



# STRUCTURAL CRASH ANALYSIS

FOR AUTOMOTIVE



## KEY BENEFITS

- Use one simulation model to run all performance tests
- Increase Productivity
- Lower indirect costs
- Gain Time
- Drive Innovations

*“Using Virtual Performance Solution, we were able to meet the targeted performance in our design. We had very accurate results especially in the assessment of structural failure scenarios in crash conditions using ESI-Wilkins-Kamoulakos (EWK) damage and rupture model. ESI Group supports our product innovation by offering an all-inclusive scalable simulation solution: Virtual Performance Solution allows cost and time savings in our Product Development Cycle.”*

Kazuhiro OBAYASHI,  
Integrated CAE Department Manager,  
NISSAN MOTOR CO. LTD.

## A DEDICATED SOLUTION

Virtual prototyping plays an important role in the Product Development Cycle for Automotive industry leaders. It improves qualitative management and speeds up time-to-market. ESI's Virtual Performance Solution is a highly versatile software application package addressing market needs for scalable simulation solutions and Multi-Domain Optimization. Large models can be calculated in DMP (Distributed Memory Parallel) mode enabling outstanding performances.

Elaborated hand in hand with Automotive OEMs and their suppliers worldwide, Virtual Performance Solution enables workflow automation, integration of relevant disciplines and considers the impact of manufacturing processes.



Škoda Superb frontal impact: 5 stars at EuroNCAP crash test certification  
Courtesy of SKODA AUTO

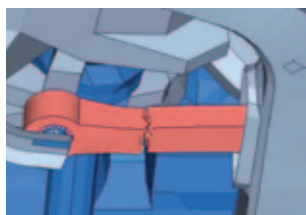
## MANUFACTURING EFFECTS

From a CAD based model, Virtual Performance Solution, with its structural crash application PAM-CRASH, allows you to design a virtual prototype. It offers predictive and realistic simulation from virtual manufacturing to virtual testing analysis.

Virtual manufacturing analyses take into account manufacturing effects by chaining the simulation of casting, stamping, composites forming and continuous welding processes.

## MULTI-SCALE MODELING

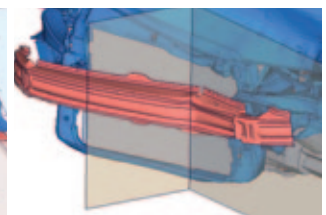
Modeling local areas in detail requires a more refined mesh and consequently longer calculation time. With Multi-Model Coupling, PAM-CRASH and related products enable, in a very efficient way, the use of fine local meshes.



Detailed torque brace



3D Spot welds



Detailed bumper system

Courtesy of SKODA AUTO

Rather than impose the calculation to the whole structure, PAM-CRASH isolates the areas with refined mesh and makes them run simultaneously, using subcycling technology.

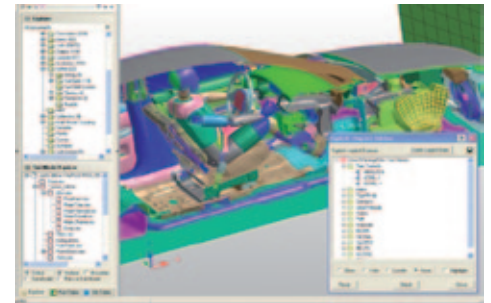
Multi-scale modeling helps simulate material failure using rupture models, including EWK (ESI-Wilkins-Kamoulakos) model or other models, with an acceptable calculation time. It saves overall computation time and increases flexibility and performance.

Multi-Scale Modeling facilitates also model assembly, for instance to easily set up a car-to-car crash model.

## A COLLABORATIVE ENVIRONMENT

Virtual Performance Solution includes a dedicated Graphical User Interface for Pre- and Post-processing: Visual-Environment. Using this integrated framework enables parallel and collaborative engineering work in the development tasks.

Offering users ultimate flexibility, Virtual Performance Solution is also open to third-party or proprietary products.

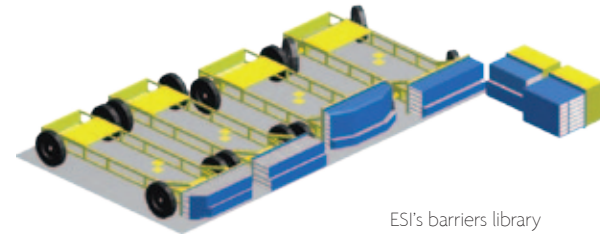


Post-processing with Visual-Crash PAM, the dedicated application for crash simulation within Visual-Environment

## COMPUTE MODEL LIBRARY

ESI offers a broad and fully validated compute model library comprised mainly of crash dummy models, human models and barrier models.

ESI has developed and keeps enhancing a new set of crash test barrier models within a consortium project with automotive manufacturers. Members of the consortium have brought an extensive set of experimental data and largely contributed to the validation of the models. The new library covers current regulatory barriers for frontal and side impact tests: frontal offset deformable barrier (ODB, R94), NHTSA (FMVSS 214/301), European (Advanced, R95) and IIHS mobile deformable barriers. Models are also available for newer barrier designs, candidates for future regulations: AE-MDB for side impact and PDB for frontal impact and compatibility. ESI offers a choice of two models for aluminum honeycomb structures: a high fidelity model based on shell elements, and a faster model, based on solid elements.



ESI's barriers library

For more information, visit: [www.esi-group.com/virtual-performance-solution/structural-crash](http://www.esi-group.com/virtual-performance-solution/structural-crash)

## ABOUT ESI GROUP

ESI is a world-leading supplier and pioneer of digital simulation software for prototyping and manufacturing processes that take into account the physics of materials. ESI has developed an extensive suite of coherent, industry-oriented applications to realistically simulate a product's behavior during testing, to fine-tune manufacturing processes in accordance with desired product performance, and to evaluate the environment's impact on product performance. ESI's products represent a unique collaborative and open environment for Simulation-Based Design, enabling virtual prototypes to be improved in a continuous and collaborative manner while eliminating the need for physical prototypes during product development. The company employs over 750 high-level specialists worldwide covering more than 30 countries. ESI Group is listed in compartment C of NYSE Euronext Paris. For further information, visit [www.esi-group.com](http://www.esi-group.com).



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