VEHICLE SYSTEMS MODELING AND ANALYSIS (VeSyMA) LIBRARY
Predict on-road vehicles main performance, fuel economy and energy usage

CAR PERFORMANCE AS A BUSINESS EXPERIENCE
The VeSyMA Library provides the essential models for on-road vehicle systems modelling and analysis. It enables engineers to predict the main performances of the vehicle based on a system-level definition comprising the thermal, hybrid or electrical propulsion, transmission and drivetrain, according to existing standard or user defined drive cycles. VeSyMA library is the foundation for a suite of Modelica libraries, specialized in suspension, powertrain and engines.
VESYMA LIBRARY

Developed as the cornerstone for the wider VeSyMA suite, the VeSyMA library initiates a top-level adaptable vehicle template layout, building upon the subsystem templates established in the open-source Vehicle Interfaces library. A modular approach to vehicle modelling leads to an intuitive and versatile tool, where the user tailors the complexity of the simulation to their specific needs. Each vehicle subsystem present in the VeSyMA platform utilizes a base-class found within the VeSyMA library, ensuring compatibility between all VeSyMA platform extension libraries.

The VeSyMA library is a collection of idealized sub-component models, enabling longitudinal vehicle based studies and drive cycle analyses.

HIGHLIGHTS

• Top-level and sub-system templates and interfaces for diverse vehicle models using the open standard Modelica language
• CAN-bus style control bus for vehicle data signal distribution
• Manual, automatic and dual clutch transmission models
• Mapped petrol and diesel engine models including multibody and frictional effects
• Variable fuel tank mass with dynamic center-of-gravity position and inertia
• 1D independent brake models, from idealized to hybrid compatible, brake-by-wire and single/twin cylinder pseudo-hydraulic models
• Table based DC motor with static and dynamic state-of-charge (SOC) battery models
• 1D drivetrain, including FWD, RWD and 4WD layouts

BENEFITS

• Accelerate vehicle performance investigation through an intuitive open and modular approach
• Predict fuel economy for standard and specific drive cycles, based on multi-domain simulation
• Simplifies the understanding of vehicle sub-system interactions and behaviors
• Streamlines the processes for further specialized investigation such as vehicle dynamics, or electrified powertrain development
• Open to other disciplines system-level investigation and energy usage, such as occupant thermal comfort