 20 years of collaborative development with industry and academia.

Supported by

YORKSHIRE FORWARD

The Region's Development Agency

Project Part-Financed by the European Union

European Regional Development Fund

" The CAST-IT program provides foundry businesses with a fantastic, first hand opportunity to evaluate software and also to develop new engineering skills and practices using Virtual Manufacturing software tools for casting simulation. The sophistication of these software tools enables rapid and risk-free design development of components and foundry methods that can be assessed completely off-line, thereby maximizing productivity and utilization of a foundry's resources. "

Roger Darlington,
Manager of the Design and Modeling Simulation Center at NAMTEC.

" The CAST-IT event was an exciting opportunity to meet local casting companies and help them set up a dedicated virtual approach for improving their processes. Many casting industries with different casting processes (sand, gravity die, investment, HPDC, etc) attended the 1-week training period. It was an occasion to focus on their components using our casting solutions QuikCAST and ProCAST. Depending on their equipment and organization (CAD software, process department...), the best approach was individually thought. A 3-month close assistance (technical support and meetings) was done in order to help each customer in their learning curve. "

Loïc Calba,
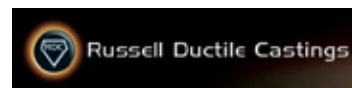**Quality & Customer Support Manager at Calcom ESI.**

First Success:
Russell Ductile Castings
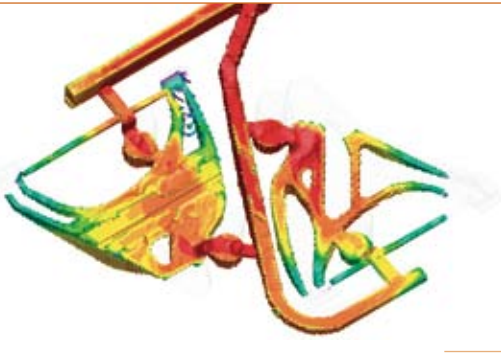
Russell Ductile Castings

The first success was with the company Russell Ductile Castings who invested in casting process simulation for filling and solidification assessments after participating in the CAST-IT program.

Russell Ductile has extensive in-house facilities across 2 sites including molding lines using conventional boxed molding technique, another line using a box-less production method and other lines with resin bonded capability up to 6 tons. As a world-leading supplier of ADI castings, Russell Ductile prides itself on its flexibility to supply a range of volumes from small batch production orders to quantities in excess of 20,000 units per year with a total output of 10,000 tons per annum. Until recently, Russell Ductile did not offer its customers process simulation support for mold development of its castings but had been keen to acquire further in-house engineering capabilities to support its customers.
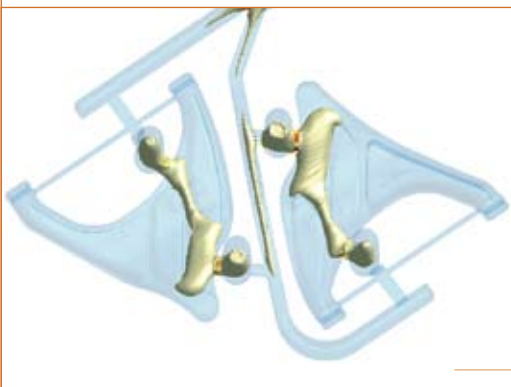
Resin Mold Cast Iron Casting Simulation

**Filling Temperature Distribution**

Shrinkage Porosity

Fraction of Solid

Courtesy: Russell Ductile Castings

" Since its introduction to the business, QuikCAST simulation has become another tool frequently used by the technical team throughout all stages of product development. At the outset, most work was done on new product implementation where potentially difficult jobs were simulated prior to tooling being started. Right first time results and deliveries have resulted in customer confidence with further orders being obvious benefits. Testament to the software's results is the fact that team members with 40 years experience in the black art of foundry methods are often requesting simulations and reviewing the results as part of their decision making process. "

Tim Cant,
Technical Sales Manager at Russell Ductile Castings
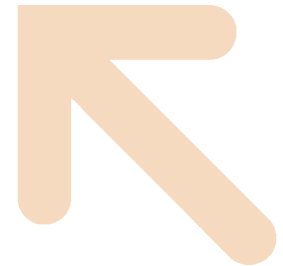
CAST-IT has been a real success for ESI Group and NAMTEC since companies such as Russell Ductile Castings have had the chance to see first how simulation software can help them reduce cost and time-to-market. CAST-IT participants became far better equipped to judge when and how to use simulation in the casting process.

Following this success, ESI Group and NAMTEC are already planning a similar program for the welding sector.

www.esi-group.com/casting

About NAMTEC

NAMTEC was established in 2002 to improve the competitiveness and sustainability of the metals and related engineering industries throughout the UK. A key part of NAMTEC's role is to facilitate the transfer of technical information and knowledge between industry and academia, to the mutual benefit of both parties.
www.namtec.co.uk

## About Russell Ductile Castings

Russell Ductile Castings have been manufacturing in Leicester since 1864 and are part of the successful Chamberlin & Hill plc group. They produce casting components range in sizes from 0.1 kgs to 6000 kgs for a range of markets with applications such turbines, transmissions, oil and gas compressors, earth moving equipment, vacuum pumps.
www.russellcastings.co.uk

Vulcan SFM uses ProCAST
to simulate and optimize the biggest ever ingot produced in the UK

SHEFFIELD FORGEMASTERS
INTERNATIONAL
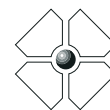
Engineers at Vulcan SFM, a subsidiary of the Sheffield Forgemasters International Ltd (SFIL) specializing in design and project management, have recently been faced with the challenge of casting a large ingot to produce plate mill rolls used by the ship-building industry large metal sheets up to 4.5 meters wide, about one meter wider than most existing rolling mills can produce. Net delivery-weight of the mill roll is around 170 tons whilst the estimated total weight of the ingot approximately 300 tons. Ingots of this size have no room for error.

Finite Element modeling capabilities were used to simulate and optimize the design of the ingot mold as well as the casting process itself. Indeed, this involved producing a number of highly complex geometries for ingot mold design using advanced CAD system and running a series of numerical simulations to examine the solidification progress in each design. The main considerations for the ingot design focused on a trade-off between extended solidification times to promote axial soundness and restricted solidification time to reduce the extent of segregation in the final product.

To run these simulations, Vulcan SFM chose ESI Group's casting solution. ProCAST allowed Vulcan SFM to simulate the casting process in a relatively short computational time which means that several scenarios were tested thoroughly before reaching the optimum solution. Furthermore, ProCAST results were in agreement with the inspection results of the final product. The computational model was truly representative of the actual feeding characteristics for such a large ingot.
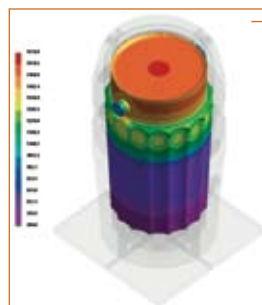

Large ingot and finished plate mill roll

Ingot Development Casting Simulation

Temperature (°C)

Fraction of Solid on the left and Shrinkage Porosity on the right
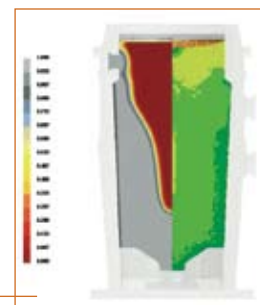
" Using ProCAST software, SFIL was able to analyze several virtual scenarios before delivering a 'right first time' ingot casting. After forging it to produce the final roll shape and NDT testing, it was evident that this was the highest integrity ingot ever produced at SFIL. "

Jesus Talamantes-Silva, Research and Development Manager at Vulcan SFM.

About Vulcan SFM

Vulcan SFM is the world's leading supplier of large, safety-critical steel castings to the offshore industry. For more than 20 years, Sheffield Forgemasters International Ltd (SFIL) has designed and manufactured offshore steel castings which have been tried and tested around the world, supplying over 50,000 tonnes of cast steel components for use in jackets, decks, semi-submersibles, sub-sea pipelines and various mooring systems.
www.sheffieldforgemasters.com/vulcan/home

The 300 tons ingot after being taken out of the mold

Courtesy: Vulcan SFM

www.esi-group.com/casting

ESI Group and LAC/BIAM in China

A joint Simulation Center of Advanced Composites in China, between ESI Group, the Beijing Institute of Aeronautical Materials (BIAM) and the National Key Laboratory of Advanced Composites (LAC) was recently established to support the strategic upgrade of the Chinese aerospace manufacturing industry from an analogue to a digital base.

ESI Group and the Beijing Institute of Aeronautical Materials

BIAM has selected ESI Group's solutions for Composites manufacturing and performance simulation for their composite research.

ESI Group's composites and plastics solution is made of four different software packages: PAM-FORM, dedicated to non-metallic forming processes; PAM-QUIKFORM for composite part feasibility assessment, PAM-RTM – Resin Transfer Molding and infusion processes – simulating the manufacturing processes of resin injection/infusion; and SYSPLY, advanced solution for designing, analyzing and optimizing composite material structures.

BIAM also cooperates with ESI China, ESI Group's Chinese subsidiary, for vertical application development, and composite database development.

As a partner, BIAM will continue to benefit from ESI Group's expertise in Simulation-Based Design, while at the same time offering excellent testing facilities to further improve the accuracy of composite simulation.

" The composite simulation solution from ESI Group is very attractive to us. The Resin Transfer Molding (RTM) process will have a good future in China. As ESI Group has such a wide scope of composite simulation solutions, I am confident that ESI's solutions will benefit BIAM and LAC, and will leverage China's aeronautics composite simulation level. "

Dr. Yi Xiaosu, Director of the Science Technology Committee at Beijing Institute of Aeronautical Materials

About LAC

LAC carries out applied research and engineering applications in advanced composite materials for national defense, aerospace, and economic growth.

" I'm very glad to have the opportunity to cooperate with BIAM and LAC. LAC is famous in China, they are very professional in composite material research, and have a lot of experience. We at ESI Group offer a competitive comprehensive composite simulation solution enabling realistic simulation through integrated performance and manufacturing simulation. So the cooperation between us is a benefit for both sides and will bring to customers the best possible combination. "

Mr. Zhang Su, General Manager of ESI ATE.

About BIAM

BIAM, China's leading aerospace composites research and development institute, is one of the largest national institutions in the field of materials research and pilot-production and China's national resource for aeronautical materials and manufacturing technologies.
www.biam.com

Synergy of Expertise between
COMEX NUCLEAIRE and ESI Group

Now and again, partnership is key to addressing the challenges of cost-reduction and international development.

ESI Group has recently signed a 3-year partnership agreement with COMEX NUCLEAIRE, a major player in the nuclear field, aimed at developing a universal services offer worldwide and reduce design and operational costs.

Industry leaders will benefit from development solutions combining COMEX NUCLEAIRE's industrial and nuclear engineering services with ESI Group's realistic simulation solutions. This synergy will thus enable them to improve the performance of their various nuclear facilities by creating projects and tests virtually before starting the work, which is always a great consumer of resources.

Besides these objectives, the

two companies are cooperating to meet the demands of research and development facilities such as ITER - an international project for fusion power - and to undertake nuclear and industrial maintenance projects, such as the supply of replacement steam generators for French nuclear power plants.

" This agreement attests the synergy of our fields of expertise and to the demonstrated effectiveness of our joint teams on several projects. It fully supports COMEX NUCLEAIRE's strategy, which plans for international development and industrial diversification. "

Marc BRACHOTTE, Deputy General Manager of COMEX NUCLEAIRE.

" The projects carried out jointly with COMEX NUCLEAIRE's teams have allowed us to assess ESI Group's synergies with this global player on a human scale. The outcome is extremely positive as today we are launching a global long-term partnership. Our joint offer and a thorough knowledge of each other's domains of expertise will allow us to benefit from our respective international positioning to further develop close connections with our customers. "

Tomasz KISIELEWICZ, PhD., Executive Vice President of Global Projects and Engineering Services at ESI Group.

About COMEX NUCLEAIRE

COMEX NUCLEAIRE is a major player in the nuclear field. It is involved in the design and construction of facilities, maintenance and support to operators, as well as engineering and project management of decommissioning of nuclear power plants. COMEX NUCLEAIRE is a subsidiary of ONET TECHNOLOGIES.
www.comex-nucleaire.com/en/

ESI Group strengthens its position in Europe with ESI Italia

ESI Group has been working in Italy for many years thanks to a local network of agents and distributors. To respond to the considerable growth potential in the Southern European market, the Group has recently opened a new subsidiary in Italy.

ESI Group's expansion reinforces its presence in Europe, and will help identify new customers and significantly strengthen relationships with existing clients and partners. The opening of ESI Italia is also in line with ESI Group's distribution network development strategy worldwide.

ESI Italia is lead by **Denis Luci**, Managing Director, and **Valerio Galli** has been appointed Technical Manager.

Valerio.Galli@esi-group.com

Denis.Luci@esi-group.com

" The creation of ESI Italia is proof of our commitment to actively strengthen our business in one of the main European countries. At the same time, ESI keeps extending its worldwide presence to better help our customers keep their international competitive edge by expanding the usage of Simulation-Based Design right from the preliminary product design phase. "

Marco Gremaud, Head of International Business Units at ESI Group.

" I am convinced that Italy will bring attractive growth opportunities for ESI Group. We have an ambitious development plan to support existing and new customers and help them deliver better products with more innovation and at lower prices with the support of ESI's high value added software and services. "

Denis Luci, ESI Italia Managing Director.

ESI ITALIA

Via San Donato, 191 - 40127 Bologna, Italy
Tel : +39 051 6335577 - Fax : +39 051 6335601

Mark your calendar for these events!

Date	Event		Place
Dec 09, 2008	**ITB - Seating Systems 2008**	2nd Annual event focused on Seating Systems	Novi, Michigan, USA
Dec 17-19, 2008	**SAPEM 2008**	Symposium on the Acoustics of Poro-Elastic Materials	Bradford, UK
Jan 12-15, 2009	**Introduction to ProCAST**	Basic Training on Casting Simulation	Bloomfield Hills, Michigan, USA
Jan 21-23, 2009	**SIAT 2009**	Symposium on International Automotive Technology Conference organized by The Automotive Research Association Of India (ARAI)	Pune, India
Jan 27-28, 2009	**PAM-STAMP 2G Step-Up**	Advanced Training on ESI Group's Stamping Solution	Osaka, Japan
Feb 05-06, 2009	**PAM-CRASH Forum 2009**	ESI Gmbh's Event on Dynamic Impact Simulation	Fulda, Germany
Feb 09-12, 2009	**IQPC - Innovative Seating 2009**	4th Annual Conference - Meeting the space challenge and Efficiently integrating comfort features with safety systems	Wiesbaden, Germany
Feb 10-13, 2009	**Introduction on CFD-ACE+**	Basic Training on the most advanced Computational Fluid Dynamics and Multiphysics software	Santa Clara, California, USA
March 02-06, 2009	**Weld Quality And Residual Stress Engineering**	Basic Training on Welding Manufacturing Processes	Plzen, Czech Republic
March 24-26, 2009	**JEC Composites Show 2009**	The Biggest Composites Exhibit in Europe	Paris, France

On the Web: My-CAE.com!

Cost-effectiveness in Eastern European territories has always been an issue for MECAS ESI in the Czech Republic. Indeed, the expenses associated with time and travel when visiting customers can be very high compared to the scope of the requested support.

This is why MECAS ESI has recently developed a platform "My-CAE.com" for online application studies. This new web interface enables small industrials to effectively evaluate manufacturing processes such as stamping, casting and heat treatment processes with the help of MECAS ESI's expert engineers.

Benefits:

- Automatic definition of the task through a set of standardized data-forms
- Fast evaluation of the task and automatic offer preparation (specifying results date delivery)
- Automatic report delivery focusing on crucial steps of the process.

See more on:
www.My-CAE.com

Launch of ESI CFD Mobile!

ESI CFD Mobile is the first application to provide remote access to CFD-ACE+ core applications (CFD View and CFD GUI) through a simple, yet powerful interface. ESI CFD Mobile allows engineers and managers to have handheld access to their ESI products anywhere. Initially the application will be using the iPhone and iPod Touch platforms from Apple, running v2.0 or higher operating system.

ESI CFD Mobile will provide CFD results visualization and access to solver metrics while the solution is running at the workstation. This application increases productivity by allowing users access to projects at anytime from anywhere whether it is during a meeting, while traveling or when simply away from their desk.

ESI CFD Mobile allows users to check on solution progress, or interact and share results with colleagues through the intuitive gravity interface utilizing the built in accelerometers of the handheld device.

" We are excited to offer this unique handheld application free of charge for iPhone and iTouch users via the Apple App Store. We believe our CFD and multi-physics customers can benefit from intuitive interfaces and remote access to our products from anywhere "

Joseph Strelow, Director of Design and Analysis Simulation at ESI Group.

Visualization Services using CFD View v2009

2008/2009 First half sales: €29.3M

Organic Growth of +10%

First-half sales totaled 29.3 million euros, up +10% at constant exchange rates organically.

This growth is mainly associated with two key factors:

- License sales for the six months were up +7% at constant exchange rates, a similar trend to the two previous quarters.
- Services activity continued to record buoyant growth, showing an increase of +20% at constant exchange rates over the first half of 2008/09 compared to the same period of the previous financial year.

Geographically, sales were split as follows: 46% in Europe, 40% in Asia and 14% in America. The contributions of the Asian and American zones were penalized by exchange rate effects. Europe's fine performance, with sales up +13% in euros, was associated with the winning of major new contracts, whilst the Asian and American zones recorded significant growth in volume terms, gaining +8% and +10% respectively.

Outlook

Alain de Rouvray, ESI Group's Chairman and CEO, concludes: "*The high level of repeat business for License sales lays witness to the substantial renewal of licenses by our clients, which ensures us good visibility on this activity despite an economic situation that remains turbulent. The continuing and amplified fine performance of Services activity today reflects the gradual change in our model towards increased high added value Services. It confirms our leadership in this domain, with unique know-how and global coverage that meets growing demands by industrial clients to be supported in their understanding and accelerated implementation of multi-domain Simulation Based-Design. This excellent performance of strategic Services is leading to the adoption of new licenses and secures the buoyant growth and the strengthening of our software activity.*"

Sun microsystems

With ESI Group's CAE solutions for Solaris 10 on x64, get the performance you demand

Getting the overall performance, stability and compatibility you demand just got easier, thanks to ESI Group and the Sun™ Solaris™ Operating System.

With ESI Group's virtual performance and manufacturing solutions available for Solaris on UltraSPARC, AMD- and Intel-based platforms, complex problems with larger data sets, what-if analysis, and compute-intensive workloads have a simple answer: ESI Group and Solaris.

Fast and reliable. Just what you'd expect from Sun and ESI Group, a leader in CAE.

Take 10 minutes to learn more at **sun.com/esi-group**

Interested in joining our HPC community?
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