



courtesy of
Volvo Car Corporation

Crash & Safety
Take Safety to new levels



Model for all regulations in a single environment

ANSA is the Industry standard solution for demanding crash & safety pre-processing. The software's powerful functionality allows users to efficiently perform the required tasks in less time and at lower cost. ANSA supports all common solver keywords used in modern modeling techniques of crash & safety solvers. The innovative ANSA concept of interoperable decks allows a model to be easily converted from one solver input deck to another, providing superb flexibility. Process automation and data management are extensively supported allowing for fast, repeatable, and robust model build-up and loadcase definition. Additional tools such as morphing and optimization coupling, leverage ANSA to a multipurpose software package that meets the needs of even the most demanding users.

Include files Configurator

The basic concept of the Include files Configurator is the generation of "ready-to-run" main decks using existing includes. Different configurations of the simulation model can be defined in model as well as in loadcase level. These configurations can be exported at once without the necessity of reading the include files into ANSA. In cooperation with the ANSA Data Management features, include versions, and representation management are achieved, building a unique environment for the build-up of simulation models.

Weldings modeling

Numerous semi and fully automatic tools are available for the creation of modeling welds, based on definitions made within the software or on information imported by a PDM system.

The Connections Manager, allows multiple connection type definitions to be completed in a single step, thereby achieving:

- Wide variety of weld definition types for spot welds,

- adhesives, bolts or seam lines.

- Flexible re-definition of connection elements, to serve different modeling purposes.
- Detection & improvement of improper connection information.
- Configuration files and templates allow the standardization of connections creation, ensuring repeatability and enforcing model robustness.

Load case definition

ANSA provides wizard driven assistants for complicated tasks, requiring minimum effort, such as:

- Positioning of impactors and roads.
- Keyword definitions like joints, rigid bodies or output requests (time history, section forces).
- Advanced mass trimming.
- Mass balancing to achieve target weight and COG and many more.
- Advanced Load case Manager for Bulk Load case definitions.

Features

Complete modeling for:

- ABAQUS/Explicit
- LS-DYNA
- PAM-CRASH
- RADIOSS
- Interoperable decks
- Process automation
- Model assembly
- Include-files handling
- Mastering of entities Ids
- Mass trimming
- Kinematics tool
- Dummy positioning & restraining
- Pedestrian & occupant safety
- Quality validation & fixes

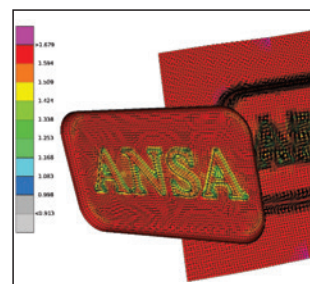
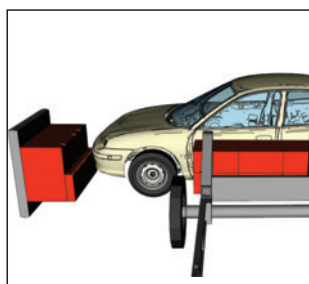
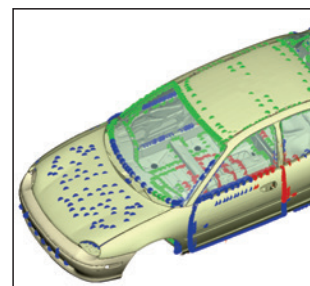
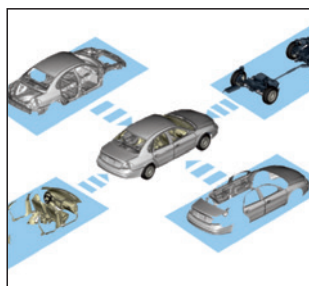
Benefits

- A complete pre-processing environment that offers a portfolio of features that covers the whole Crash and Safety area
- Intelligent interface guides even the non-expert user to the fast and smooth application of all functions
- Reduced pre-processing time

Results mapping

The usage of initial conditions during a crush simulation requires high quality mapping of results taken from other calculations, such as sheet metal forming or draping of laminates. For this purpose, the Results Mapper maps thickness, pressure, stress, plastic strain or material orientation information, offering:

- Supported solver formats: NASTRAN, ABAQUS, LSDYNA, RADIOSS, PERMAS, ANSYS, PAMCRASH, PAMSTAMP, FIBERSIM, SIMULAYT.
- Variety of interpolation methods.
- Full-automatic positioning tool available, in order to position the source part on to the target part, achieving a "best-fit".
- Semi-automatic tools, to preview and correct the source part positioning.
- Validation of the mapped results.
- Capabilities to specify user defined results readers, interpolation and validation methods.
- Fully operable in batch mode.
- Capability to handle results in different unit system.



Occupant & pedestrian safety

ANSA, in alliance with the suppliers of Crash Test Dummy models, accurately supports the commonly used dummy models and structure trees. ANSA offers the necessary functionality for:

- Positioning and articulation of Dummies, respecting the joints' rotation stop angles.
- Creation of Dummies' structure, in case of absence of structure and positioning data.
- Intuitive restraining for seatbelts systems definition and fitting.
- Dummy-seat depenetration.
- Coupling of dummy and seat allows the combined movement of both.

Powerful and innovative functionality is provided for:

- Pedestrian safety tools (EuroNCAP v6.0, EuroNCAP Grid Proposal 2010, EU Phase 1 & 2, JNCAP, TRIAS 63): calculation of reference lines, critical impact points and headform / legform positioning.
- Interior impact protection tools:
 - FMVSS 201U calculation of target points and automatic (contact based algorithm) positioning of the FMH.
 - FMVSS226 ejection mitigation
 - Instrument panel impact protection tools (FMVSS 201 / ECE-R21).
 - Seat impact (ECER17, ECCR21, FMVSS202A) calculation of zones, positioning of headform.

Positioning & Kinematics tool

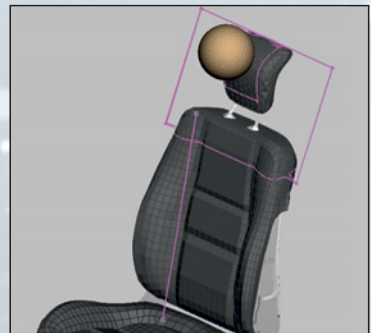
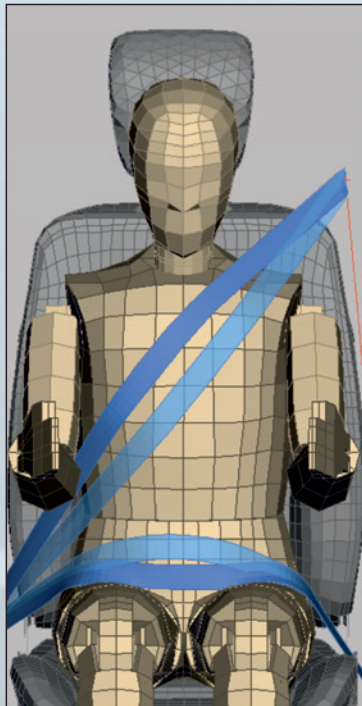
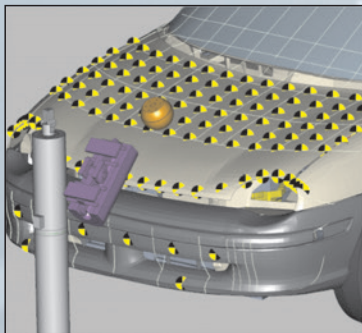
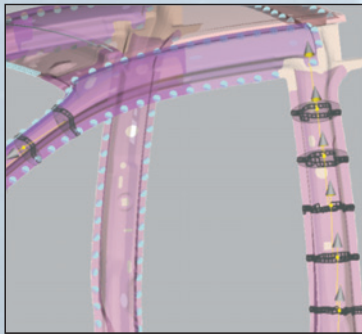
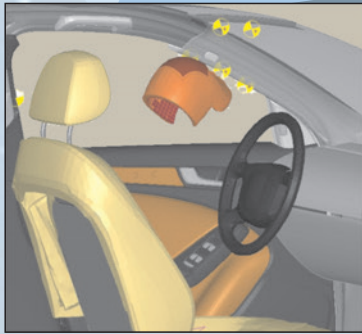
The Kinetics module tool is an implicit multi-body solver used to move complex kinematic mechanisms. Application examples are movements of suspensions, seat and dummies, convertible roofs, hoods and many more. The main features of the tools are:

- Kinematic model definition in a single step.
- Positioning of systems like seats, dummies, convertible roof systems, suspension and complete steering mechanisms without the use of an external solver.
- Tools with know how of Front and Side Impact regulations for easy load case set up.
- Creation of saved positions, in order to retrieve any applied configuration of the model.
- Transformation information export, without writing the whole FE-model.

Quality checks & improvements

A variety of checks are available in ANSA in order to verify the integrity of the model.

- Mesh quality checks and automatic fixing algorithms are provided, based on crash solvers' quality criteria and thresholds.
- Intersections and penetrations are located and removed.
- Incorrect Contacts & Tie definitions or unconnected parts are identified and corrected.
- Detailed mass information is calculated and reported, according to the mass scaling parameter, always in full compliance with the solver.
- ANSA scripting language can be employed for the definition of custom quality checks and fixes, ranking the software as the definitive high model-quality pre-processor.
- Automatic mass execution of checks via check templates.



Study and compare fast numerous model alternatives

META stands up to the modern crash-analysis challenges, such as the increasing model size and memory and numerous model comparisons, enabling easy and fast correlation studies with real videos and procedure automation. META features a complete integrated graph tool for 2D post-processing, time history results from most popular crash solvers, parallel 3D and 2D post-processing. Models handling, 2Dplot tool, cut planes, calculation of models differences, and multiple statistics windows exhibit functionality that simplifies post-processing so as to be performed in just a few clicks.

Model management

META addresses the need for simple and rapid view control of models, consisting of numerous parts and groups, through its intuitive one-click functionality. This capability is further augmented to meet extreme handling requirements through window-dependent model attributes and the definition of multiple undeformed states which also allow for simultaneous display of a model at different time steps (film strip display). Furthermore, the model assembly, created in ANSA, can be reflected in a tree form inside lists such as Parts Manager, DMBrowser, Sets, PIDs. Weldspots are realized as groups and their respective connectivity is retained.

Results extraction & calculations

Distances between nodes, elements, or even parts, planes and groups can be rapidly identified and updated in real time following the animation. Proximity between groups can be displayed as contour plots while collided elements between groups can be isolated.

Displacements, velocities and accelerations can be transformed both in 3D and 2D level relative to a moving coordinate system providing intrusion results that can be displayed either as contour/vector field or as graphs.

The analysis of sections is elevated through the cut planes tool and the use of run time annotations on planes. Using the section force calculator, results on cross sections which were not defined in the solver's input file, can be obtained, therefore avoiding rerunning the solution.

Correlation studies using videos & images

The virtual camera can simulate onboard cameras, while the image matching and video synchronization turn into easy tasks with the aid of embedded tools. Graphs of displacements and angles between traced features on test videos generate useful information also to be used for correlation with simulation results.

Project files and free viewer

META Projects are native binary files for compacting and storing necessary post-processing data, such as model geometry and results, graphs, videos, reports. Project files can also be accessed using META Viewer, the freely distributable reduced version of META. This can be used either as a standalone tool or as a plug-in of web browsers or MS Office applications.

Reporting & data communication

Reports in html, PostScript or MS Office PowerPoint .pptx format can either be created interactively through an intuitive interface or through the use of scripts or sessions, so that the analyst can receive immediately evaluable results from the automatic procedures. An embedded spreadsheet editor allows for the input/output and further processing of data. The interactive run-time creation of reports becomes a very easy task through dragging/dropping of images, spreadsheets and other data to the report composer. pptx reports can also be input

Features

- 3D & 2D post-processing
- Numerous interfaces
- Process automation
- Scripting
- Parameterized sessions
- Intrusions calculation
- Section Forces calculation
- Crash criteria
- Video & image correlation
- Annotations
- Reporting
- Native database
- Free viewer

Benefits

- Cost and time-to-market reduction
- Novel features lead faster to results, while ensuring efficiency and quality

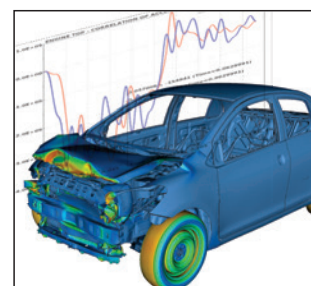
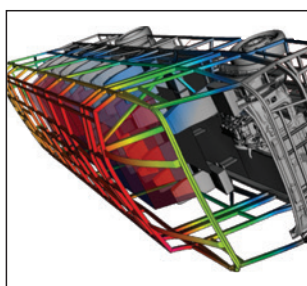
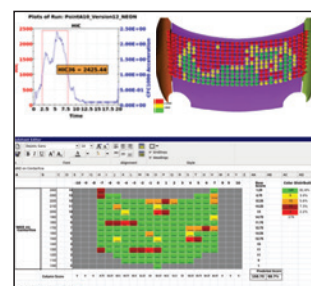
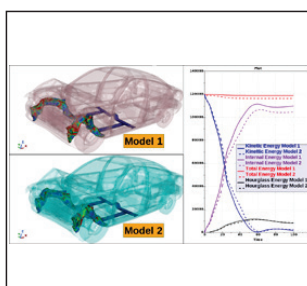
in META and previewed in Slide Show mode. Deformed geometry, as well as cross-sections and iso-contours, can be output in solver's file format.

Crash safety & process automation

Crash Safety Analyses can be realized completely inside META. A great variety of tools, such as colored annotations and the embedded 2D plot tool with the internal calculation of Crash Analysis Criteria provide the means for such analyses, while the use of META scripting language can drive to full process automation.

A simple-to-use toolbar designer ensures the fast creation of user toolbars for the standardization of crash analysis procedures. The analyst can take full advantage of the parameterized sessions and unique scripting capabilities, which can lead to automated streamlined processes regarding the extraction of specific results or model comparison. A suite of standard tools is offered, to automate the results of post-processing and the creation of reports for Occupant protection in Interior impact Pedestrian Safety analysis, IIHS structural ratings and Bus Rollover.

These automation capabilities also enable the effortless coupling of META to external optimizers which can be readily realized through the use of a provided toolbar.



Real test



Simulation in META

courtesy of
Volvo Car Corporation



physics on screen

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