

DYNA4 Car Professional

More Efficiency in Automotive
Components and Controller Development
with Vehicle Dynamics Simulation



Applications

DYNA4 Car Professional is the comprehensive real-time vehicle dynamics simulation environment for virtual test drives. Typical applications range from conceptual vehicle development on the PC to component tests in virtual or physical test rigs. The development of electronic control systems, such as vehicle dynamics or powertrain controllers, is supported by rapid prototyping on the PC to tests in software-in-the-loop (SIL) and hardware-in-the-loop (HIL) environments. DYNA4 Car Professional can be applied in diverse fields of vehicle development:

- Design, testing, calibration and verification of vehicle control systems, e. g. ABS, ESP, 4WD control systems, active front steering, in SIL and HIL setups
- Model-based rapid controller prototyping
- Handling studies
- Ride comfort studies
- Parameter studies and optimization of vehicle components, e.g. drivetrain concepts, steering system and axle suspension
- Investigation of driving stability for passenger cars up to medium-sized commercial vehicles
- Development and testing of mechanical components in virtual and physical test rigs
- Pre-calibration of control devices on the hardware-in-the-loop simulator
- Virtual test drives and animation in the driving simulator

DYNA4 Concept

DYNA4 Framework

Flexible framework for transparent model and data management, documentation, automation, reporting and visualization supports your simulation and test processes efficiently.

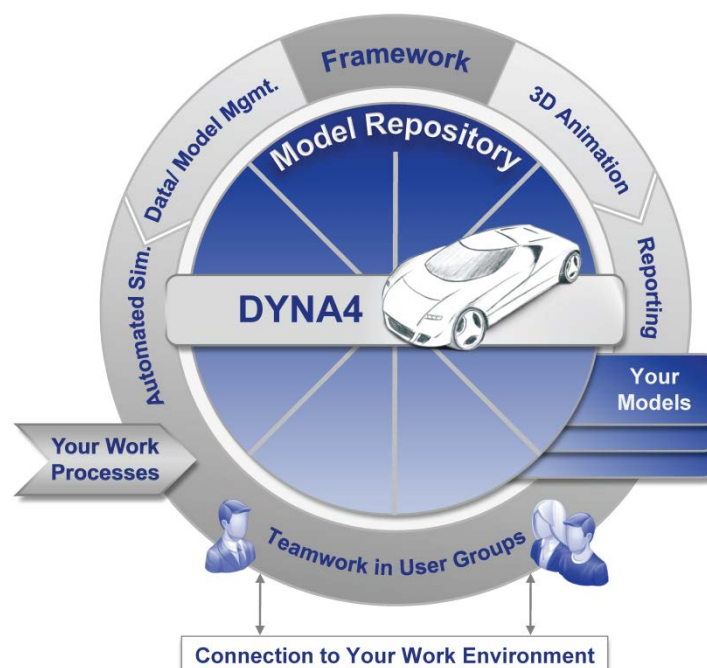
- Consistent management of models, data, simulation scenarios and results in every process step
- Provides useful tools for automated simulation and visualization
- Allows flexible adaptation to your work processes
- Interfaces for test automation, version control systems and MBS simulation tools.
- HIL platform-independent, supports all major platforms

DYNA4 Model Repository

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

The Repository is open for the seamless integration of your models (e.g. batteries, Soft HCU or other specialized models) into DYNA4, thus enabling you to benefit from all process-supporting Framework functions.

Read more about the Framework and additionally available models in the separate DYNA4 Framework flyer.



Model Features at a Glance

Vehicle model

- Modular multi-body system with transparent architecture and easy access to all vehicle component models.
- Fast and easy-to-use conceptual suspension model: tabulated axle kinematics.
- Extensive axle compliance definition. Nonlinear compliance tables for elastic displacement of left & right wheel in any direction.
- Real-time capable multi-body axle models with hard point definition for detailed analysis of the axle design. Library of 20 common suspension types, including bushings and rubber elements, with up to 30 DoF per axle.
- Various steering system configurations, such as front and rear axle steering or independent left/ right steering. Interface for active steering systems.
- TM-Easy and Pacejka 96 tire models. Interfaces for common CPI and STI tire models and FTire.
- Generic front / rear / four-wheel driveline with 13 DoF, elastic drive shafts, hang-on clutch. Extensive interface for external control inputs accounting for the latest drivetrain developments.
- Real-time simulation of hydraulic brake systems for testing ABS/ESP control units and controller networks.
- Soft ECUs for ABS, ESP and TCU are available as separate Simulink blocks.

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 specified target path and automatic speed choice.
- Preconfigured standard driving tests defined by ISO and NHTSA.

Ready-to-use examples

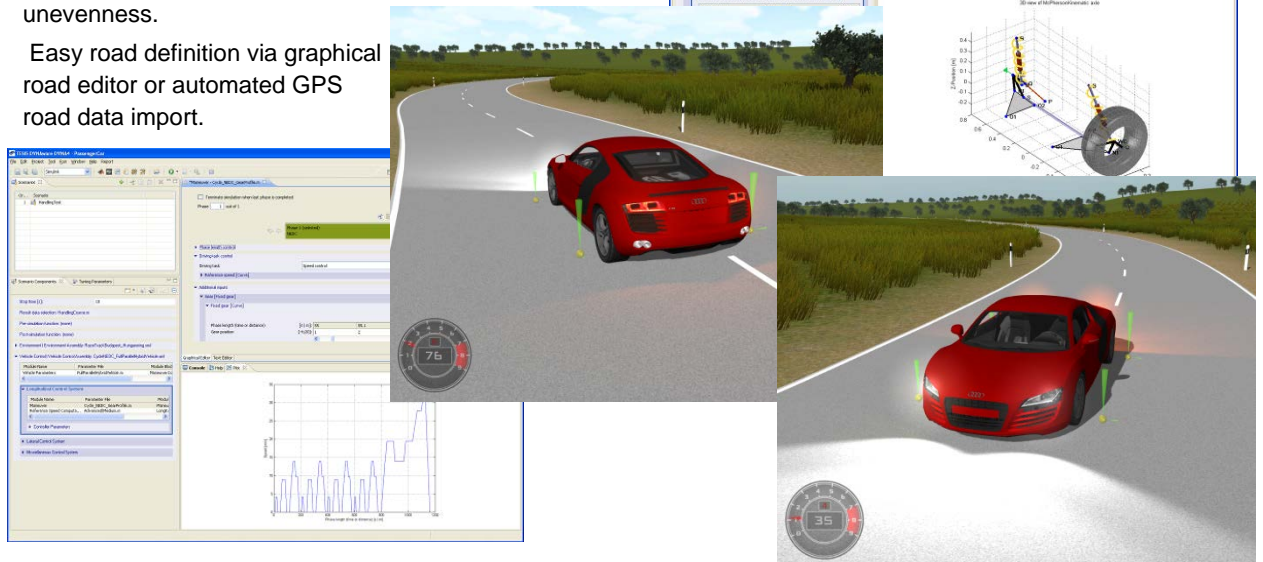
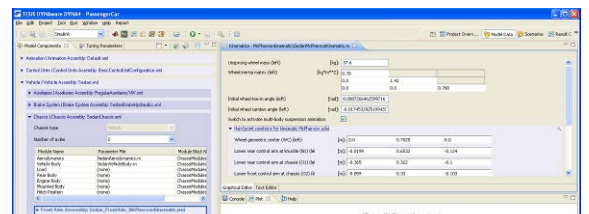
- Standard maneuvers, e.g. ISO lane change or braking on μ -split, as well as test courses of different complexity are already preconfigured.
- Example parameter sets and simulation models for many vehicle types, ready-to-use and as templates for user-specific adjustments.

3D run-time animation

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

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.



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 own models and easy adjustments to your needs
- Choice of hardware platform

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 an efficient 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 customer processes, e.g. special GUIs, views and automated reports
- Model and functional extensions to meet the customers' requirements
- Configuration and commissioning of HIL systems
- Process consulting, e.g. fleet consumption monitoring, CO₂ Conformity-of-Production (COP)
- Modeling of multi-body-systems, 1D thermodynamics, hydraulics, fluid dynamics

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

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