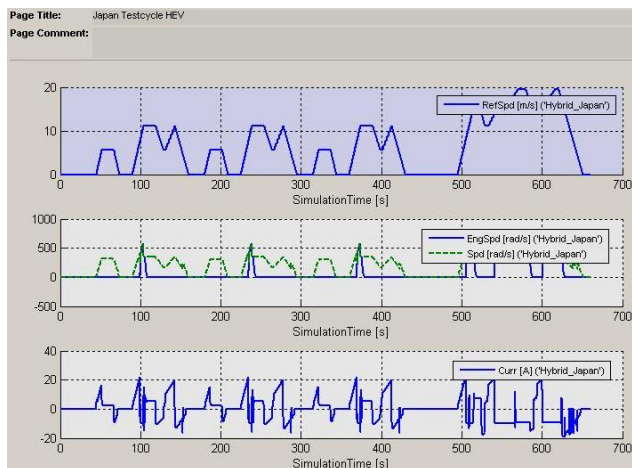


### Applications

The Hybrid Toolbox for enDYNA (physical engine simulation) is an Add-on to configure various topologies of hybrid-electric powertrains from micro to full hybrid. It can be used throughout all development phases: from conceptual function design on the desktop computer (MIL, SIL) to operating tests in real-time with hardware-in-the-loop systems (HIL).

- **Simulation of Engine Performance and Fuel/Energy Consumption**
- **HEV-specific Function Development and Test**
  - Battery management
  - Torque coordination
  - Engine start/stop function
  - Regenerative braking
  - Thermal management
- **Analysis and Optimization of Operation Strategies for**
  - Efficiency and fuel consumption
  - Driving performance
  - Stability of the electric system



### Model Features at a Glance

#### Mechanical Components

With the mechanical components from our Simulink library you can easily build arbitrary powertrain topologies featuring detailed efficiency models.

- Transmission
- Clutch
- Torque converter

#### Electric Components

Use the electric components to build various electric system topologies, including two voltage levels and thermal models for hybrid vehicles.

- Electric motors and inverter
- Battery
- DC/DC converter
- Switches
- Electric loads

#### Vehicle Concept Examples and Parameterization

- Full and Mild Parallel Hybrids (HEV), examples for other topologies and BEVs are obtainable on request
- Easily available physical parameters and characteristics

#### Scenario Catalog

The enDYNA Hybrid Toolbox can be used with all standard driving cycles for consumption and driving performance:

- European, Japanese and US consumption test cycles
- All established driving performance tests (0-100km/h, 0-60 mph, 80-120 km/h,...)
- Various possibilities for gear selection

Extend and customize the scenarios according to your needs, e.g. by user-defined velocity profiles from measurements. The driver model (which is already part of enDYNA) will perform the cycles with your virtual vehicle.

# Hybrid Toolbox for enDYNA

## Analysis of Powertrain and Electric System in HEVs

### TESIS DYNAware Product Facts

#### Based on Matlab/Simulink

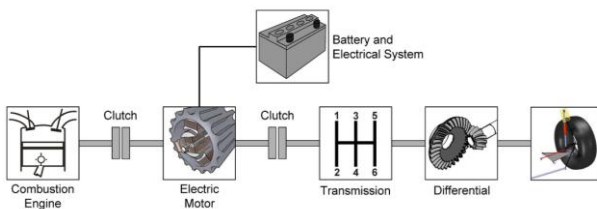
- Matlab interface: Powerful scripting for automated simulation control, model parameterization, result analysis, and report generation
- Fully integrated into Simulink interface for user-defined model extension and integration of control functions

#### All major Real-Time Platforms Supported

- dSPACE, ETAS, MicroNova, National Instruments, Opal-RT, xPC
- Other targets are available on request

#### Documentation and Online-Help

- User and reference handbooks



### Additional Services

Take advantage of our engineering expertise from hybrid and energy management projects:

- Integration of your models and simulation tools into a HEV simulation environment
- Consulting for application and validation of the powertrain and chassis control systems
- Requirement management, design and function specification of the entire vehicle system
- Engineering services for calculation of driving performance and fuel consumption, design of electrical and hybrid powertrains
- Process consulting, e.g. fleet consumption monitoring, CO2 Conformity-of-Production (COP)
- Modeling of multi-body-systems, 1D thermodynamics, hydraulics, fluid dynamics

### Your Benefits

#### Speeding up Your Innovation Process

- Ready-to-use examples
- Framework for an efficient handling of parameters and simulation projects
- Automation tools reduce routine jobs

#### Open for Your Knowledge and Infrastructure

- Model structure in Matlab/Simulink is open for your application specific adjustments
- Smooth integration of your own models
- Free choice of hardware platform

#### Technical Safety

- Solid professional software based on thorough modeling and real-time expertise
- Successfully employed in numerous projects
- TESIS DYNAware is your independent partner with optimal solutions on all real-time platforms

#### Cost Reduction

- Use the same model throughout the development process and focus on your applications.
- Frontloading: Reduction of prototype costs through early testing on the PC – get more mature physical prototypes.

### Contact us

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