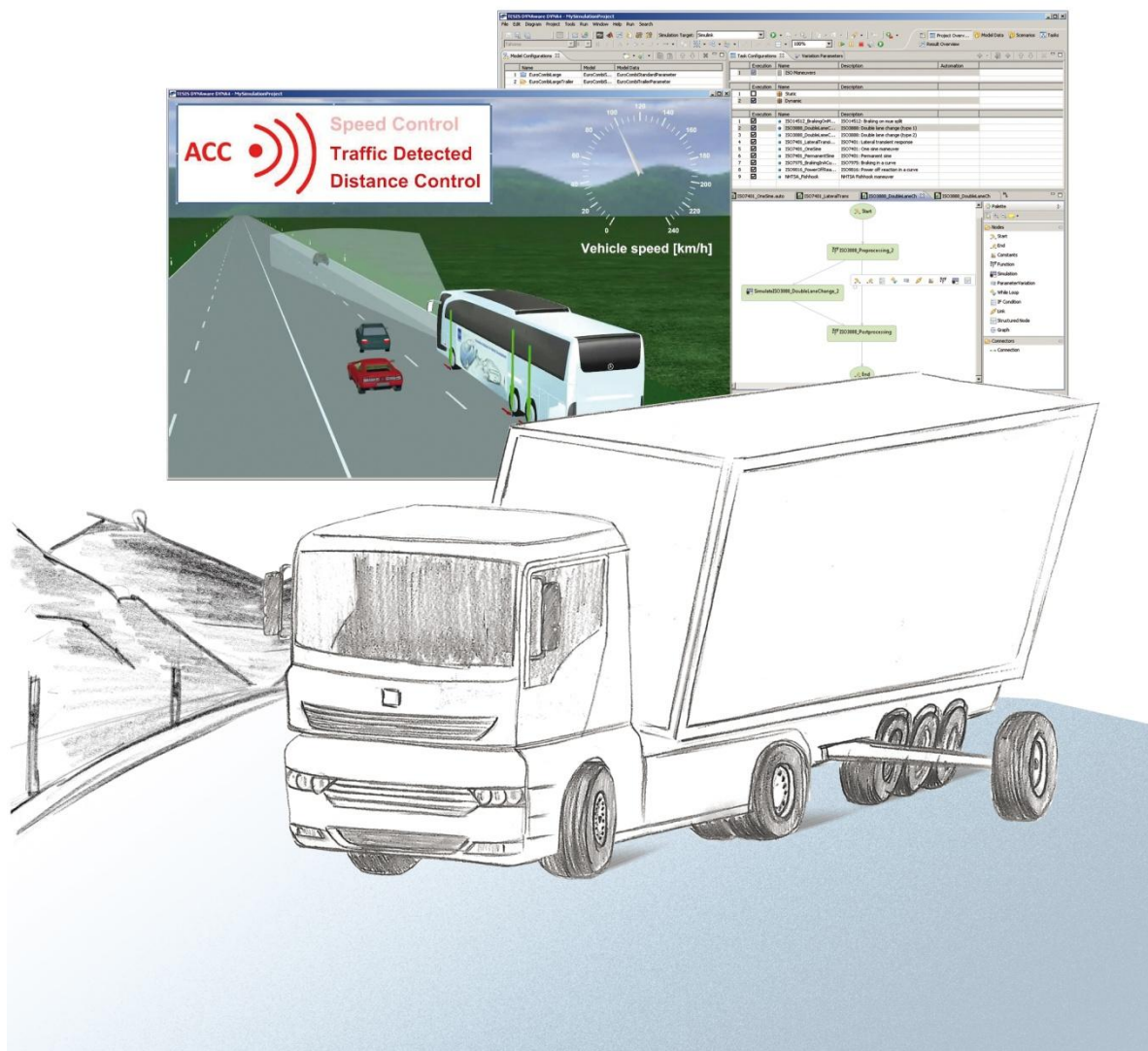


DYNA4 Commercial Vehicles

Full Vehicle and Dynamics Simulation for Components and Controller Development of Commercial Vehicles



Development and Testing of Vehicle Dynamics Controllers

DYNA4 Commercial Vehicles allows the efficient execution of simulation tasks in the development process and testing of vehicle dynamics and powertrain controllers. Numerous commercial vehicles can be simulated, e.g. various trucks, truck-trailer combinations such as EuroCombis, busses, agricultural and specialty vehicles. The simulation software supports rapid prototyping on the PC as well as tests in software-in-the-loop (SIL) and hardware-in-the-loop (HIL) environments. Application examples include:

- Stability investigations in critical driving situations, e.g. roll-over protection, prevention of jack-knifing and skidding
- Safety analyses of commercial vehicles subject to road disturbances, e.g. lane grooves and patches of different road surfaces
- Pre-calibration of control devices on the hardware-in-the-loop simulator
- Development and hardware-in-the-loop testing of vehicle dynamics controllers for truck and trailer stabilization
- Integration tests in laboratory vehicles
- Homologation of ECUs for commercial vehicles

Due to the modularity of DYNA4, you can fully combine **DYNA4 Commercial vehicles with additional packages** to enlarge your fields of application:

Development of Hybrid and Electric Drive Trains

DYNA4 Advanced Powertrain contains the components necessary to configure various drive train topologies for hybrid and electric powertrains.

Typical applications include:

- Simulation of driving performance and fuel/energy consumption
- Analysis and optimization of operating strategies
- Function development and testing of hybrid vehicle control units
- Energy and thermal management

Development of Driver Assistance Systems

DYNA4 Driver Assistance is a simulation environment for the development and testing of driver assistance systems under reproducible conditions in the laboratory. Examples include:

- Camera-based systems
- Sensor-based systems
- Systems using external data
- Pre-crash systems

Detailed information about all additional DYNA4 Packages:
www.thesis-dynaware.com/dyna4



Model Features at a Glance

Truck model

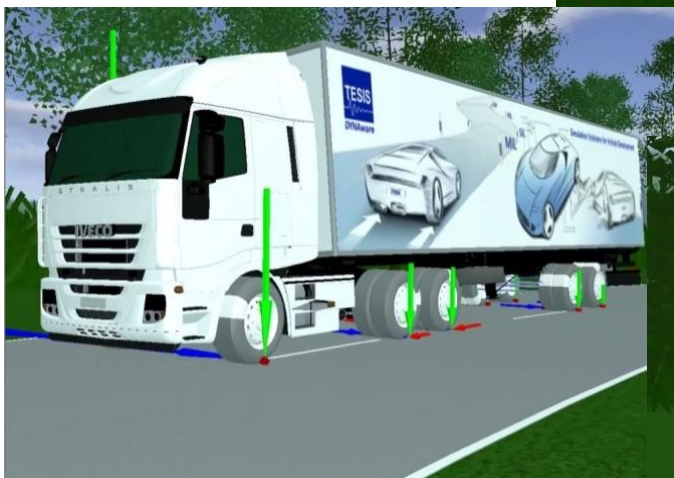
- Torsion-flexible vehicle frame to consider twisting of the truck body.
- Specific suspension types, e.g. rigid or leaf spring axles.
- Moving engine body, driver cabin, and truck load elastically coupled to main truck body by means of up to 10 mounts.
- Up to three rear axles. All axles steerable for simulation of special purpose vehicles, including heavy duty trucks and military vehicles.
- All axles configurable with twin tires.
- Modular drive train, different configurations possible, e.g. 8x2 to 8x8 drives
- Up to 20 forward and 4 reverse gears.
- 4 standard axles, expansion possible
- All axles can be driven
- All axles can be steered

Trailer model

- Trailer modeled as a separate vehicle body (without a steering system and drive train).
- Variable parameterization and numerical stability of the hitch.
- 4 standard axles, expansion possible. All axles steerable.
- All axles configurable with twin tires
- Turntable trailer

3D road model

- Proving ground and multi-lane road model with separate definition of horizontal and vertical road layouts in a series of segments. Surface properties account for variable friction conditions and stochastic unevenness.
- Easy road definition via graphical road editor or automated GPS road data import.



DYNA4 Commercial Vehicles

Maneuver control

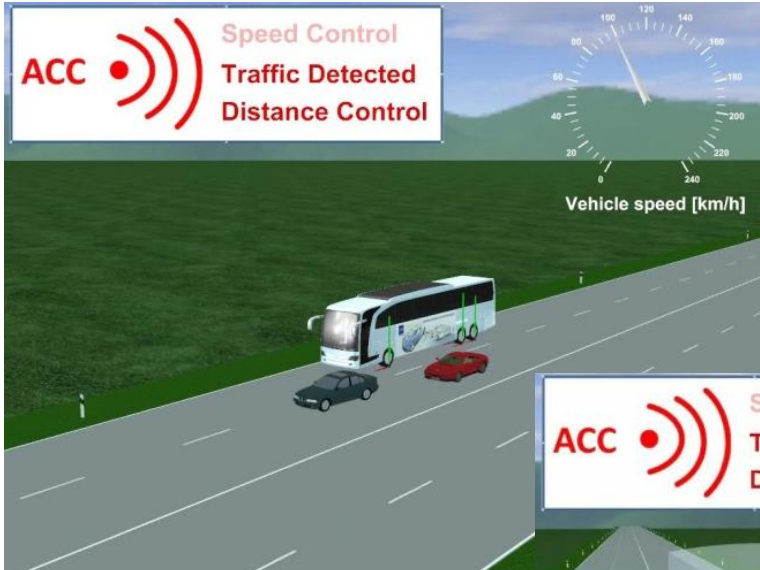
- Flexible maneuver with various open-loop and closed-loop control options. Maneuver segments defined over time / distance or event-triggered.
- Stable and robust driver guidance on a specified target path and automatic speed choice.
- Preconfigured standard driving tests defined by ISO and NHTSA.

Ready-to-use examples

- Standard maneuvers, e.g. roll-rate feedback fishhook maneuver, ISO lane change or braking on μ -split, as well as test courses of different complexity are already preconfigured.
- Sample parameter sets and simulation models for many vehicle types, ready-to-use and as templates for user-specific adjustments.

3D run-time animation

- Run-time animation of simulation results on all supported PC and real-time platforms with the 3D animation tool DYNAanimation.
- The **DYNAanimation Editor** provides various displays to highlight characteristic vehicle states and many other powerful functions for impressive presentations of results. In addition, full remote functionality is available via programmable ActiveX and DCOM interfaces.



DYNA4 Simulation Framework

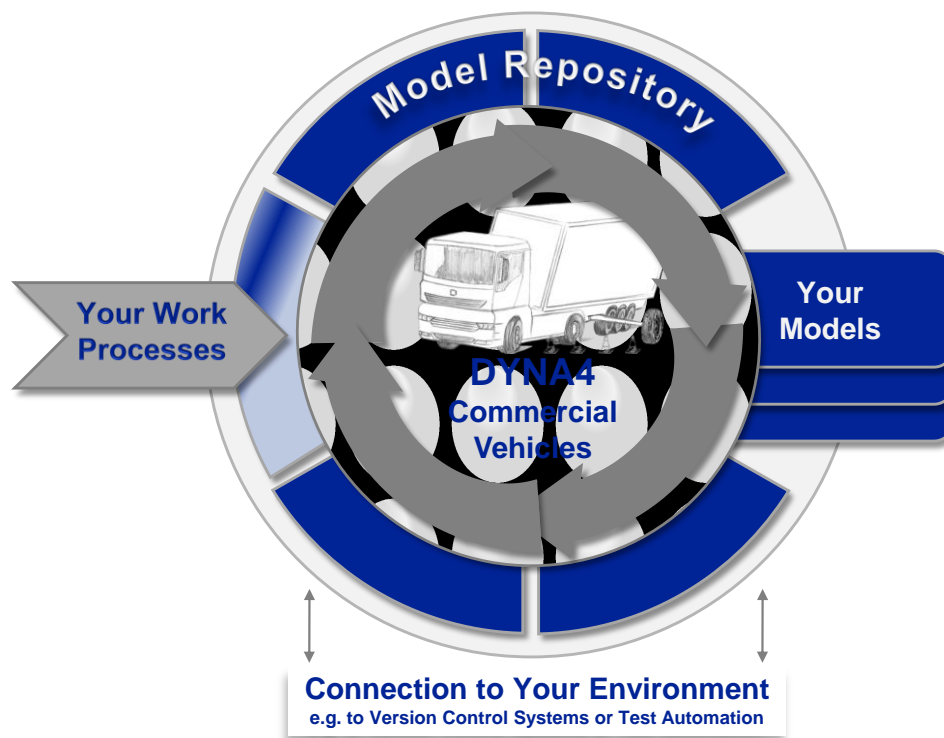
The flexible framework for transparent model and data management, documentation, automation, reporting, and visualization supports your simulation and testing processes efficiently.

- Organize your models, data, scenarios, and results in DYNA4 simulation projects.
- Connection to a central database allows the synchronization of user installations and distribution of new models and parameter sets
- Transparency even for complex simulation scenarios by the definition of different views
- Powerful task proceedings for the design, operation, and documentation of simulations
- Allows flexible adaptation to your work processes via Eclipse Plugins and Matlab scripting.
- Interfaces for test automation, version control systems, and MBS simulation tools.
- HIL platform-independent, supports all major platforms

DYNA4 Model Repository

The DYNA4 Model Repository provides a clearly laid out user environment to administer and parameterize your own simulation models as well as the included TESIS DYNAware model library

- Assemble your virtual vehicles for test drives on the PC or HIL
- The Model Repository contains flexible and stable truck and trailer models (see “Model features at a Glance”)
- Open and modular model architecture in Matlab/Simulink with transparent signal flow via extensions to the Simulink bus
- Integrate your own simulation models (e. g. special steering or brake models) seamlessly into DYNA4 and take advantage of all framework functions.
- GUI adapts to your models automatically for easy parameterization, analysis, and animation functions

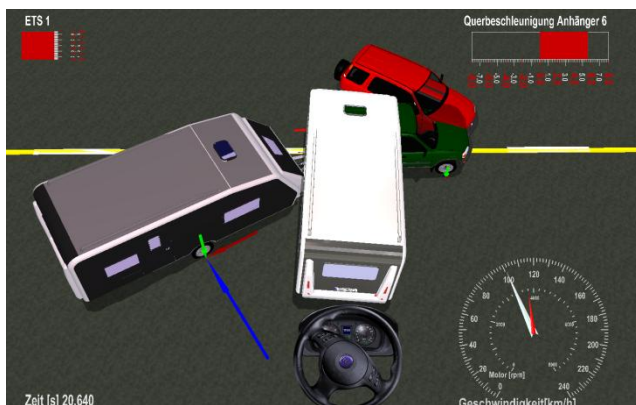


Your Benefits

- **Speed up your innovation process**
 - Ready-to-use examples
 - Comparison of different variants
 - Automation tools accelerate routine jobs
- **Flexibility**
 - Open model structure in Matlab/Simulink
 - Smooth integration of your own models and easy adjustments to your needs
 - Free choice of hardware, from PC to all common HIL platforms
- **Technical safety**
 - Project and data management for more reproducibility and traceability.
 - Solid professional software based on thorough modeling and real-time expertise
 - Successfully employed in numerous projects – the vehicle dynamics model veDYNA is the proven basis
- **Cost reduction**
 - Use the same simulation software supporting appropriate model depths for all stages throughout the control unit development and testing process
 - Reduction of prototype costs through early testing on the PC
- **Easier decision-making**

Powerful visualization and post-processing tools show the key interdependencies, e.g. through

 - Quick overview and automatic comparison of results and characteristic values for vehicle variants
 - Animation and comparison of different vehicles in 3D



Engineering and Consulting

We offer tailored consulting and engineering services to create your individual simulation solution, comprising your models, work processes, and functional requirements. Extensive knowledge from previous projects provides the basis, e.g.:

- Calibration, validation, and functional safety tests of powertrain and chassis control systems
- Model parameterization for various vehicle controllers
- Adaptations to your work processes, e.g. special GUIs, views, and automated reports
- Model and functional extensions to meet your specific requirements
- Implementation of specialized proving grounds
- Development of tailor-made models, e.g. in Matlab/Simulink, Dymola, C or C++.
- Configuration and commissioning of HIL systems

Read more in our customer project reports on our website: www.thesis-dynaware.com/customers

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