
# What Are New Features and Enhancements of VisualDOE 4.0?

## New Features of VisualDOE 4.0

VisualDOE 4.0 has added a number of new features over version 3.1.

Significant new features include:

- Check Model Definitions
- Advanced Edit of Alternatives
- Polygon Clipping Module
- Water-side Economizer
- Import Schedules from DOE-2 and EnergyPlus Files
- Import CoolTools Chillers
- Diagnostics of Systems
- Water-cooled Condenser for Packaged Systems of PSZ, PVAVS and PVVT
- Ground Source Heat Pump Systems
- Re-order Design Alternatives
- LEED Style End-use Report
- Run Multiple Copies on the Same PC
- DOE-2 Manuals with Bookmarks
- New VisualDOE 4 User Manual
- Updated Online Help System

### Check Model Definitions

Users can check whether a model is defined correctly before or after running simulations. If there are errors or warnings in the model, users will get alert messages identifying the sources. Then users can locate and fix the error quickly. This will catch most errors in a model and save users a significant amount of time to troubleshoot a model. The logic used to catch errors is based on our technical support for thousands of VisualDOE users worldwide.

### Advanced Edit of Alternatives

Advanced edit of alternatives provides handy tools to help users model features not supported by previous versions of VisualDOE, and will save users significant amount of time in creating a large energy model with hundreds of spaces, facades, and/or systems. These advanced editing features are designed for experienced users of VisualDOE; beginners should use with caution.

## New Model Features

*Rooms*

- Use pre-calculated ASHRAE weighting factors by entering floor weight, furniture type, furniture fraction and furniture weight. Previous versions of VisualDOE default to custom weighting factors (with floor weight set to 0).
- Change space design temperature. The space design temperature is the constant temperature setpoint used for heating and cooling loads calculation in the LOADS module of DOE-2. The calculated peak loads are used for auto-sizing calculations of airflow and heating/cooling capacity in the SYSTEMS module of DOE-2. Previous versions of VisualDOE default to 70°F for IP units.

*Facades*

- Adiabatic Wall. Users can specify some exterior walls to be adiabatic (no heat transfer through these walls)
- Underground Wall. Users can specify some exterior walls to be underground walls with heat transfer modeled differently by DOE-2.
- Calculate Surface Temperature. Inside and outside surfaces temperatures can be produced in hourly reports. Hourly reports of mean radiant temperature (MRT) of a space can also be produced for further thermal comfort analysis. The hourly report of surface temperatures is stored in an ASCII text file in the name of MyJob_srfT.H??, where the MyJob is the project file name and "??" represents the ID of the alternative.
- Change an exterior wall to an interior one. Based on the concept of a block, all perimeter walls of a block are assumed to be exterior walls. If a block is attached to another one, the attached walls are treated as two separate exterior walls belong to two rooms of the two blocks. To model this accurately, users can delete one of the attached walls, and change the other attached wall to be an interior one by changing the wall type to be interior and assigning the adjacent space.
- Delete exterior walls. This is mainly used for the above feature.

*Zones*

- Minimum Air Flow. Minimum design airflow per floor area used when DOE-2 auto-sizes zone airflow.
- Design Cooling and Heating Temperatures used in the calculation of zone airflows and heating/cooling capacity for zonal systems. These two temperatures are assigned when an occupancy is selected for a space/room. Users can overwrite them without having to create another new occupancy.
- Minimum Flow Schedule. The hourly schedule of zone minimum flow ratio. Previous versions of VisualDOE assume the zone minimum flow ratio is constant for all operating hours.
- Total Cooling Capacity, Sensible Cooling Capacity, and Heating Capacity. These are inputs for zonal systems like Unit Heater, Unit Ventilator, Two Pipe Fan Coil, Four Pipe Fan Coil, Two Pipe Induction Unit, Four Pipe Induction Unit, Heat Pump, and Package Terminal Unit.

*Systems*

- Cooling Availability Schedule. The schedule of cooling available from the system, default to central plant cooling availability schedule.
- Heating Availability Schedule. The schedule of heating available from the system, default to central plant heating availability schedule.

- Save systems as templates to library. Users can select some systems to save to the library so that they can be used later for new projects. All system data is saved except zones data. Users can create their own typical systems and save them to the library and share them with other engineers.
- Import system templates from library. The new VisualDOE library has more than 140 system templates for different system types, occupancies and vintages. User-saved system templates can also be imported.
- Apply a system template to selected systems. Users can apply a system template from the library to selected systems.
- Apply default system to selected systems. Users can edit the default system template and apply it to selected systems.

### Objects Filtering – Rooms, Facades, and Zones

Objects filtering provide a handy way to select objects with certain criteria so that common properties can be set for these objects.

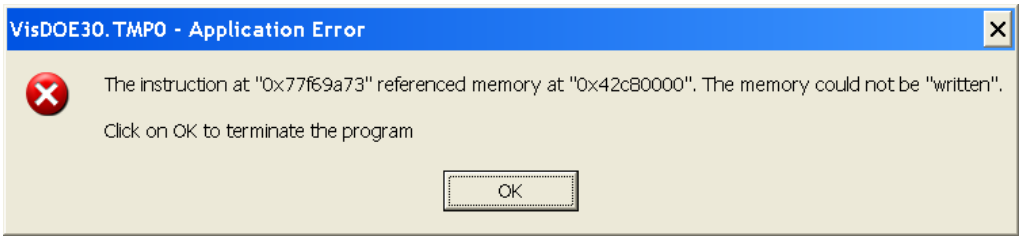
- Rooms can be filtered by their parent blocks. Users can view and edit all rooms of the model or rooms belong to a specific block. An example is a model that may have multiple blocks representing multiple buildings with different constructions and different operating schedules. Users can select rooms for a block and make changes to those rooms only.
- Facades can be filtered by orientation and their parent blocks. Users can view and edit all facades of the model or facades with a specific orientation and/or belong to a specific block. When creating an alternative for a code baseline like California Title 24 or ASHRAE 90.1, facades with common orientation will usually have common window type.
- Zones can be filtered by their parent systems. Users can view and edit zones served by a specific system.

### Applying Multipliers

Users can apply multipliers to adjust lighting power density, equipment power density, and occupant density for selected rooms. For example, a user may want to decrease 20% of the lighting power for selected rooms, so he/she can enter the LPD adjustment factor of 0.8 and update the rooms.

## Polygon Clipping Module

Before VisualDOE runs a simulation, all horizontal surfaces of rooms will be recreated. This is done by clipping polygons of the lower level rooms with polygons of the upper level rooms to create surfaces of roofs, ceilings, floors, and interior floors. The new polygon clipping module allows almost any complicated room shape (as long as no holes exist in the polygon), either drawn or imported from CADD DXF files. Previous versions of VisualDOE cannot handle the situation when a lower level room has more than three common horizontal surfaces with an upper level room (typical error message shown in ***Figure 1***). This new module enables users to work on more complicated models.



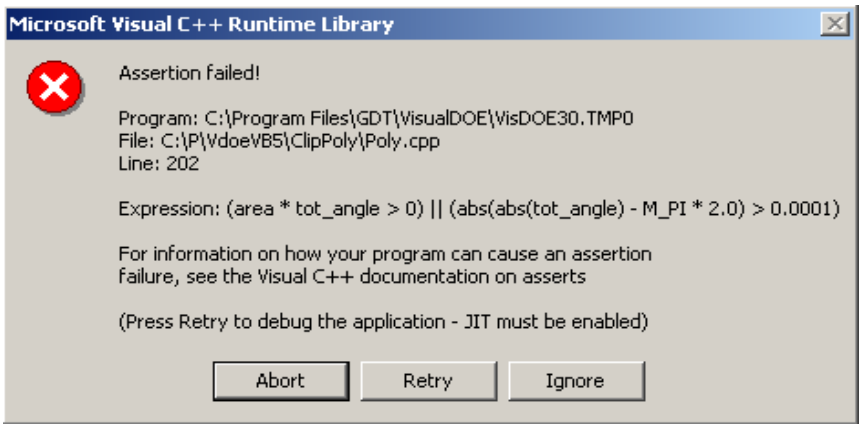



*Figure 1 -- Typical message of failed polygon clipping in previous versions of VisualDOE*

## Water-side Economizer

Water-side economizers are now supported. In the water-side economizer cycle, cooling towers in a central plant provide cool water instead of chilled water from chillers for space cooling.

## Import Schedules from DOE-2 and EnergyPlus Files

Schedules of lighting, equipment, occupant, fan, air infiltration, cooling and heating temperature setpoints can be imported from input files for DOE-2 (created by VisualDOE, eQuest, EnergyPro, PowerDOE, or even with a text editor) and EnergyPlus. Imported schedules can be further saved to the VisualDOE library or project template files for later use or sharing among users.

## Import CoolTools Chillers

The new VisualDOE library includes more than 170 electric water-cooled chillers from CoolTools database. Users can select chillers to import to the project as chiller templates. Chiller performance curves are included in the chiller template.

## Diagnostics of Systems

After running a simulation, users can diagnose possible problems associated with systems like airflow, peak loads, heating and cooling capacity, and minimum outside air ratio. This is useful for verifying system sizing and to troubleshoot why there are hours some systems are not meeting loads. If heating and cooling sources are at the zone level, no heating or cooling capacity will be reported at the systems level. For example, heating (reheat) is normally done at the zone level for VAV with reheat systems, the reported heating capacity is for the central heating coil rather than the zone heating/reheat coil capacity (***Figure 2***).

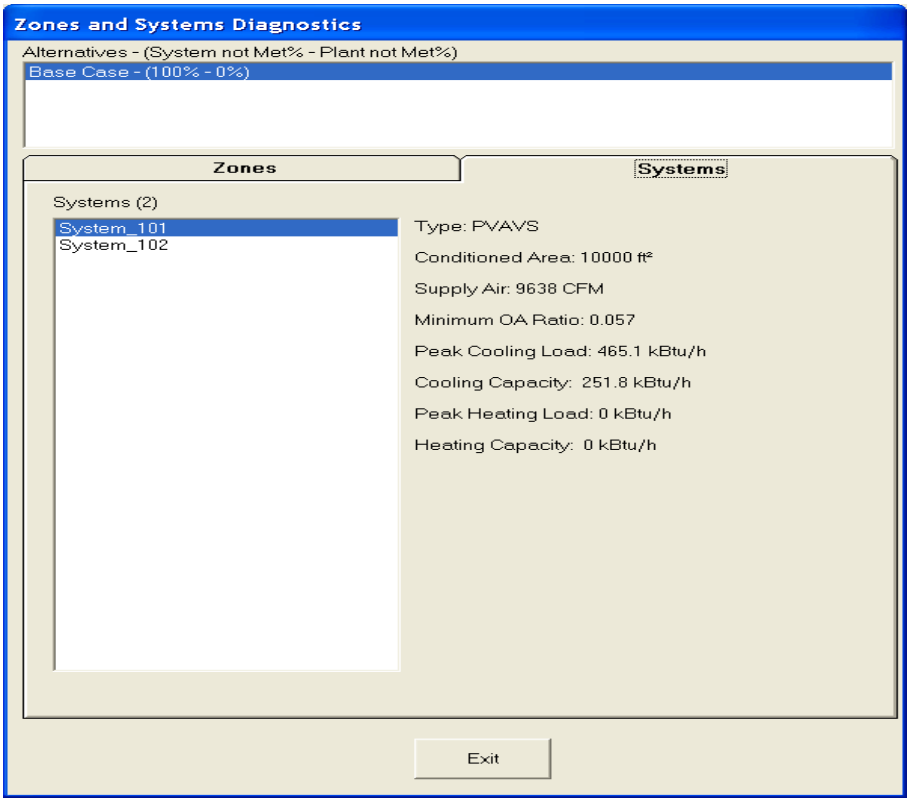



*Figure 2 -- Diagnostics of systems*

Together with diagnostics of zones, users can easily discover why some zones are underheated or undercooled, or why some systems are undersized or oversized.

## Water-cooled Condenser for Packaged Systems PSZ, PVAVS, and PVVT

This is a new HVAC system-modeling feature. Water-cooled condensers with cooling towers are implemented for packaged systems of PSZ (Packaged Single Zone), PVAVS (Packaged Variable Air Volume), and PVVT (Packaged Variable Volume and Variable Temperature). Water-side economizers are implemented for PSZ and PVAVS systems, which allows the condenser water to be diverted through a WSE coil (that cools the entering air) to precool the mixing air if the water temperature is more than a predetermined number of degrees below the air temperature. After leaving the WSE coil, the water then enters the unit condenser.

Water-loop heat pump (WLHP) systems cannot coexist with packaged systems (PSZ, PVAVS, and PVVT) with water-cooled condensers. This is a DOE-2 limitation.

## Ground Source Heat Pump systems

This is a new HVAC system-modeling feature. To model a ground source heat pump (GSHP) system, users first create a water-loop heat pump system, then specify the option of using ground source heat pump and define properties of circulation pump. The GSHP water loop cannot have cooling tower or boiler.

## Re-order Design Alternatives

Design alternatives can be re-ordered so that the VisualDOE Results can be sorted based on users' requirements.

### LEED Style End-use Report

A new LEED style end-use report is provided so that users can copy and paste end-use and cost data to compile the submittal for the LEED Energy and Atmosphere Credit 1 – Optimal Energy Performance.

### Run Multiple Copies on the Same PC

Users can run more than one copy of VisualDOE 4.0 on the same PC. The more copies you run, the more computer memory is required, which may slow down simulation runs. This is good for visually comparing two alternatives to identify differences in user inputs. It is a violation of the copyright held by Architectural Energy Corporation if users purchase a single-user license of VisualDOE but run it on multiple computers simultaneously.

### DOE-2 Manuals with Bookmarks

Bookmarks are added to the DOE-2 manuals: 2.1E Supplement, BDL Summary, and 2.1A Reference Manual Part 1 for easy browsing.

### New User Manual

The User Manual is updated with new contents (more than 120 new pages!) to cover features added to VisualDOE versions 3.1 and 4.0. New chapters and appendices are added to provide useful resources for performing building energy simulations. The User Manual should be the first stop if users have questions regarding VisualDOE. The tutorial is revised and new users are strongly recommended to start there.

### Updated Online Help

The online help system is updated for VisualDOE 4.0.

## Enhancements of VisualDOE 4.0

VisualDOE 4.0 incorporates many improvements over previous versions. The program now runs faster and is very stable. Major new improvements include:

- Custom Block Editor
- Use Smart HVAC Defaults
- Create Plenum Zones
- Water Loop Heat Pump
- VisualDOE Reports
- Move Blocks
- Description Property for Organizer Items
- Launch Schedules Organizer from the Occupancy Editor
- Updated Library and Templates
- Bug Fixes of 3.1 after October 2003

### Custom Block Editor

When a room is drawn or imported from polygons in a DXF file, duplicate vertices or vertices too close to each other will be removed so that the room can be merged into the block. This version enables one decimal digit of coordinates of vertices when creating a room using (X,Y) method or editing room polygons. The maximum number of vertices for a block is expanded from 100 to 200, which enables creating complicated blocks from DXF files.

## Use Smart HVAC Defaults

When system assignments are first specified for a new project, HVAC systems will be created based on the occupancy type, floor area, and building era.

## Create Plenum Zones

Only one plenum zone will be created for a system if any block served by the system has plenum. Blocks served by a same system can either have plenum or not. Previous versions of VisualDOE may create two plenum zones if one block served by the system is on the top level of the building while another block is at lower level. Previous versions of VisualDOE may produce an error by creating a plenum zone with zero air volume if some blocks served by a HVAC system have plenum zones while others do not.

## Water Loop Heat Pump

The Water Loop Heat Pump editor has added new inputs (maximum and minimum supply air temperatures at zones, loop water flow rate, loop operating temperature setpoints) and consolidated existing inputs, which provides user more control of a WLHP system operation.

## VisualDOE Reports

VisualDOE reports including Architectural Summary, Zone Summary, System Summary, and Plant Summary are updated with new useful information.

## Move Blocks

A standard block or custom block can be moved by changing the X and/or Y of the block at the Blocks tab of the VisualDOE interface. Another way to move a block is by using the Custom Block Editor, but this may require zones to be recreated and zones data lost.

## Description Property for Organizer Items

A new property description is added to Organizer items such as materials, constructions, glazings, openings, schedules, and occupancies.

## Launch Schedules Organizer from the Occupancy Editor

When working on the Occupancy Editor, users can launch the Schedules Organizer directly to create a new schedule.

## Library and Templates

Library and project templates have been updated. 20 new occupancies and their schedules have been added to the library. Lighting and equipment schedules for energy simulation and load calculation for small, medium and large office buildings from ASHRAE Research Project 1093 are also added to the library.

## Bug Fixes

User-reported bugs for VisualDOE 3.1 after October 2003 have been fixed in version 4.0.