

CATIA SYSTEMS ENGINEERING HEATING, VENTILATING & AIR CONDITIONING LIBRARY

Optimize the design & performance of HVAC systems for buildings



HVAC SYSTEMS DEVELOPMENT

The Heating, Ventilating and Air Conditioning (HVAC) library accelerates the development and optimization of large thermo-hydraulic heating, ventilation, and air conditioning systems. The Modelica HVAC library provides an optimum trade-off between simulation accuracy and time taken to simulate the dynamic behavior of building heating and cooling systems, and is particularly suited for performing simulations that span a whole year of system use.

Rapidly model, simulate & analyze HVAC systems

The cross-discipline systems modeling capabilities provided by Modelica enables systems engineers to define and simulate models that comprise physical components from many engineering domains. These models can contain a combination of mechanical, electrical, electronic, hydraulic, thermal, electric power, software control or process-oriented characteristics and components. Each model represents a combination of system elements that follow the physical laws of the fundamental components or sub-system that defines them.

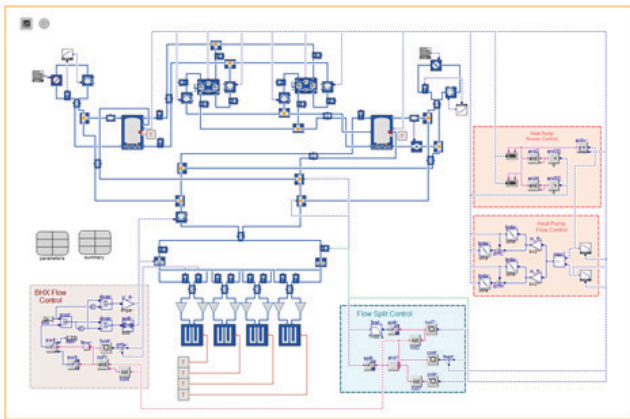
The advantage of using Modelica for system modeling is that the models are easier to understand, reuse and maintain than traditional block diagram based system modeling approaches.

Determine HVAC system operating costs.

It is possible to quickly analyze different system layouts and compare their primary energy consumption, costs, and their associated carbon dioxide emissions over any reference period. Using transient models of the HVAC systems, the thermal behavior of building and its interaction with the heating and cooling systems can be quickly modeled and analyzed.

Understand the impact of system design choices.

Multiple HVAC system design scenarios, like cost optimized system layout with various heating and cooling generating devices, can be analyzed in minutes. Different types of heat recovery or humidity control can also be modeled, simulated and analyzed.



Supplied HVAC library component & system models:

- Absorption and vapor compression chillers
- Evaporative and dry cooling towers
- Steam humidifier and water extraction (for dehumidification systems)
- Borehole heat exchangers (for geothermal energy systems)
- Boiler and combined heat and power
- Heat exchangers (liquid and air side)
- Solar panels
- Heat pumps
- Air ducts with various cross sections
- Pipes, valves and manifolds
- Pumps, blowers and fans
- Domestic hot water storage systems and tanks
- Solar energy storage tanks
- Radiators and under floor heating
- Heating and cooling consumers
- Fluid and air sensors
- Controllers
- Automatic energy balances

Analyze the impact of HVAC on building occupants.

The HVAC library can be used in conjunction with the Modelica Human Comfort library to provide a complete HVAC and human comfort analysis solution. Using both libraries it is possible to optimize the overall performance of transient building HVAC systems while ensuring all human comfort requirements are fully addressed.

Business benefits delivered.

- Minimize building HVAC operating costs by selecting the correct system control strategy.
- Avoid costly HVAC system design errors early in the building design process.
- Accurately analyze operating costs through whole-year usage

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