

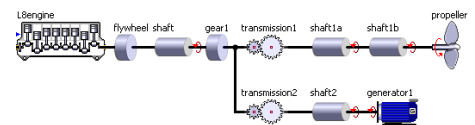
Fact Sheet

New in SimulationX 3.4

This document summarizes major advancements in version 3.4. From now on SimulationX will be available as 64bit version on demand. For further information please contact us by email to 64bit@simulationx.com.

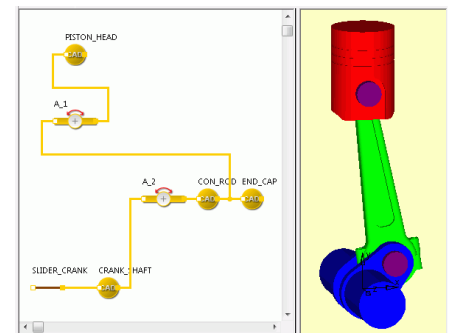
New TVA Package for Simulation in Frequency Domain

With the new package Torsional Vibration Analysis SimulationX is enhanced with an efficient model library for steady-state simulation of drive systems with combustion engines, electrical machines, gears and typical loads. The package contains linear and non-linear models tailored to the extensive steady-state simulation capabilities in SimulationX and the special requirements in the evaluation and certification of drive systems. The open structure of the TVA package allows easy modification and enhancement by the user.



Enhanced CAD Import

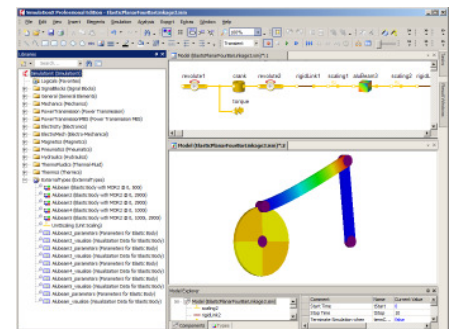
In addition to Pro/ENGINEER SimulationX 3.4 now supports also SolidWorks. The enhanced CAD component import now allows the definition of geometrical dependencies. The created model elements are connected according to the defined dependencies, whereby the position of the model elements in the structure view is taken from the position in the CAD component. This enables enhanced management of the model results with significantly reduced manual effort and reduced potential for errors in the import of CAD models.



New Interfaces Improve Flexibility

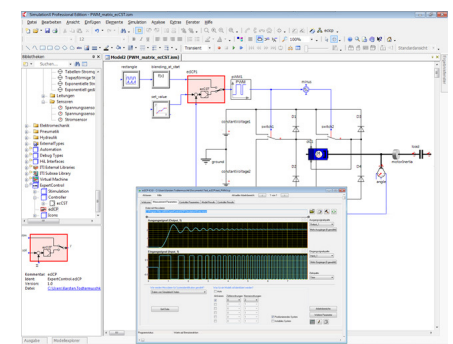
- **Import of Three-Dimensional Mechanical Structures**

The new SimulationX FEM Import Interface imports three-dimensional mechanical structures from popular FE programs like ANSYS or COMSOL Multiphysics models into the SimulationX MBS mechanical library. Any elastic structure (beam, shell, solid etc.) may be integrated as order-reduced sub model and thus used within the context of system simulation. Compared to the existing "Modal system" import from ANSYS, large motion of the imported elastic body in a non-inertial reference frame is permissible. Furthermore, the model comprehension is improved by the realistic visualization of the deforming FE mesh.



- **Integration of Partner Tool Revolutionizes Control Design**

The ExpertControl design tools ecCST and ecCP are now fully integrated into SimulationX 3.4. They provide the engineer with fully automatic design capabilities for optimum controllers in early product development stages. As a result, the identification of transfer functions and the set-up of controllers are considerably simplified and accelerated.

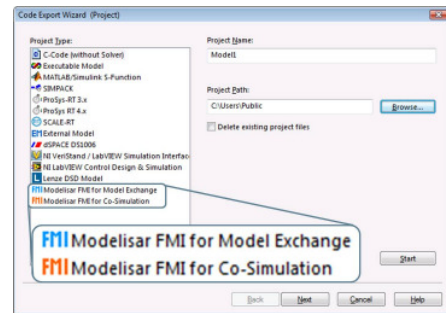


- **Platform-Independent Model Exchange**

SimulationX 3.4 supports the creation and import of Modelisar Functional MockUp Units (FMU). Standardized interfaces facilitate the platform-independent exchange of simulation models and increase the flexibility in the connection of external simulation tools and models, which implement an equation-based interface (FMI for Model Exchange) or contain an embedded solver (FMI for Co-Simulation).

- **New Target Platforms for Real-time Applications**

The Code-Export to Simulink now can integrate the Fixed-Step Solver into the generated S-Function. This has advantages when transferring the models to real-time platforms by means of the Real-Time Workshop®, permitting oversampling as well as the integration into triggered-, function call-, or enabled subsystems. SCALE-RT 5.1 by Cosateq is now supported as new target platform.



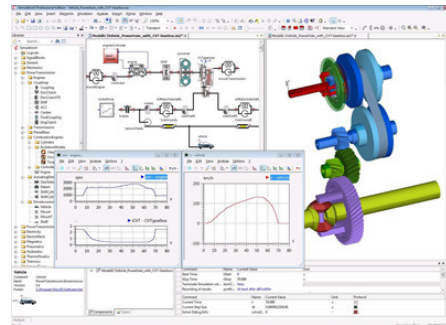
Accelerated Analysis and Code Optimization

- **Enhanced Robustness and Performance for CVODE and Code Export**

Thanks to optimized linear equation solvers and event handling, as well as the efficient Jacobian matrix computation the CVODE solver has been improved in robustness and speed. Especially variant computations with large models are accelerated considerably. Enhancements in the SimulationX Modelica Compiler and the consequent use of Common Sub Expressions allow the generation of more efficient C Code. This reduces the required computation time when using SimulationX models within real-time applications and in turn allows the implementation of more complex models.

- **Significant Speed-Up for Steady-State Simulation**

The improved step-size control applied in the new „Linear Method with Interpolation“ reduces computation time significantly. In typical applications, such as combustion engine drive trains in ship propulsion systems or construction equipment, simulation times are reduced by a factor 10.

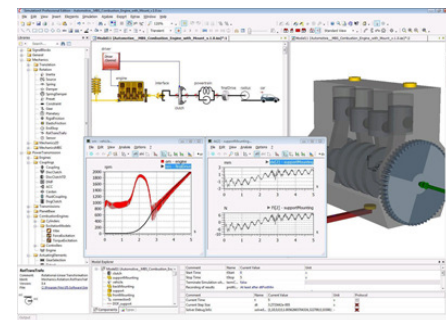


Complete Range of the Modelica Language

SimulationX 3.4 delivers enhanced model handling and an easy introduction for traditional Modelica users due to the full support of Modelica 3.1. SimulationX greatly increases the efficiency of this standardized modeling language.

Accelerated and Simplified Modeling with Extensive Library Enhancements

This new release contains extensive modeling enhancements in the SimulationX libraries of power transmission, 1D mechanics, multi-body mechanics, hydraulics, thermo fluids, and controls. These enhancements improve amongst others the performance for real-time models and provide a more comfortable modeling environment for engineers in the field of automotive, offshore/subsea and marine.



- **Power Transmission**

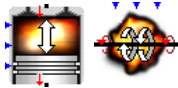
Drive Accessory



In the course of extending the Power Transmission library models for a *Vehicle*, representing the effects of mass and driving resistances on the vehicle driveline, and a *Translatory Mount* model for the consideration of support forces have been added.

The *Shaft Segment* model now can be also parameterized by Lehr's Damping Factor.

Combustion Engines I & II



The group of excitation models now contains elements for *Force Excitation* and *Torque Excitation*. Both are characteristics-based excitation models for reciprocating engines and thus for cylinders of combustion engines. They operate as external force or external torque, respectively.

Transmission Elements

The *Marine Propeller* has new and comfortable parameterization opportunities. New parameter options allow the straightforward specification of loads (e.g. a propeller curve). The definition of a compensation parameter for steady-state simulation is also possible.

Synchronization



The *Dog Clutch* element now visualizes dog geometries and animates the engagement process.

Two new modeling options in the Dog Clutch reduce the computation time. Optionally, a friction model with continuous transition between forward and backward slipping (no sticking) as well as a spring-damper-backlash model for the contact (normal direction) with continuous transition between backlash and contact can be selected.

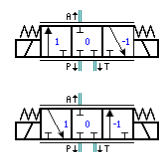
- **Mechanics (Rotary and Translatory)**

Friction Elements

SimulationX 3.4 now provides alternative friction models for real-time applications. *Rigid Friction* and *Elastic Friction* elements now offer the option to use a continuous transition model without discontinuities instead of stick-slip modeling.

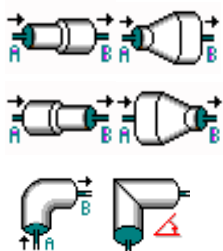
- **Hydraulics**

Valves



The library *Proportional Control Valves* has been extended by two new elements for 3/3 control valves. Therewith nine different control valves with numerous adjustable options e.g. valve dynamics, characteristic curves or edge parameters are available. Furthermore, the valve models are suited for modeling directional switching valves.

Lines



A number of special losses have been added to the library *Lines*. With these models and the T-junctions and complex pipe models already available in the library, the behavior of control blocks or complex pipe systems can be more analyzed..

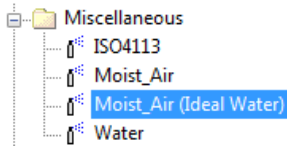
Accessories



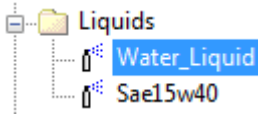
The model piston accumulator in the *Accessories* library with a pneumatic port on the piston rod side has been supplemented by a model *Piston Accumulator Type B*, which has the pneumatic port on the piston side. These models can be used, e.g., for the simulation of passive vibration and wave compensation especially in offshore plants.

- **Thermal Fluid**

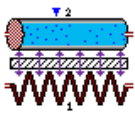
Additional Fluids



In addition to the *MoistAir* fluid, there is now available the fluid *MoistAir_IdealWater*, which implements a simplified fluid computation assuming ideal water (liquid phase) and using simple temperature-dependent functions instead of the ASME description used in *MoistAir*. This accelerates symbolic analysis and Code Export and can reduce computation time by up to 50 % .



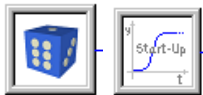
The fluid group *Liquids* has been extended with *Water.Liquid* characterizing water in its fluid phase for applications close to atmospheric pressure. The characterization for *Water.Liquid* according to IAWPS (International Association for the Properties of Water and Steam) considerably accelerates computation with water in comparison to the two-phase model (fluid group *Miscellaneous*).



The new heat exchanger model *TwoPhaseHX* can be easily parameterized and operated as condenser or evaporator and thus enables comfortable modeling of invertible cooling circuits.

- **Signal Blocks**

Signal Sources



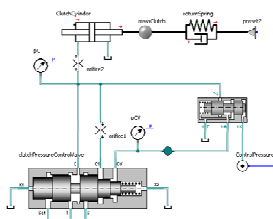
The new *Initial Random Generator* computes a random value which can be used for initialization at the start of the simulation. It allows running stochastic parameter variant studies.

Thanks to four initialization opportunities and new internal computation algorithms the *Hysteresis* element is numerically robust.

The new element *Start-Up Function* eases the smooth application of loads, motion quantities, pressures etc. in simulation models, minimizing initial transient oscillations.

- **ITI External Libraries**

Gearbox Actuation



Within the *ITI External Libraries SimulationX 3.4* provides a new library *Gearbox Actuation*. The new library is intended for the modeling of hydraulic systems in the field of gearbox actuation systems. The *Gearbox Actuation* package includes types of externally controlled pressure control valves, pressure relief valves, and pressure reducing valves. Furthermore hydro-mechanical accumulators are included, which can be parameterized either with physical and geometry-based data, or via characteristic curves. Solenoid valve actuation components complete the contents of this external library.