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Simcenter Amesim Thermal library

Enabling you to virtually model, analyze and design all heat exchanges

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Benefits

- Virtually model, analyze and design any type of thermal network, including standard types of heat exchange: conduction, convection and radiation
- Exploit full compatibility with other libraries (liquids, gas, etc.)
- Represent heat exchanges with ambient air, including humidity
- Represent solar irradiation with real-life solar load conditions

Features

- Rigorous handling of thermal properties
- Database of solid properties
- Solid properties generation wizard
- Phase change material (PCM) modeling
- One or more solids in the model
- Large number of built-in heat transfer correlations for each type of heat-exchange process

Summary

Heat exchanges occur in most industrial processes, either because they are expected (heat exchangers, etc.) or unavoidable (thermal losses, friction, etc.). These exchanges are likely to occur as soon as temperature differences are encountered through motionless solids or moving fluids.

The Simcenter Amesim™ Thermal library deals with solid materials, and is based on a transient heat-transfer approach. It is used to model traditional heat-transfer modes: conduction and radiation between solid materials, and convection between solid and fluid.

Components

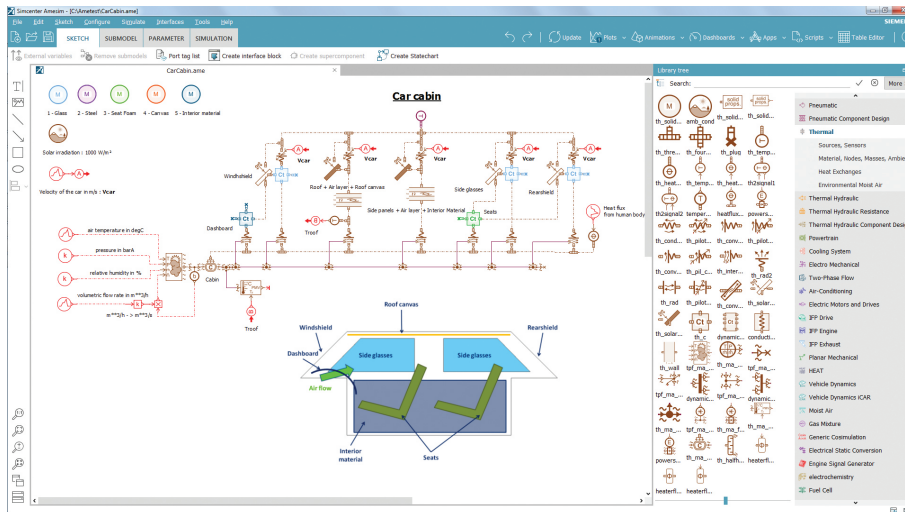
Sources, sensors

- Zero heat-flow source
- Temperature and heat-flow sources
- Modulated temperature and heat-flow sources
- Signal-port to thermal-port converters
- Temperature and heat-flow transducers
- Modulated moist air source
- Power/energy sensors

Material, nodes, masses

- Thermal solid properties (polynomials)
- Solid database: cast iron GS53, zinc, titanium, nickel, iron, copper, aluminum, carbon steel, lead, gold, bronze, AISI347, AISI316, AISI304, AISI302, AISI1010

Simcenter Amesim Thermal library



Prerequisites

The Thermal library requires the following:

- Simcenter Amesim Base [IL-AME.01.1]

Extensions

- Simcenter Amesim Blackbox Export option [IL-BBO.03.2]
- Simcenter Amesim Real-time option [IL-RTO.03.2]

Supported hardware platforms

- For details on supported hardware, minimum/recommended physical configurations and operating systems, please refer to the Simcenter Amesim fact sheet.

- Thermal Phase Change Material (PCM) properties
- Ambient conditions component with solar irradiation conditions
- Calculation of thermal properties
- Three- and four-port thermal nodes
- Thermal mass (capacity)
- Multi-layer wall
- Moist air nodes
- Moist air volume
- Piloted radiative exchange
- Transparent and opaque surfaces with solar irradiation
- Radial conductive exchange
- Half heat exchangers for environmental moist air
- Generic heat transfer calculation between two half heat exchangers based on performance maps, regression from experimental data or configuration and geometry
- Generic heat transfer calculation between two half heat exchangers with piloted efficiency
- Generic heat transfer source for one half heat exchanger with piloted heat flux or outlet conditions

Heat exchanges

- Conductive exchange
- Piloted conductive exchange
- Convective exchange
- Piloted convective exchange
- Two ports convective exchange
- Two ports piloted convective exchange
- Two ports convective exchange with environmental moist air consideration
- Enclosure with internal free convection
- Radiative exchange between two bodies

Environmental moist air

- Moist air nodes and plugs
- Moist air sources
- Moist air generic sensor
- Moist air chamber
- Human thermal comfort sensor predicted mean vote (PMV)/ predicted percentage of dissatisfied (PPD) indexes

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