

# Simcenter FLOEFD HVAC module

## Facilitating simulation for the built environment and occupant comfort

### Benefits

- Assess thermal comfort
- Test efficiency of HVAC systems
- Design to meet stringent environmental regulations

Siemens Digital Industries Software is a leader in the simulation of airflow and temperature for the built environment. Its Simcenter™ FLOEFD™ software is a frontloading computational fluid dynamics (CFD) solution that is designed to work inside computer-aided design (CAD) software. This enables the user to simulate airflow and heat transfer using 3D CAD models, with no need for data translations or copies.

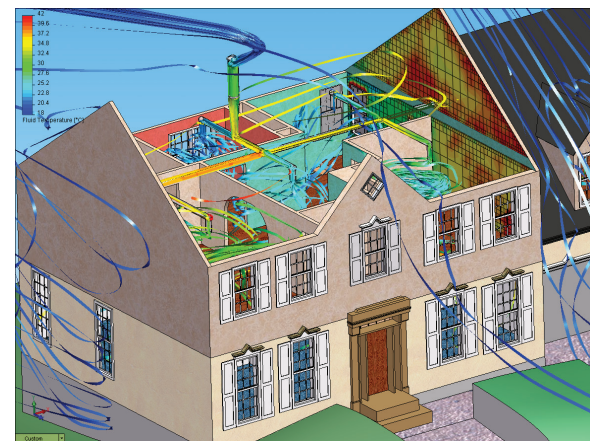
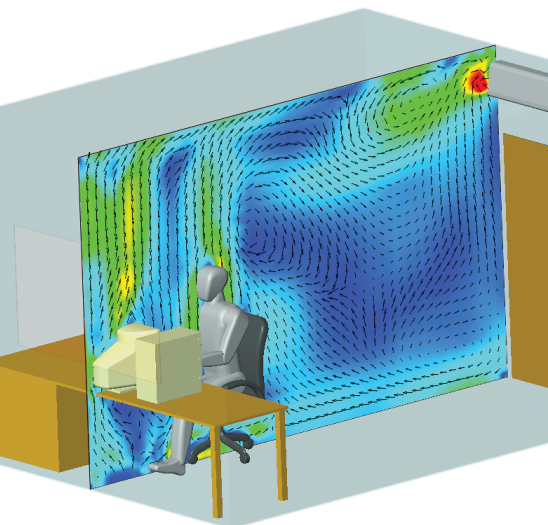
Simcenter FLOEFD can be used to solve Navier-Stokes equations. It can predict both laminar and turbulent flows. It employs one system of equations to describe both laminar and turbulent flows. Moreover, it is possible to transition from a laminar to turbulent state and/or vice versa.

The Simcenter FLOEFD HVAC module provides additional capabilities for design engineers who conduct analysis in support of heating, air conditioning and ventilation (HVAC) applications, such as:

### Comfort parameters

To assess the thermal comfort of an occupant and the efficiency of the ventilation system, the following comfort parameters are offered with the HVAC module:

- Predicted mean vote (PMV)
- Predicted percent dissatisfied (PPD)
- Operative temperature (K)
- Draft temperature (K)
- Air diffusion performance index (ADPI)
- Local air quality index (LAQI) for fluids
- Contaminant removal effectiveness (CRE) for fluids
- Flow angle (X, Y and Z)



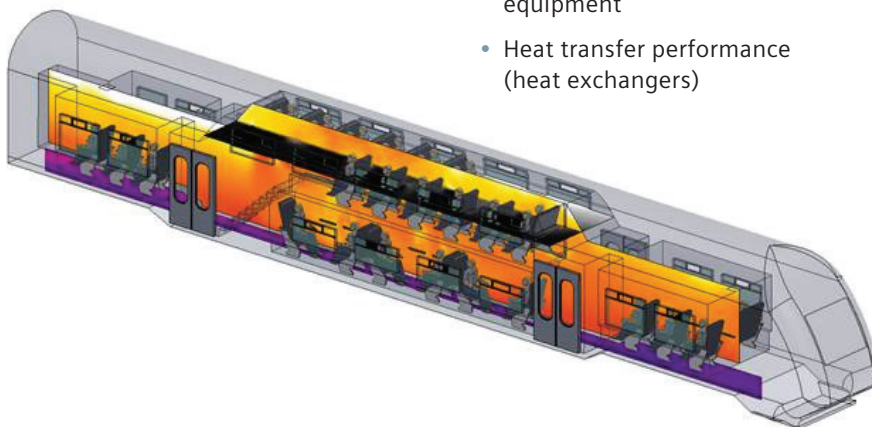
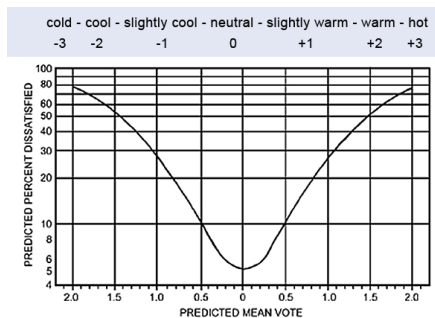
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The following comfort parameters are already included in the basic Simcenter FLOEFD: local mean age (LMA), local air change index (LACI) and dimensionless LMA.

## Advanced radiation model

Advanced capabilities with the discrete ordinate (DO) radiation model allow for more realistic radiation simulation by capturing the following effects:

- Absorption of radiation within semi-transparent solids such as glass
- Wavelength dependency of solid and surface properties as well as spectral characteristics of radiation sources
- Specularity coefficient to ensure appropriate reflection on surfaces
- Refractive index to ensure reflection and propagation of light traveling through objects



## Materials library

Aside from the basic materials, the following items are available:

- Large database of building-specific materials such as concrete, gravel, timber, asphalt and tiles
- Database of solid materials such as alloys, ceramics, metals, polymers, laminates, glass and minerals

The HVAC module's postprocessing capabilities also offer a tracer study, an admixture to analyze the propagation of low-concentration gasses or water vapor, which predicts condensation and evaporation regions.

Simcenter FLOEFD allows you to model the following physical phenomena:

- Complex flows in rooms (forced and natural convection)
- Ventilation and comfort models
- Industrial hygiene
- Airflow around and through buildings
- Chemical or biological agent transport
- Simulation of relative humidity and condensation (H<sub>2</sub>O in air)
- Simulation of flows of gas mixtures (contamination, exhaust gas emissions)
- Pressure drop optimization in equipment
- Heat transfer performance (heat exchangers)

- Determination of forces and torque on movable parts
- Determination of flow rates with fans, pumps, blowers
- Determination of flow rates through vents, etc.
- Simulation of solar radiation, surface-to-surface radiation
- Particle tracking (clean rooms)
- Heat exchangers with different phases in separated cavities (for example, gas/fluid)

## What-if testing made easy

One of the most powerful features of Simcenter FLOEFD is the ease with which you can conduct what-if analyses. The process is simple. Create your base model and analyze it. Then create multiple variations of your design by modifying the solid model without having to reapply material properties, etc. When the analysis is complete, Simcenter FLOEFD makes it easy to compare the results among the many options to choose your best possible design. When you are satisfied with your design, publish your report with the touch of a button. You can even publish a fully interactive 3D dynamic plot and share it with colleagues or customers.

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