

## Fact Sheet

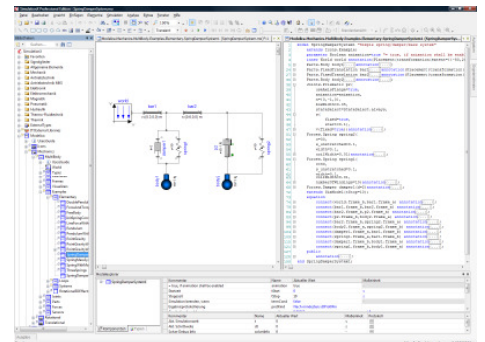
### New in SimulationX 3.3

#### Objective

This document will inform about new features in SimulationX 3.3.

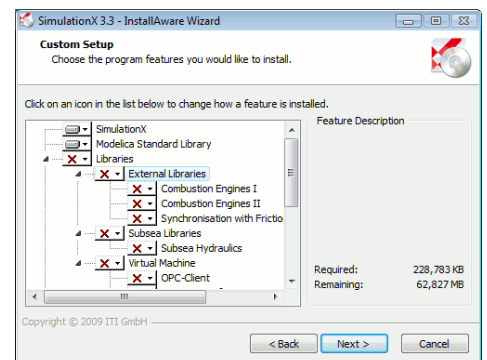
#### SimulationX Modelica Edition

The SimulationX Modelica Edition allows a convenient and inexpensive introduction into SimulationX. Beside the known Diagram View the new Modelica Text View may also be used for direct editing of the Modelica code.



#### New all-in-on installation package

The SimulationX installation is significantly eased since all needed components may be selected and installed from a single setup program. New components and software updates may be installed in the future without the need of a previous uninstall. The Modelica Standard Library Vs. 3.0 is included by the setup program, too.



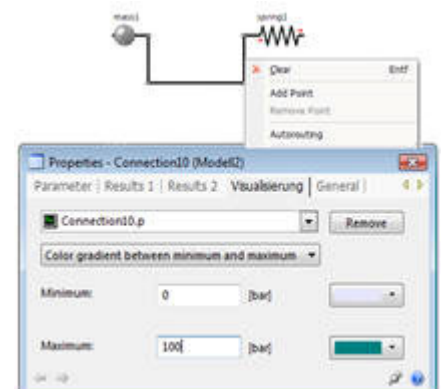
#### Improved Modeling

##### Fully customizable connection line routing

Automatic connection line routing usually results in a well-arranged model diagram view. Additionally the connection lines may be manually customized by

- insertion, movement or deletion of connection line points,
- drag and drop of connection lines and points,
- insertion of additional connection line points already at connection creation by right mouse clicks.

The customized connection lines are persistent with respect to further model changes and enhancements.



### Improved graphics editor

The dynamic visualization for connection lines gives you an improved model overview. The current state or the exceeding of minimum/maximum of certain variables like pressure or temperature can be color-marked. Even video recording is possible.

### Documentation View

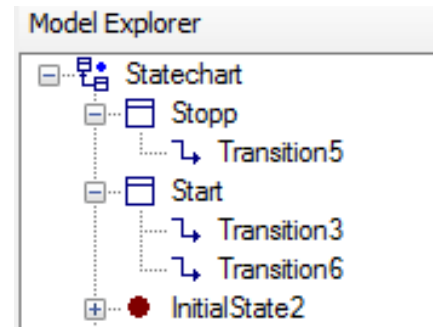
The documentation of Modelica types or models was displayed in the SimulationX help window in previous releases of SimulationX. With the introduction of the new Documentation View window the HTML documentation is displayed faster within the SimulationX model area.

### Text View

The TypeDesigner is a powerful and convenient modeling tool for the creation and editing of custom types and models. Sometimes it might be more effective to apply changes and enhancements directly in the underlying Modelica code. The new SimulationX Modelica editor features syntax highlighting and code completion for an up-to-date ease of use.

### Extended model explorer of the StateChart Designer

The model explorer of the StateChart Designer displays not only the different state kinds but also the transitions. Thus the navigation of complex state charts is made easier.



## Analysis

### Transient Simulation

The fixed step size solver (external solver) is suitable for Software-in-the-Loop (SiL) testing of potential real-time models. The five different solvers (as described in the user manual) may be selected by the solver parameter iMode.

The solver debug information is also available for CVODE (external solver). See the user manual for more information on the solver debug information. The input-output analysis is available for models with NIST fluids. The memory consumption of the symbolic preprocessing (Global Symbolic Analysis) is cut in half.

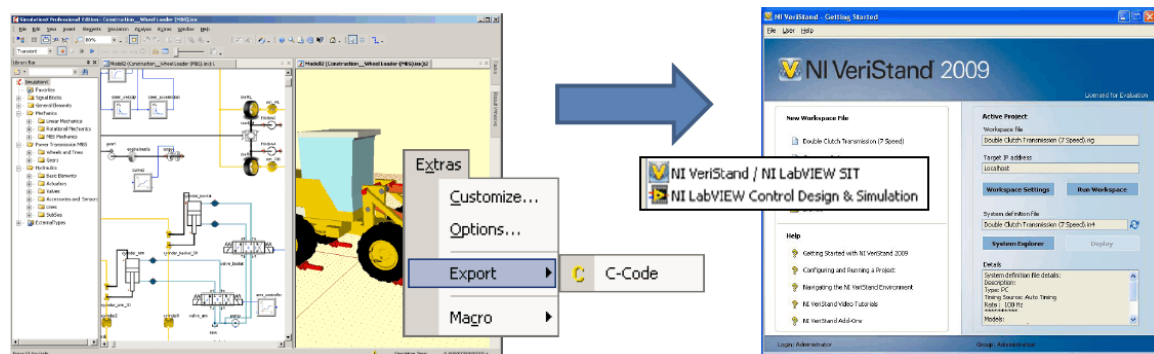
### Performance Analyzer

The performance analyzer is also available for the CVODE solver and the fixed step size solver (external solvers). The performance analyzer needs to be activated before simulation start.

## Code Export

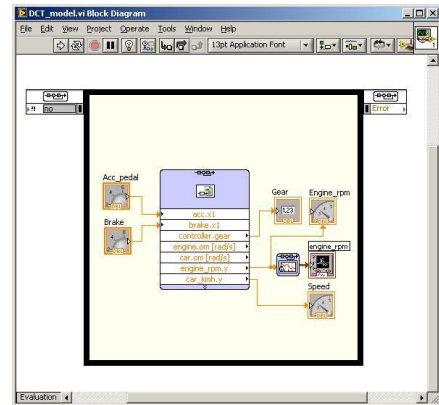
### NI VeriStand / LabVIEW Simulation Interface

With the project type NI VeriStand / LabVIEW Simulation Interface the real-time testing and simulation software NI VeriStand from National Instruments is directly supported. It allows the real-time simulation of SimulationX models.



## NI LabVIEW Control Design and Simulation Module

Using this project type SimulationX models can be integrated with NI LabVIEW. A valid license for the NI LabVIEW Control Design & Simulation Module from National Instruments is needed. The exported model is integrated with LabVIEW utilizing the NI External Model Interface.



### Libraries

Some libraries were extended and new models added.

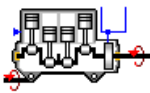
#### Library signal Blocks

The group **Signal Blocks** contains now the new model type **Product Junction**, which completes the group adequate to the **Summing Junction**. This element allows the simple modeling of products or divisions in signal structures. Both models have new coordinated symbols.

In the group Special Signal Blocks the element type **Short Time Mean Value Filter (ShortTimeMean)** has been added. With elements of this type one can compute the short time mean of the input signal  $x$  in dependence of another input signal  $\phi$ .

#### Library Power Transmission

##### Motors and Engines



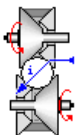
The new model type **Combustion Engine (extended)** features in addition to existing engine model, the possibility to compute optionally gasoline or Diesel engine excitations by approaches. Furthermore it is possible to enter the engine map as curve family or 2D map as well as the optionally consideration of reciprocating masses. The engine model can also be used as mean torque model without non-uniformities.

##### Couplings and Clutches

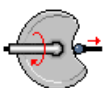
All models of the group **Couplings and Clutches** can now switched to rigid behavior. The Boolean parameter *rigid* can be referenced by further model elements. In many cases, backlashes can also be taken into account. The properties dialogs of some model types have been reworked.

##### Transmission Elements

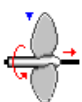
The **Gear** stage model has a further loss computation model (option). This is a rigid friction model with continuous transition (rigid slipping friction). Using this, singularities in rigid powertrains models can be avoided and the simulation will be accelerated (less discontinuities).



The new model type **Ideal CVT** can be used for the modeling of all linear and especially nonlinear kinds rotational transmission stages (e.g., belt drives, friction gears). The transmission ratio is defined on speed level and can be parameterized.



The new **Cam Disk Mechanism** model represents a non-linear transmission stage with cam disk. The model transforms between a rotational coordinate (cam disk) and a translational coordinate (follower). The model also allows the analyses of stepping gears, which are used in production machines.



The new model of a **Marine Propeller** is a load model for marine powertrains. It represents the rotor inertia and it computes the thrust force by the generated jet velocity. Similar to **Wheel-Ground Contact** model, the ship mass and further loss models can be considered at the translational connector. The pitch angle of the rotor blades can be varied, thus gives a further possibility of controlling the thrust next to the rotor speed. An internal approach is used for the computation of the excitation (torque) by the rotor blades and the rotor losses can be entered.

### Combustion Engines I

The group *Combustion Engines* now contains the news model type *Combustion Engine (rigid)*. The model is similar to the engine models of the group *Motors and Engines*, but contains some more features (options):

- Preset of the cylinder pressure, the tangential pressure, or the excitation torque (per cylinder)
- consideration of misfiring cylinders
- consideration of cylinder without compression and expansion (open valves)

### Combustion Engines II

The excitation model for the computation of *Vibe Combustion Function* in the group *Combustion Engines \ Excitation Models* has now two options for choosing parameter sets (with adequate default values) and computation basics for the computation of a Diesel or Gasoline combustion. Parameters, which are not needed, will be deactivated.



In the group *Combustion Engines \ Controllers* the news model of an Electronic Control Unit (ECU) can be found. It models a controller of gasoline engines.



The ITI External Libraries \ Combustion Engines II contain now the new engine model *Inline Four Cylinder Gasoline Engine*. This model uses the new ECU model as well as the new options of the *Vibe Combustion Function* model.

### Library Mechanics

*MBS CAD Import*

Structured import of Pro/ENGINEER coordinate systems and axes is available. Axes are interpreted as *Prismatic* or *Revolute Joint*. Coordinate systems are interpreted as *Rigid Link* (with visualization set to coordinate system).

### Library Electronics

In the group *Semiconductors* the element type *Z-Diode* has been added.

### Library Magnetics

The element-type *MagAirResistCD* from the library *Magnetics* has been supplemented by the enumeration *bdKind*. If *bdKind* is set to *Cylindric Boundaries* the idealized airgap field between two circular cylindrical axisymmetric boundary surfaces is modelled. With *bdKind* set to *Inside: Cylinder, Outside: Perforated Sheet* the type describes the airgap field established between a punched sheet and a circular cylinder symmetrically passing the hole.