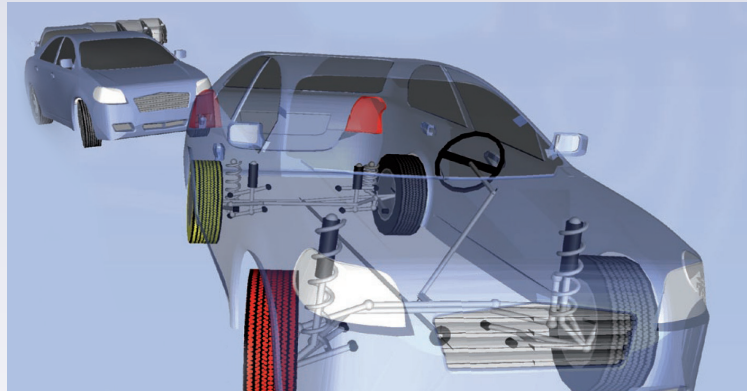


Vehicle Dynamics Library

For CATIA V6 and Dymola



ISO double lane-change with closed loop driver at 100km/h

OVERVIEW

- Modeling, simulation, and analysis of cars and heavy vehicles

KEY FEATURES

- Full environment and infrastructure for full vehicle and subsystem analysis, including roads, drivers, and test rigs
- Based on the Modelica® standard language for intuitive component based modeling and powerful multi-engineering capabilities
- Openness and flexibility streamlining routine work and concept design
- Easy-to-use and efficient Simulink® interface for real-time simulation performance on standard PC hardware

BENEFITS

- Easy construction and efficient simulation of detailed and realistic models of cars, light trucks, and heavy vehicles

Vehicle Dynamics Library (VDL) features an open, user extensible, object-oriented architecture with access to the model source-code in Modelica®. Use the library to optimize and verify design of your vehicle systems from the early design phases through control design and implementation. Unrivalled real-time performance makes Vehicle Dynamics Library the premier choice for HIL/SIL simulations. The true multi-domain environments in combination with the seamless integration with other platforms such as Simulink® make CATIA V6, Dymola and VDL natural elements of any model-based development process.

Modeling

VDL is defined in the modeling language Modelica®. This means complete insight into library implementation with the possibility to study models in detail for in-depth understanding. Components can be modified by the user and new components can be defined at all levels with the full power of the multi-engineering Modelica® libraries always at hand. With VDL, the user is given a toolbox for full vehicle modeling. With a hierarchical structure, templates and predefined components, configuration of different vehicles is convenient and straight-forward. Component-based drag-and-drop modeling allow for flexible design of new topologies and combination with other Modelica® libraries, facilitating e.g. hybrid electric vehicle and active system development.

All chassis variants are intuitively built with library components for rigid or flexible bodies and frames, axles and suspension linkages of various detail levels, steering mechanisms, anti-roll mechanisms, etc. Complete kinematic and elasto-kinematic suspension components such as McPherson, DoubleWishbone, MultiLink and BeamAxle are included, as well as low-level components for modeling custom suspensions.

The library offers full flexibility and support for heavy-duty trucks and truck combinations. Twin tires, flexible frames, axle configurations, a variety of couplings, full trailers, semitrailers, tractors, and tankers are available to allow for convenient definition of new vehicle configurations.

Active components and sensors are easily introduced at any location. It is straightforward to include both conventional and hybrid electric propulsion as well as different types of brake and suspension systems. Integrated models allow for complete vehicle simulation and system-level evaluation of any novel vehicle control concept.

To protect in-house knowledge but still make it possible to share models, it is possible to encrypt models. This allows suppliers and OEMs to work with the same models without revealing proprietary information.

Experiments

For the evaluation there is a wide range of simulation setup possibilities.

There is a flexible segment-based road definition with friction and unevenness. To control the input to the vehicle, there are easily customizable maneuvers and tracks with open- and closed-loop driver models, and drivers that can follow sequences of instructions. Both handling tests and drive cycle experiments for fuel economy and energy management are available. It is possible to simulate one or multiple vehicles and also parts or subsystems of vehicles under a variety of different conditions. Models are easily integrated into Simulink® block diagrams. All model variables are available for evaluation in plotting and post-processing. Animations may conveniently be shared to demonstrate simulation results. CATIA V6 and Dymola have outstanding and proven capabilities of simulation in real-time for automotive applications.

The Vehicle Dynamics Library is developed, supported, and maintained by Modelon AB, a Dassault Systèmes technology partner.

One customer benchmark demonstrated remarkable real-time performance of a detailed model of a mid-sized sedan chassis with front MacPherson and rear MultiLink suspensions with stiff bushings, giving a total of 72 degrees of freedom.

Test rigs are used to isolate behavior that requires constraints on the tested model. For full vehicles or chassis this can be done to investigate for example the roll, pitch and bounce dynamics. For parts and subsystems such as suspensions, the test rigs can for example be used for kinematics and compliance analysis.

Main libraries

VDL can be ordered with any of these options:

- **Cars:** Vehicle models for cars with basic suspensions
- **Trucks:** Chassis models for Heavy vehicles and trucks with basic suspensions
- **Suspensions:** Detailed suspension models for cars or trucks
- **Drivelines:** Detailed driveline models and templates for cars taking into account 3D effects
- **Active safety:** Models for driver-vehicle-safety systems
- **Parsfile import:** Import of parsfile car data



Vehicle on a segment-based road with a closed-loop driver testing the ability to avoid an obstacle hidden by a crest.

www.3ds.com/products/catia/portfolio/dymola

