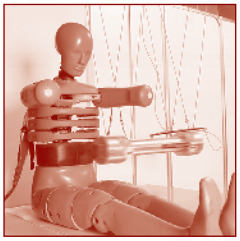
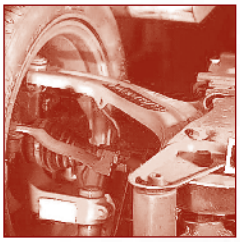
CRASH & SAFETY

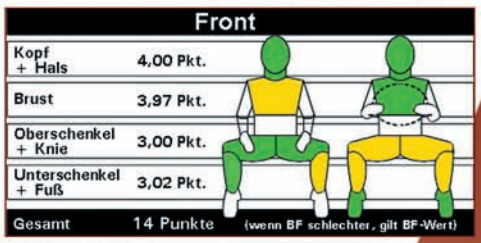
ESI GROUP
THE VIRTUAL TRY-OUT SPACE® COMPANY

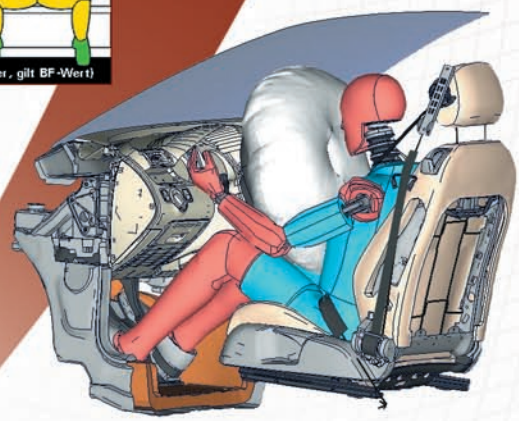
PAM-CRASH 2G

Virtual Testing for Crash & Safety Professionals









Selected References

HYUNDAI

"Hyundai uses PAM-CRASH 2G to speed product development and drive collaboration. In the certification process of a vehicle, PAM-CRASH 2G enabled us to take up the challenge of decreasing the number of prototype phases. Modeling of crash impact and airbags position have been carried out in a reasonable computation time, saving time and reducing delays, allowing us testing on more crash scenarios. "

S.G. Hong, Vehicle CAE Team Leader, Hyundai

KARMANN

"The addition of PAM-STAMP 2G data to our crash simulations requires to have accurate results when using new types of steel, such as the new high strength steel DP600 with increased hardening effects compared to common steel. The ability to include this information in the PAM-CRASH 2G simulation can make a crucial difference in the correlation between simulation and prototype testing. "

Mr. Norbert Schulte-Frankenfeld, Manager of CAE, Wilhelm Karmann GmbH

SKODA

"The body structure of Skoda Fabia, was entirely designed with the help of PAM-CRASH 2G. Increased competition and higher market standards, have made it impossible for Skoda Auto to develop a car model without resorting to computational simulation. ESI Group's simulation solution for crash analysis within the VW Group, has taken our company one step closer towards fully virtual prototypes."

Ing. Miloš Šáfr, Manager of FEM department, Škoda Auto, a.s.

VOLKSWAGEN

"PAM-CRASH 2G is a solution to drive business value and gain a competitive edge. We used PAM-CRASH 2G for the frontcrash simulation with subframe failure prediction. Its multi-scale coupling using subcycling enables the representation of locally refined models for detailed failure analysis. Computation time has been greatly decreased due to subcycling in comparison with standard PAM-CRASH 2G jobs. Morevover, code coupling enables further applications, like convenient handling for Car-To-Car crash."

Mr. Greve, CAE Methods, Volkswagen Group Research

Crash test and Occupant Safety simulation solution for the extended enterprise

Since the major engineering breakthrough in 1987 with the first full scale crash simulation of a car, ESI Group has been constantly striving to deliver innovative and state-of-the art technology in crash test and safety simulation. PAM-CRASH 2G, ESI Group's flagship physics-based simulation software, today provides our customers with the versatility, product integration, quality and reliability required to bring the best product to the market.

All actors of the automotive industry are asked to save on costs while reducing their time to market, rolling out a highly diversified product portfolio, and meeting stringent safety requirements and environment regulations. In direct response to those industrial requirements, the solution offers predictive virtual testing accross the extended enterprise.

PAM-CRASH 2G helps our industrial partners improve their product lifecycle while saving time and money. Fully integrated within ESI Group's solution offer, PAM-CRASH 2G allows easy multi-chained process coupling across various engineering disciplines. Initial conditions resulting from the manufacturing processes, such as stamping or casting, can be taken into account for better behavior and accuracy of the part to be crashed. New rupture models precisely characterize new high performing materials which are now currently used by the automotive industry. Embedded within a new pre and post processing open environment with advanced capabilities in communicating with tier solutions, PAM-CRASH 2G favours collaborative engineering between OEM, tier1 and tier2 and leverages each one's competencies.

- Allows collaborative engineering across design and manufacturing departments (casting, stamping…) through product/process integration
- Reduces design cycle
- Shortens time to market
- Optimizes costs
- Decreases the number of prototype phases
- Allows the testing of more crash scenarios
- Enables easy changes of design and test parameters
- Improves crash testing and occupant restraint systems
- Brings deeper insight into energy absorption mechanisms, kinematics and injury criteria

Shared within the extended enterprise, PAM-CRASH 2G embraces various manufacturing processes based on realistic material properties. It supports collaborative work between users, customers, suppliers and all actors participating in the crash simulation process.

STAMPING

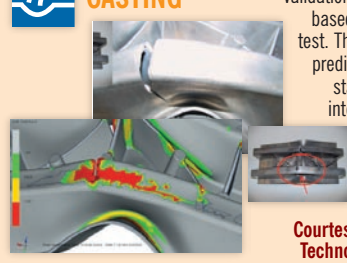
PAM-CRASH simulation (without coupling)

PAM-STAMP + PAM-CRASH (with coupling)

«A coupled PAM-CRASH/PAM-STAMP approach helps to design parts to their just needed performances» *Laurent Taupin, ACI*

Courtesy of Auto Chassis International

CASTING



Validation of fracture prediction based on a 3 point bending test. The porosity distribution predicted with the ProCAST standard model is taken into account in the crash simulation.

Courtesy of BMW and Alcan Technology & Management

PAM-CRASH 2G

Courtesy of Volkswagen AG

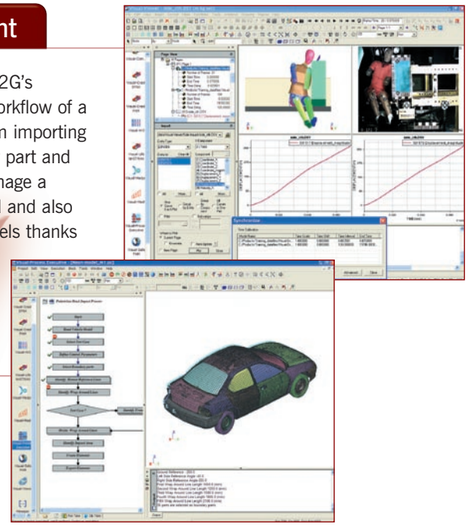
PRODUCT/PROCESS INTEGRATION

PAM-CRASH 2G in Action

From the first drawings…

Visual Crash Environment

Offering ease-of-use, PAM-CRASH 2G's environment supports the whole workflow of a crash simulation case. Starting from importing CAD data, the engineers can repair part and components models. They can manage a part's assembly related to spotweld and also produce high-quality compute models thanks to advanced data checking capabilities. Finally, the environment provides automated reports through scripting and dedicated process builder.



Product/Process integration

ESI Group works with thousands of companies worldwide in hundreds of industries to develop better products faster by utilizing PAM-CRASH 2G to enhance and automate the product design and manufacturing process. Simulating product performance throughout the extended entreprise facilitates the workflow between departments. This speeds up time-to-market.

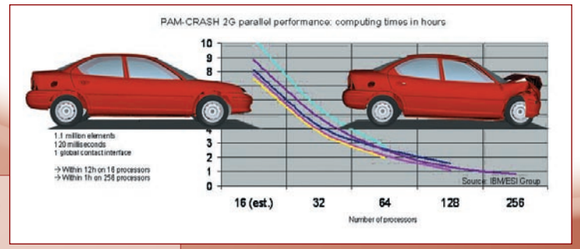
Courtesy of Volkswagen AG

Best-in-class performance

PAM-CRASH 2G offers enhanced performance due to the increased scalability for models especially with large numbers of rigid bodies. Mesh-free methods have been parallelized.

Smooth Particle Hydrodynamic is now available in shared memory parallel mode, and the Finite Point set Method in distributed memory parallel mode enabling realistic airbag simulation.

Courtesy of IBM/ESI Group



Predictive simulation

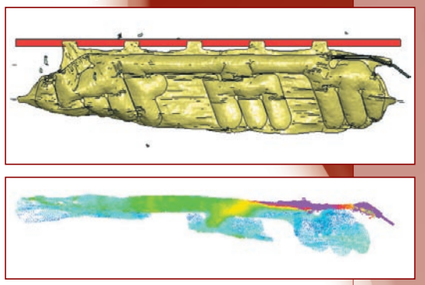
PAM-CRASH 2G achieves accurate crash simulation capabilities with enhanced material models such as metals, plastics and composites. Users can model extreme non linear behavior under high loads by simulating elastoplastic behavior with strain rate, damage effects and rupture for most materials.

The spotweld model brings an accurate treatment of bending and torsion. Porosity of cast parts can be taken into account by the new ProCAST - PAM-CRASH 2G mapping interface.

… to a five star rating

Finite Point Method for airbag inflation

Courtesy of Delphi



An accurate prediction of the gas flow during the process of airbag deployment is required in order to assess the loading of the airbag system on its environment. There is an increasing need particularly for occupant and structural components and notably at the early stage of air bag inflation. FPM (Finite Point Method) is a predictive Computational Fluid Dynamics (CFD) module fully integrated in PAM-CRASH 2G which enables simulations using real physics equation, thus avoiding extensive parametric studies, saving costs and turnaround times.

Dummy and barrier libraries

Courtesy of Volkswagen AG

ESI Group offers a broad and fully validated dummy model library. In close collaboration with FTSS, and other dummies vendors like FAT in Germany.

Optimization

PAM-OPT "push-button" solution controls PAM-CRASH 2G solver via an interface using a set of initial design parameters to find the optimized solution.

The user is seeking to prevent unwanted bifurcations and instability in crash simulation. PAM-CRASH 2G, coupled with DIFF-CRASH, performs statistical analysis and investigate different type of variations.

PAM-CRASH 2G in the Virtual Try-Out Space

Customer References

OEMS

Audi AG, BMW, First Automotive Works, Ford Corp. USA, Gedas, Harbin Hafei Motor Co. Ltd, Hyundai Motor Company, Taldesign-Giugiaro S.p.A., Kia Motors Company, Mitsubishi Fuso Truck, Nissan North America Technical Center, Nissan, Pininfarina, Renault, Samsung Motor, Skoda Auto, Subaru/Fuji Heavy Industries, Volkswagen AG.

AUTOMOTIVE SUPPLIERS

Autoliv, Bötzingen Siemens, Comau S.P.A.-Uts, Delphi, Eurostyle, Nacam France, Evektor, Faurecia, Grupo Antolin, Guyancourt, Mollertech, Heuliez, Cerisay, Idestyle, Hyundai Mobis, Japan Automobile Reserach Institute, Karmann, Key Safety Systems, Koyo Seiko, Lear Corporation, Magna Steyr Graz, Peguform, Plastic Omnium, Sungwoo Allied Signal Corporation, Swell, Tachi-s, Takata AG, TRW Automotive, Tuv Uvmv, Unipres, Visteon.

MATERIAL PROVIDERS

Corus, Posco, Nippon Steel.

NF EN ISO 9001
A S C I I
CERTIFICAT 2000 - LXXXVIII.
QUALITATEM
ACCREDITATION N° 4-016/98
cofrac

SUPPORTED PLATFORMS:

Windows NT, Windows 2000, Windows XP Professionnal
Unix: COMPAQ, IBM, HP, SGI, SUN,
Linux: Intel / AMD

Detailed specifications upon request

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About ESI Group

ESI Group is a pioneer and world leading provider of digital simulation software for prototyping and manufacturing processes that take into account the physics of materials.

ESI Group has developed an entire suite of coherent, industry-oriented applications to realistically simulate a product's behavior during testing, to fine tune the manufacturing processes in synergy with the desired product performance, and to evaluate the environment's impact on product usage.

ESI Group's product portfolio, which has been industrially validated and combined in multi-trade value chains, represents a unique collaborative, virtual engineering solution, known as the Virtual Try-Out Space (VTOS), enabling a continuous improvement on the virtual prototype. By drastically reducing costs and development lead times, VTOS solutions offer major competitive advantages by progressively eliminating the need for physical prototypes.

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