ACTIVATE™
solidThinking®

solidThinking Activate enables product creators, system simulation and control engineers to model, simulate and optimize multi-disciplinary systems. By leveraging model based development Activate's users can ensure that all design requirements are successfully met while also identifying system level problems early in the design process. Activate's intuitive block diagram environment empowers users to rapidly build demonstrations of how real world systems function and easily experiment with new ideas without any need to build prototypes.

Product Highlights

- Model based development of hybrid systems
- Construct hierarchical, parameterized multi-disciplinary models
- Mix signal-based and physical (Modelica) components in the same diagram
- Easily extensible, built-in block libraries including library management
- Model exchange or co-simulation through the Functional Mock-Up interface
- Co-simulation with multi-body dynamics
- Compile models into executable code

Learn more:
solidThinking.com/Activate

Benefits

Improve system level performance
Simulate and improve the dynamic behavior of any multi-disciplinary system using Activate. Activate makes it easy to model, simulate and validate smart systems where users can incorporate functions of sensing, actuation, and control coming from diverse components.

Design for robustness
Model based development using Activate provides an efficient approach for establishing a common framework for communication throughout the design process. Perform what-if analyses at the system level to quickly test several designs and investigate the interactions of all components in a system.

Gain functional insight early
Activate empowers users to identify system level problems early in the design process while ensuring that all the design requirements are met. Activate provides its users with a standard set of predefined blocks that can easily be combined to model systems.

Activate users can easily leverage the large library of Modelica physical components to further describe the plant and the controller.

## Capabilities

Build diagrams intuitively
- Drag, drop and connect paradigm to rapidly construct models
- Multiple window configuration with the ability to modify diagrams between windows using the drag-and-drop and copy-and-paste operations
- Support for concurrent loading of multiple models in a session

Hybrid modeling
Model and simulate continuous and discrete dynamic systems.

Multi-disciplinary modeling
Real-world systems are multi-domain in nature. Activate allows users to model and simulate the combined system behavior of real world systems with support for multiple domains such as Mechanical, Electrical, and more.
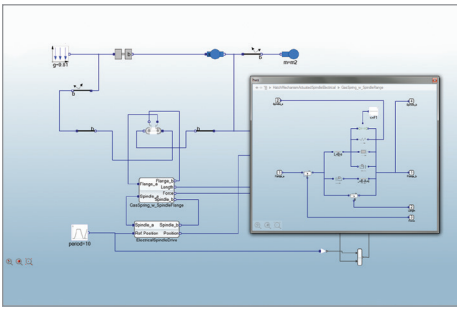
Physical component Modeling of a hatch Mechanism – (Mechanical/Electrical modeling)
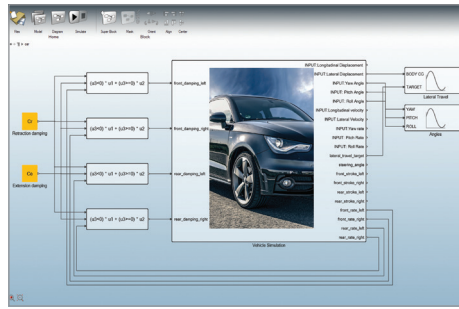
State-of-the-art co-simulation with Multi-body Dynamics
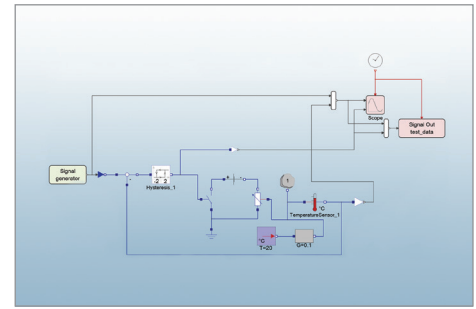
Room temperature control system with Modelica components

Hierarchical & parametric modeling

- Build hierarchical component-based models of the real world system using signal based and physical modeling libraries
- Mix signal based and physical modeling blocks in the same model
- When modeling large or complex systems, easily create super blocks by encapsulating multiple blocks in a diagram into a single block. Super blocks are modular, reusable, can be masked, and fundamentally behave like regular blocks allowing users more flexibility
- Since a model can be hierarchical and parameters can be defined at different levels, Activate provides an all available parameters option which lets users navigate in a diagram and get a report of all parameters that are known or defined at a current level
- Generate C-code directly from your model

Built-in block-based model libraries

Activate includes a large variety of predefined blocks that are available in a library system of palettes. Users can also create their own custom blocks in C or math scripts and save them to new or existing libraries.

- Signal Generators
- Signal Viewers
- Signal Importers
- Signal Exporters
- Signal Conversions
- Signal Properties
- Math Operstions
- Dynamic
- Hybrid
- Routing
- Logical Operations
- Activation Operations
- Matrix Operations
- Lookup Tables
- Ports
- Buffers
- Bus Operations
- Optimization
- Cosimulation
- FlipFlops
- Custom Blocks

Physical Component Modeling Using Modelica

Easily extend the capability of Activate using Modelica. A better way to model physical components is to use implicit blocks in which the behavior of the blocks is specified through symbolic equations.

Modelica, which is a standard in component level modeling is supported natively in Activate for acausal modeling.

Library Management

Easily create components and assemble custom applications. Use Activate's library manager to create and edit custom libraries. Activate also provides an IDE along with API functions for users to further leverage library management.

Hybrid Simulator

Activate's simulator provides users with several high performance numerical solvers that accurately and robustly solve dynamic systems including continuous, discrete-time and event based behaviors.

Solver Type	Stiffness	Solver Name
Fixed step -size	Non-stiff ODE	Forward Euler Explicit Trapezoidal Classical Runge Kutta Runge-Kutta
	Stiff ODE	Backward Euler Implicit Trapezoidal
Varible step-size	Non-stiff ODE	CVODE-BDF-Functional CVODE-ADAMS Functional DOPRI (Dormand-prince)
	Stiff ODE	Lsode CVODE-BDF-NEWTON CVODE-ADAMS-NEWTON RADAU-IIA for ODE CPODE
	DAE	IDA RADAUV-IIA for DAE DASKR

Optimization

Formulate optimization problems to improve the system parameters and design robust control strategies via:

BOBYQA optimizer block

- This optimization block can be used directly in a model and doesn't require any external calling function/link up
- Cascade multiple optimization blocks to formulate max-min and min-max problems

- Graphical optimization tool - the simplest way to formulate and solve optimization problems
- Script based optimization - a powerful mechanism for solving general optimization problems where the cost and constraints may be obtained from a combination of Activate simulation results and math scripts

Model exchange and Co-simulation via Functional Mock-up Interface (FMI)

Activate supports FMI 2.0 standard for both model exchange and co-simulation of dynamic systems including the ability to import and export FMU (Functional Mock-up Unit).

Co-simulation with Multi-body Dynamics

The co-simulation interface lets users simulate a complex system that includes a multi-body system (MBS) and one or more control subsystems. In order to effectively simulate the entire system, the MBS is simulated with a Multi-body simulation solver while the control subsystem is simulated with solidThinking Activate.

Linearization

Activate allows users to create linear models from Activate blocks by linearization. The operating point can be computed either by running the simulation at a given time instant or by computing a steady-state point by imposing constraints on inputs, outputs, states and state derivatives.

Compiling models into executable code

Activate supports code generation for system performance & IP protection.