SIEMENS
Ingenuity for life

Simcenter Madymo

Providing dedicated software for occupant and pedestrian safety design

Benefits

- Provides worldwide standard software for designing, analyzing and optimizing vehicle safety for occupants and vulnerable road users
- Cuts costs for building and testing prototypes, which accelerates time-to-market
- Minimizes the risk of making design changes late in the development phase
- Correlates precisely with crash test results
- Enables safety engineers to apply design of experiments, methods and run multiple scenarios simultaneously
- Offers an all-in-one package, including solver, dummy and human model, preprocessing and postprocessing tools

Summary

Simcenter Madymo™ software has been used extensively for automotive safety simulation and provides almost everything an engineer needs to create advanced and integrated safety systems.

Simcenter Madymo provides a dedicated software environment for developing occupant and pedestrian safety; delivers fast and accurate simulations, enabling extensive design of experiments (DOE) and optimization studies; offers a comprehensive package, including solver, dummy and human model preprocessing and postprocessing tools, and provides token-based licensing.

Simcenter Madymo is an excellent computer-aided engineering (CAE) solution for the occupant safety market. Scenarios for pre-crash and crash avoidance are multiplying and the duration of these simulated events is increasing. With its accurate, computationally efficient solver, dummy and human models, built-in sensing, control functionality and interfaces for co-simulation with other software, Simcenter Madymo is an excellent solution.

Flexibility in modeling

Simcenter Madymo enables the user to integrate multibody (MB), finite element (FE) and computational fluid dynamics (CFD) technology in a single solver, providing the engineer with the flexibility to model safety systems with the right balance between accuracy and speed. The Simcenter Madymo input syntax allows for hierarchy in the input deck. This lets engineers take a modular approach to their input deck, in which submodels can easily be exchanged.

Crash dummy and human body models

Simcenter Madymo includes a database of validated crash dummy and human body models. Simcenter Madymo occupant models are widely used in the automotive industry for occupant safety engineering and research in human (impact) biomechanics.

Simcenter Madymo Workspace

The Simcenter Madymo product suite includes Workspace, consisting of several preprocessing and postprocessing modules. Users can easily set up Simcenter Madymo models and also visualize, present and report simulation and test results.

Easy access with licensing

Token-based licensing allows direct access to all Simcenter Madymo tools and models using just one token set. This means you can directly access less frequently used tools and models without having to obtain additional licenses and costs.

Simcenter Madymo

Features

- Explicit multibody dynamics solver
- Explicit finite element solver
- CFD solver for airbag gas dynamics
- Full-featured seat belt and airbag modeling
- Built-in sensing and control functionality
- Dedicated vehicle safety output options (SAE filters, injury criteria, ISO-MME format)

Flexibility with interfacing

Simcenter Madymo can be used to interface and run in co-simulation with other explicit FE solvers. This enables engineers to use Simcenter Madymo occupant and restraint system models in any FE vehicle structure model. Simcenter Madymo can also run in co-simulation with the MATLAB® environment and Simulink® environment, enabling the user to include the most advanced control algorithms in Simcenter Madymo modeled safety systems.

Application fields

- Advanced vehicle passive safety systems, including pre-crash and in-crash sensing and control
- Seat belt and airbag design and optimization
- Occupant safety for frontal, side and rear impact
- Rollover protection
- Pedestrian safety
- Child restraint systems (CRS)
- Accident reconstruction

Interfaces for co-simulation

- MATLAB, Simulink
- LS-Dyna, RADIOSS, PAM-CRASH and ABAQUS FE solvers

Simcenter Madymo crash dummy and impactor models

- Hybrid-III adult model family (5th percentile female, 50th and 95th male)
- Side impact dummy (SID) models (ES-2, ES-2re, SID-IIs, US-SID, SID-H3, WorldSID)
- Rear impact dummy (RID) models (BioRID-II)
- Child dummy models (TNO P-series, Q-series, Hybrid-III, CRABI)
- Specialty dummy models (TNO-10, Hybrid-II, standing Hybrid-III, MATD motorcycle)
- Scalable dummy models (Hybrid-III 5th, 50th, standing 50th, 6-year-old (YO)
- Subsystem impactor models (pedestrian head forms and leg forms, U.S. Federal Motor Vehicle Safety Standards (FMVSS) 201 and 226 head forms, Economic Commission for Europe (ECE)-R12 body block)

Simcenter Madymo human body models

- Human occupant models (5th female, 50th male, 95th male, 3 YO and 6 YO child; 50th male with active muscle control
- Human body pedestrian models (5th female, 50th male, 95th male, 3 YO and 6 YO child)
- Scalable human body models (HBM) (5th female and 50th male occupant, 50th male pedestrian)

Simcenter Madymo Workspace

- XMADgic – Simcenter Madymo
- Dedicated preprocessing
- XML editor with interactive viewer
- Standard and rule-based model validation
- Password-based model encryption
- Dummy positioning and seat-belt fitting

Coupling assistant – preprocessing for FE users

- Full graphical interface (no XML editing)
- Simcenter Madymo dummy model positioning
- Simcenter Madymo seat-belt fitting

Exchange and Exchange assistant – Simcenter Madymo made easy

- Easy model components exchange
- Automated routines to reduce pre-processing time
- Graphical user interface (GUI) and batch mode execution

MADPost – Simcenter Madymo dedicated postprocessing

- Viewers for movies, kinematics, contour and curve plots
- Readers for numerous test and simulation output data formats
- Visualization of energy dissipation and flow in Simcenter Madymo models

Protocol rating – Safety ratings visualized

- Rating generation from Simcenter Madymo dummy output or direct user input
- Multiple safety protocols, including European New Car Assessment Program (Euro NCAP), U.S. NCAP, United Nations ECE and U.S. FMVSS
- GUI and batch mode execution

Objective rating – Signal correlation quantified

- Multiple rating criteria and weighted rating combination
- Readers for several test and simulation output data formats
- Intuitive matrix display and reporting
- GUI and batch mode execution

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