



Altair® Activate™ provides an open integration platform for modeling, simulating and optimizing multi-disciplinary systems-of-systems using inherent 1D block diagrams. Users have the option to include subsystem models either from Altair®'s 3D tools, such as Altair® MotionSolve and Altair® Flux, or from 3rd-party tools. Models can also be imported from Simulink®.

**Product Highlights:**

- Hierarchical systems-of-systems defined as parameterized models
- Signal-based and physical modeling can be conveniently combined to define a system model
- Built-in block libraries can be easily managed and extended
- Model exchange or co-simulation achieved through FMI / FMU
- Multi-disciplinary models can include multi-body models, electromagnetic models, FEA models, CFD models, and more
- OD, 1D and 3D modeling can be used together allowing the best approach for different types of sub-systems

Learn more:  
[Altair.com/activate](http://Altair.com/activate)

**Benefits**

**Improve System Level Performance**

Simulate and improve the dynamic behavior of multi-disciplinary systems. Easily model, simulate and validate smart systems where users can incorporate functions of sensing, actuation, and control coming from diverse components.

**Leverage Model-Based Development**

Altair® Activate provides a common framework for functional product assessment and communication throughout the product development process. Perform what-if analyses at the system level to quickly test numerous designs and investigate the interactions of all components and subsystems comprising a system.

**Gain Product-level Functional Insight Early**

Identify product-level problems early in the design process while ensuring that all the design requirements are met. Altair® Activate provides its users with a standard set of predefined blocks that can easily be combined to model systems. Altair® 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**

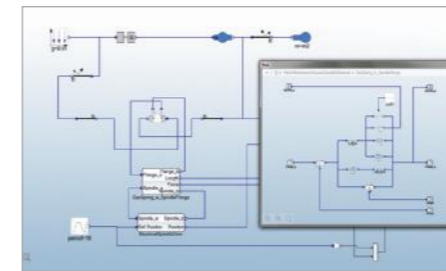
Model and simulate continuous and discrete dynamic systems.

**Multi-disciplinary Modeling**

Altair® 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.

**Hierarchical and Parametric Modeling**

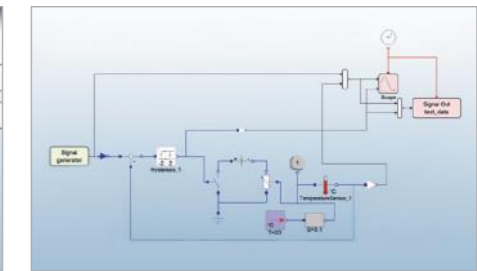
- Build hierarchical component-based models of a real-world system using



Physical component Modeling of a hatch Mechanism – (Mechanical/Electrical modeling)



Co-simulation of controller models with multi-body plant models



Room temperature control system with Modelica components

- 1D block diagram 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 more flexibility
- Since a model can be hierarchical and parameters can be defined at different levels, Altair® 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

**Built-in Block-based Model Libraries**

Altair® Activate includes a large variety of predefined blocks available in an easy-to-use library of palettes. Users can also create their own custom blocks in C or math scripts in OML and save them to new or existing libraries.

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

**Physical Component Modeling Using Modelica and SPICE**

In addition to the signal-based blocks listed above, Altair® Activate comes with the Modelica standard library (MSL) – a collection of blocks describing the physical behavior of Electrical, Electromagnetic, Mechanical, Thermal components.

These blocks can be extended by user-defined Modelica blocks. Furthermore,

users can provide SPICE netlists to model electrical circuits.

**Library Management**

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

**Hybrid Simulator**

Altair® 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
Variable 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 with multiple options.

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 ob-

tained from a combination of Altair® Activate simulation results and math scripts

BOBYA Optimizer block:

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

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

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

**Co-simulation with Multi-body Models**

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 Altair® Activate.

**Linearization**

Altair® Activate allows users to create linear models from Altair® 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**

Altair® Activate supports code generation for system performance & IP protection.