

Course Contents

DesignBuilder 2-Day Simulation Training Workshop

After this course, trainees will be able to:

- Enter data on activity, building constructions, glazing, solar shading, schedules of building operation, lighting systems and HVAC systems.
- Create components and templates and import/export these between projects.
- Understand the various model options.
- Size heating and cooling systems using EnergyPlus.
- Run EnergyPlus simulations using real weather data and check building energy consumption, CO2 emissions, occupant comfort etc.
- Carry out daylighting and natural ventilation analyses.
- Work with Simple and Compact HVAC.
- Export EnergyPlus IDF data for use outside DesignBuilder (the course does not cover working with EnergyPlus IDF data)
- Set up external CFD analyses from site data and internal CFD analyses from models incorporating assemblies, run CFD simulations and review results. Understand how to set up models that will provide converged results.

Outline Programme

The proposed elements of the course are shown below under the header of the day on which it is expected that we will cover the material. The actual timing of each element may differ from this on the day.

Note: The course requires that the attendees have carried out the “Basic Geometry” online tutorials and attendees must confirm that they are competent in generating a model for simulations using the [Basic Geometry Tutorials Confirmation Form](#)

Day 1 – Basics of Heating and Cooling Calculations and Dynamic Simulation

Model data overview

- Activity
- Constructions
- Openings
- Lighting
- HVAC

Using model options

- Compact HVAC, calculated ventilation, 7/12 schedules etc., Advanced options, calculation options.

Calculated natural ventilation

- Practical considerations - reduce number of openings as far as possible.
- Window, vent and door operation (opening and closing).
- Modelling cracks - switching infiltration modelling on/off.
- Model a simple stack example.
- Mixed mode

Heating and Cooling Design System sizing

- How to size heating and cooling systems using DesignBuilder
- System sizing issues: e.g. mixed mode operation where natural ventilation plus mechanical ventilation not allowed.
- System sizing options.

Daylighting calculations

- One or two daylighting zones per zone
- Stepping/continuous dimming
- Positioning sensor
- HVAC downsizing results
- Radiance daylighting

Simulation results

- Understanding simulation output.
- Zone heat balance.

Export results

- Export DB data to file or report topic
- Compiling reports from report topics
- Using report topics as a quick easy way to compare results for various design options

Simple HVAC

- Based on purchased air.
- Energy consumption/plant modelled outside EnergyPlus using seasonal efficiency factors.
- Minimum fresh air data and other system control zone data associated with the activity set on the Activity tab.
- Setting minimum fresh air.

Day 2 – Compact HVAC Dynamic Simulation, CFD and use of DSM results in CFD investigations

Compact HVAC

- 5 Compact HVAC types, description of each.
- Mechanical ventilation, setting minimum fresh air.
- Controlling VAV/CAV heating system types (pre-heat, main heating, reheat).
- Avoiding simultaneous heating and cooling
- Economisers, heat recovery, coil temperature reset options.
- DHW.
- Operation - mechanical ventilation operation required for heating/cooling with VAV.
- Plant modeling - calculating fuel consumption.
- Understanding results.

CFD

- Setting up external CFD simulation models and getting convergence
- Setting up internal CFD simulation models
- Setting up boundary conditions manually
- Adding assemblies including boundary conditions
- Creating and editing the grid
- Setting up monitor points to help check for convergence
- Understanding calculation options
- Running CFD simulations, pausing, resuming and checking for convergence
- Reviewing CFD results including adding slices, displaying 3-D result grids etc