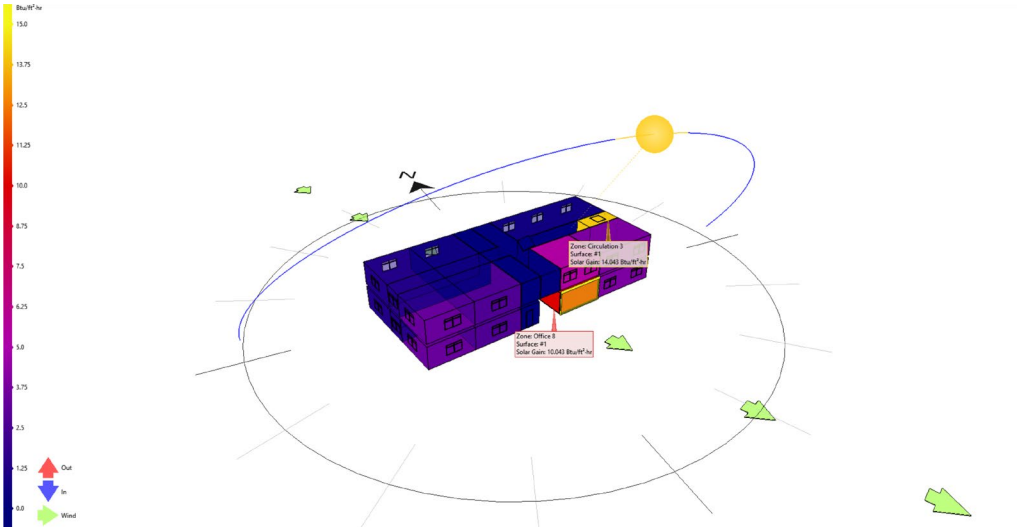
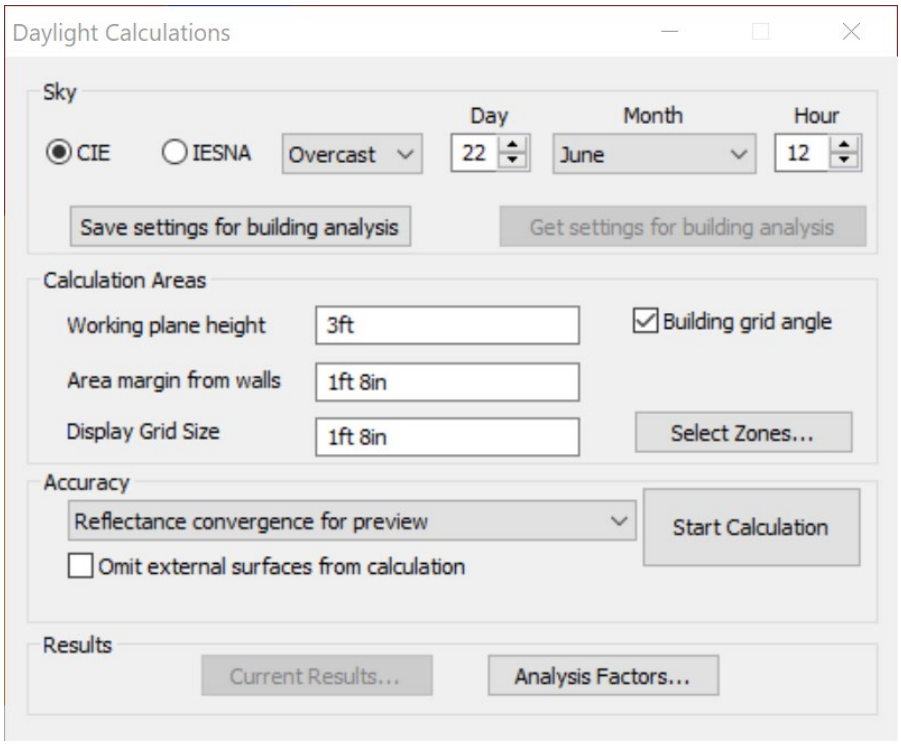
Tas Engineering Training

Workbook 2

Tas Building Simulator & Results Viewer



Setting up Daylighting Calculations



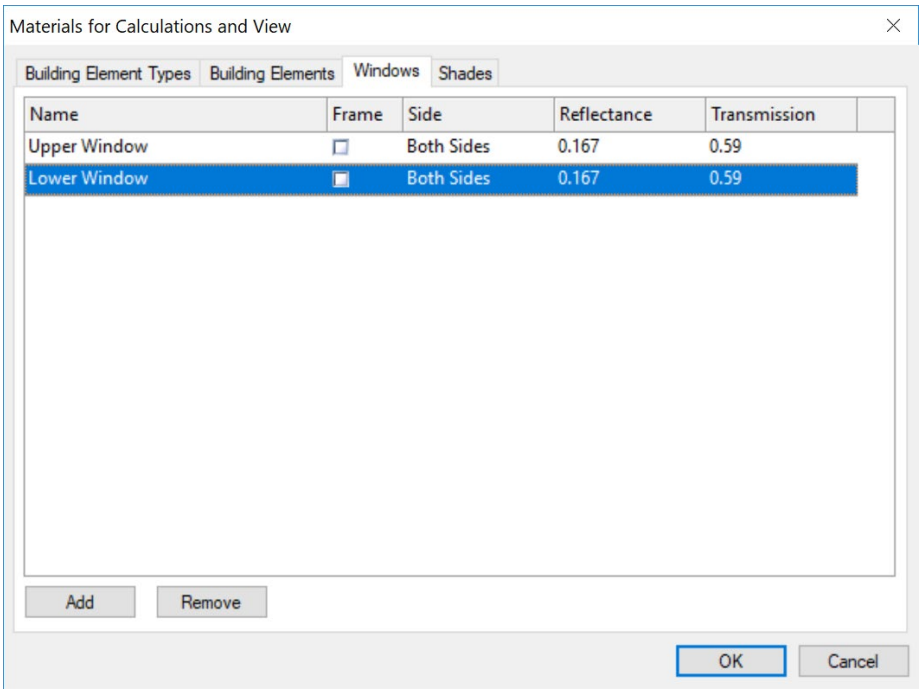
Key Points:

- Before starting a daylighting analysis, the 3D model must be in analysis mode.
- If the 3D model is already in analysis mode and changes to the model have been made, the analysis model must be refreshed.
- With daylighting calculations, all the zones do not have to be calculated at the same time. Use the **Select Zones** dialog box to determine which zones to calculate daylight for.
- The user can set up the details for the sky. This information can be stored by clicking on the **Set for building analysis** button.
- Checking the **Use sky setting for building analysis** will set the sky setting to whatever was saved when the **set for building analysis** button was clicked.
- The **working plane height** sets the distance the calculation grid will be above the floor level.
- The area margin from walls affects the dimensions of calculation grid area by starting the grid away from the walls.
- The **display grid size** determines the distance between the grid points. The smaller the value, the more points and the more accurate but slower the calculation.

Exercise:

1) Open the 3D model created in workbook 1, go to the **3D view** then click on the **Analysis Mode** button.
2) Click on the **Refresh** button.
3) Select **Calculations** from the **Daylight** menu.
4) Open the **Select Zones** dialog box and select only the ***Office 16*** zone
5) Make the Calculation Areas settings match the above image.

Setting Material Properties for Daylighting Analysis



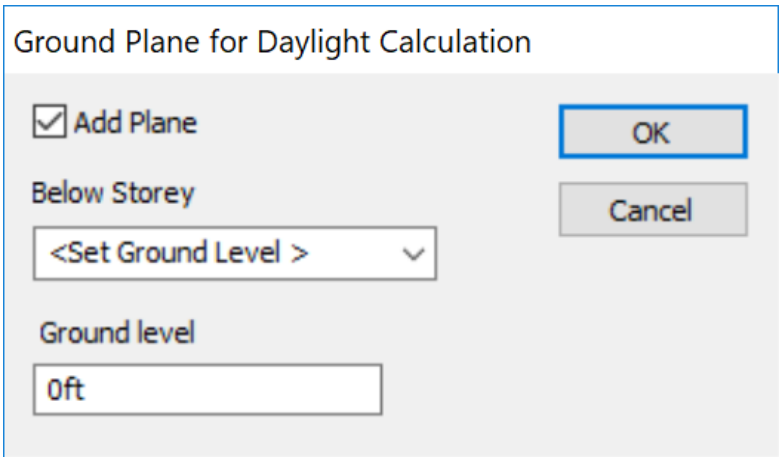
Key Points:

- The **materials** dialog box can only be opened *after* the daylighting **Calculations** dialog box has been opened and left open.
- The **Building Elements Types** tab allows the user to set the reflectance and transmittance properties of building element based on their **Type** as set in the **Building Elements** dialog box
- The other tabs allow the user to set the reflectance and transmittance properties for individual building elements. The values entered here supersede the values entered in the **Building Elements Types** tab.
- There is an option to set different reflectance\transmittance properties for different sides of the same building element.

Exercise:

1) Select **Materials** from the **Daylight** menu.
2) Click on the **Windows** tab.
3) Add **Upper Window** and **Lower Window** to the **Windows** list
4) Set the reflectance to 0.167 and the transmittance to 0.59.
5) Close the **Materials** dialog box.

Adding a Ground Plane



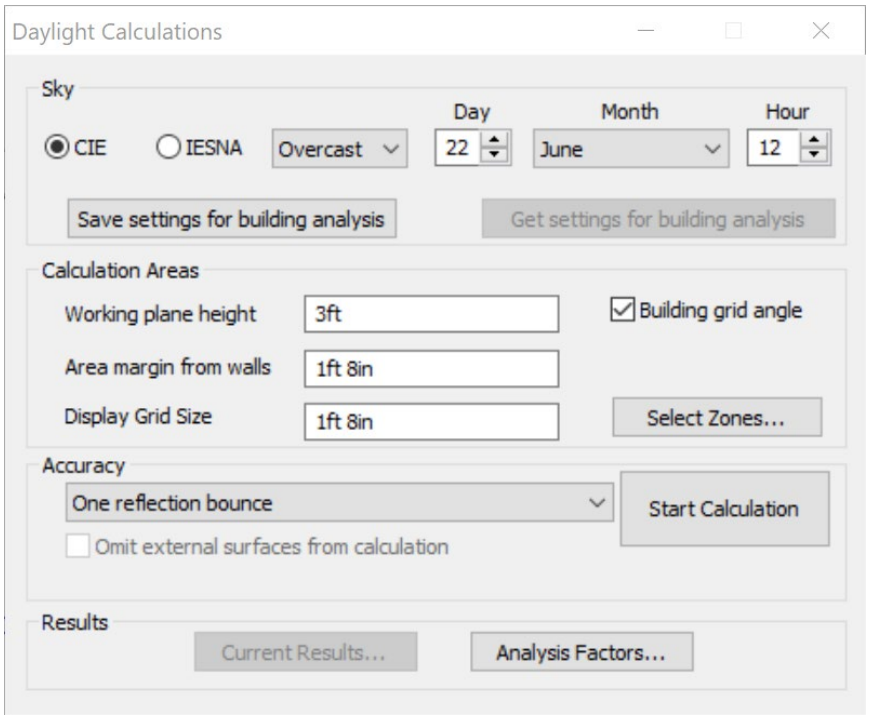
Key Points:

- There is an option to add a ground plane for daylighting purposes. Not adding a ground plane could lead to the daylight levels being underestimated.
- The ground plane can be defined as below a floor or at a value above or below the ground datum.
- Selecting to place the ground below a floor level supersedes setting a ground level.

Exercise:

1) Select **Ground** from the **Daylight** menu.
2) Check that the dialog box is set up as above.
3) Close the **Ground** dialog box.

Running the daylight calculations



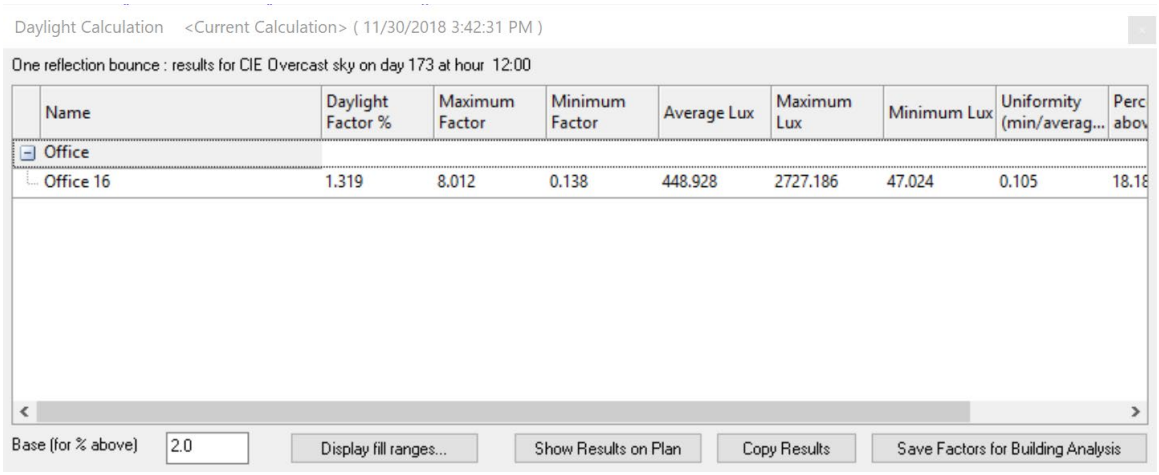
Key Points:

- The accuracy of the daylighting calculations can be set by the user. The more accurate the calculations, the longer the light bounces are done and the longer the calculations take.

Exercise:

1) Click on the **Select Zones** button.
2) Ensure that **Office 16** is the only zone that is selected.
3) Close the **Select Zone** dialog box
4) Ensure the accuracy is set for **One Reflection Bounce** and then start the calculation (should take approx. 1minute).

Viewing the Daylighting Table



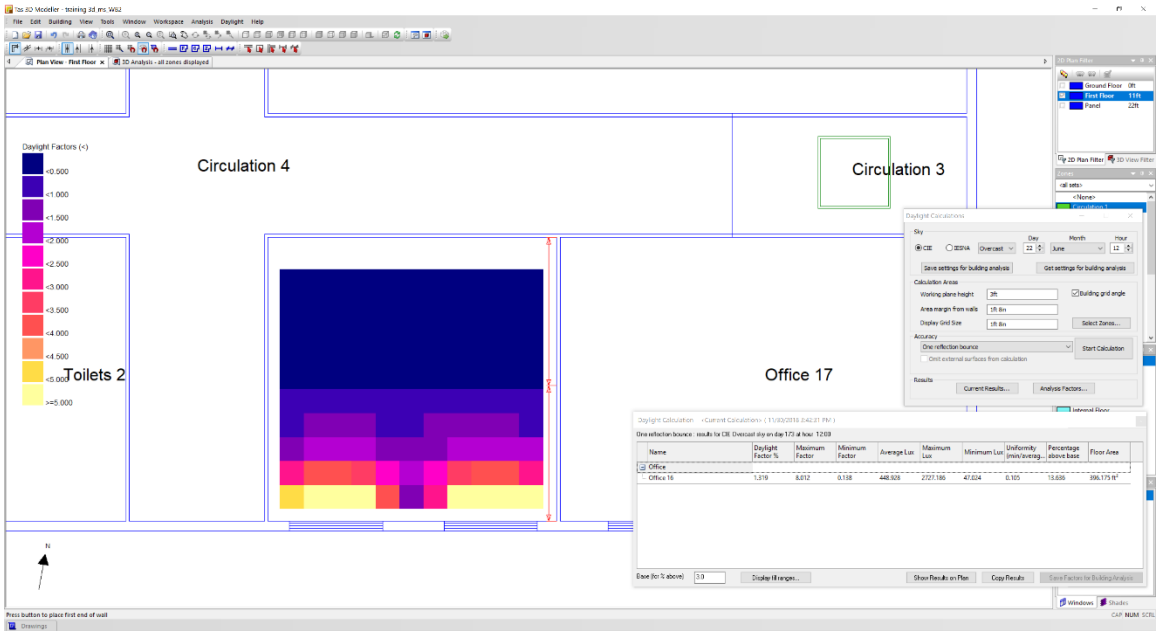
Key Points:

- The table that is displayed shows the daylighting\lux levels that have just been calculated. They do not contain previous calculation results.
- To the see the percentage of the grid which is above a certain daylight factor, enter the daylight factor target in the **Base (for % above)** box and press return. This will update the **percentage above base** value as shown in the last column.
- Click on **Saves Factor for Building Analysis** to save these results. This will save the results for later viewing and the daylight factor displayed here will be the one used for lighting control in the TBD file.
- Saving the results will override existing results but only for the listed zones. Other zones will remain at their existing values.

Exercise:

1) Set the **Base (for % above)** to 3 and press return.
2) Click on **Saves Factor for Building Analysis** to save these results.

Viewing Daylighting Results on the Plan View



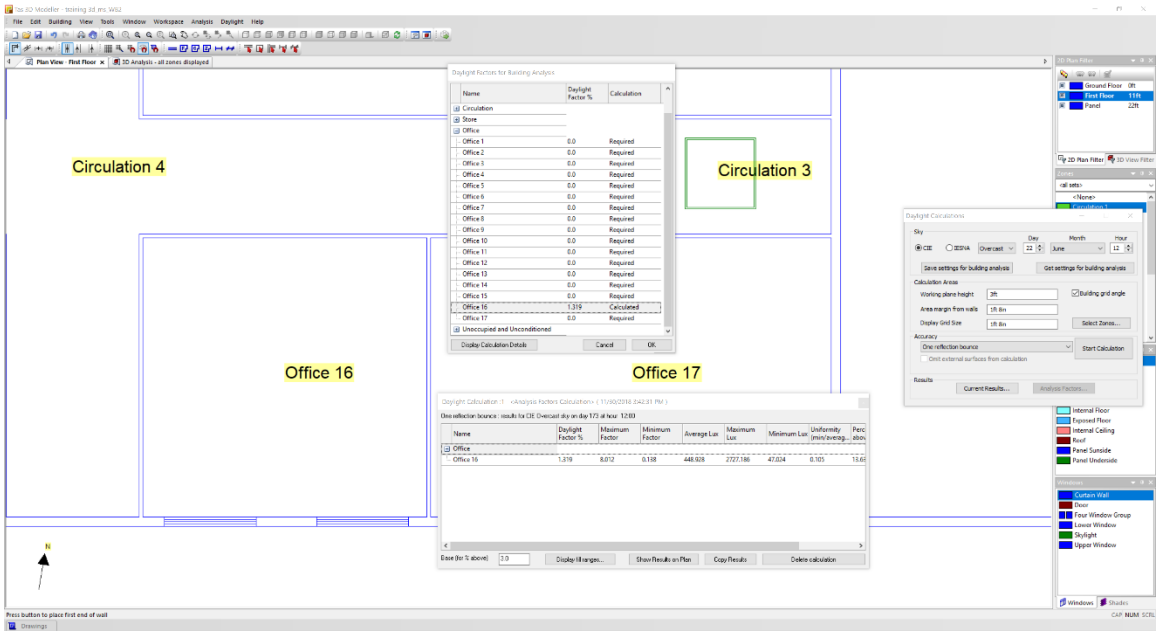
Key Points:

- Lux levels and daylight factor can be displayed on a plan view (2D or 3D).
- These values can be displayed by colour or as numbers.
- The colour scale is can be altered in the **Display Fill Ranges** dialog box which is opened from the **Daylight Calculations Results** dialog box

Exercise:

1) Move the dialog boxes to the right edge of the screen.
2) Select **Show Results on Plan** -> **Lux Values** from the Daylight menu.
3) Select **Show Results on Plan** -> **Daylight Factors** from the Daylight menu.
4) Select **Show Results on Plan** -> **Text** from the Daylight menu.
5) Select **Show Results on Plan** -> **Summary** from the Daylight menu.
6) Move the dialog boxes back into their previous position.

Analysis Factors



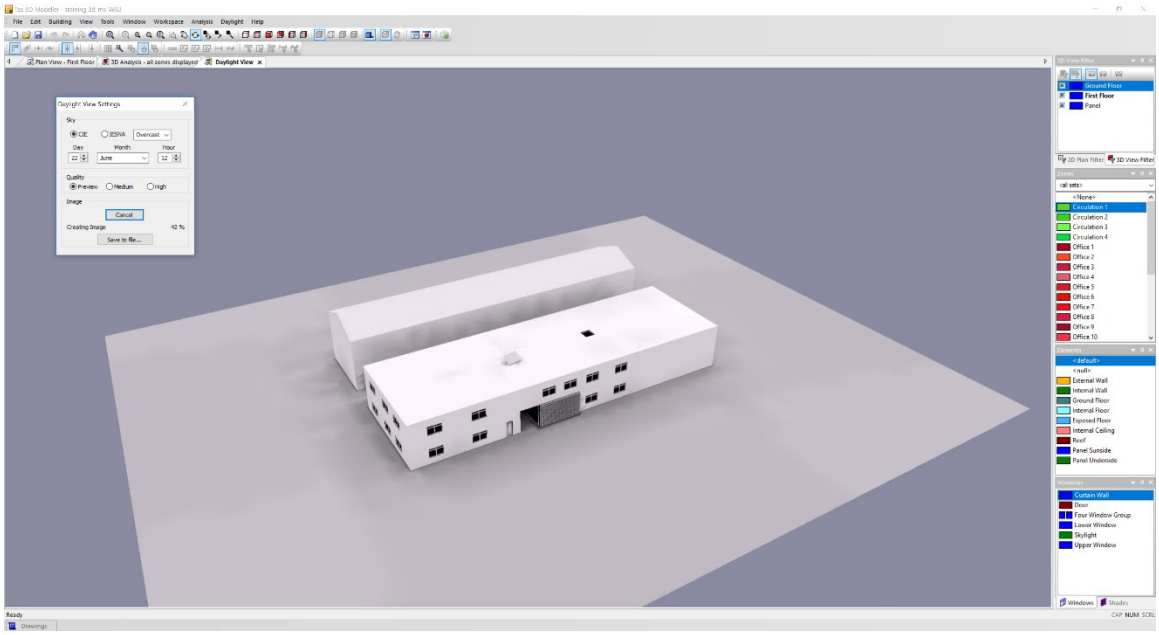
Key Points:

- The **Analysis Factors** dialog box can be opened from the **Daylight Calculations** dialog box. These are the daylight factors that will be used by the TBD file for lighting control
- If the **Calculation** parameter for a zone states **No daylight** then the zone has no transparent surfaces and does not require a daylight calculation.
- If the **Calculation** parameter for a zone states **Required** then the zone has transparent surfaces and requires daylight factor to be calculated if the zone has daylighting lighting control.
- If the **Calculation** parameter for a zone states **Calculated** then the zone has had its daylight calculated already. If this zone is selected and display calculation details is pressed then the Daylight Calculations Results dialog box will appear for the appropriate calculation. You will also be able to view that calculation's results on the 2D plan.
- If the Calculation parameter for a zone states Assigned then it means the user has clicked in the **Daylight Factor %** column, typed in their own value and pressed return.

Exercise:

1) Open the **Analysis Factors** dialog box.
2) Find **Office 16** and **Display Calculation Details** for it.
3) Close all the dialog boxes
4) Save the model.

Rendering



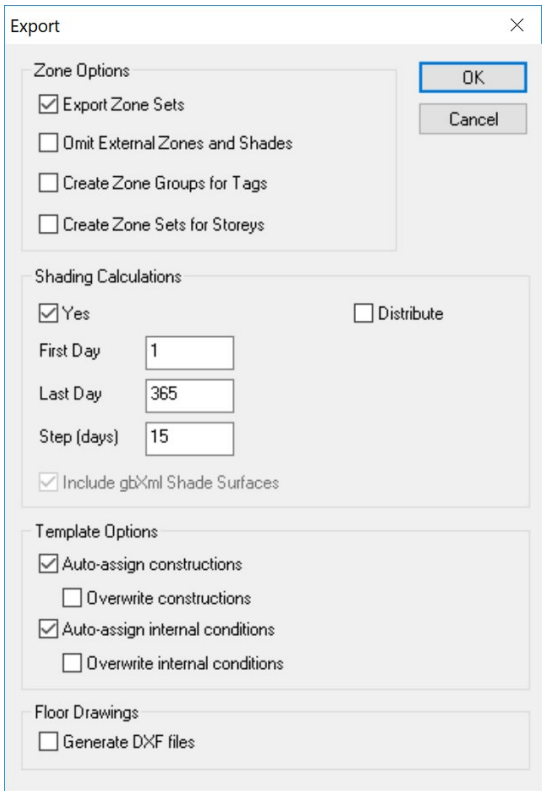
Key Points:

- To see a rendered image, the user must create a daylight view.
- The user can move around this view in the same as they can in a normal 3D view
- Choose view settings to start a render.
- The quality of the render and the sky details can be set by the user. The better quality the image the longer it will take to render.
- The image can be saved as a jpeg, bitmap or PNG file.
- Rendering is in beta.

Exercise(optional):

1) Go to the ***3D Analysis – All zones displayed*** tab and select **Create View** from the **Daylight** menu.
2) Select **View Settings** from the **Daylight** menu then click on **Render** leaving the parameters at their default.
3) Once completed save the image as jpeg in the **\Tas Data\Training** Directory.

Generating a Building Simulator (.TBD) File



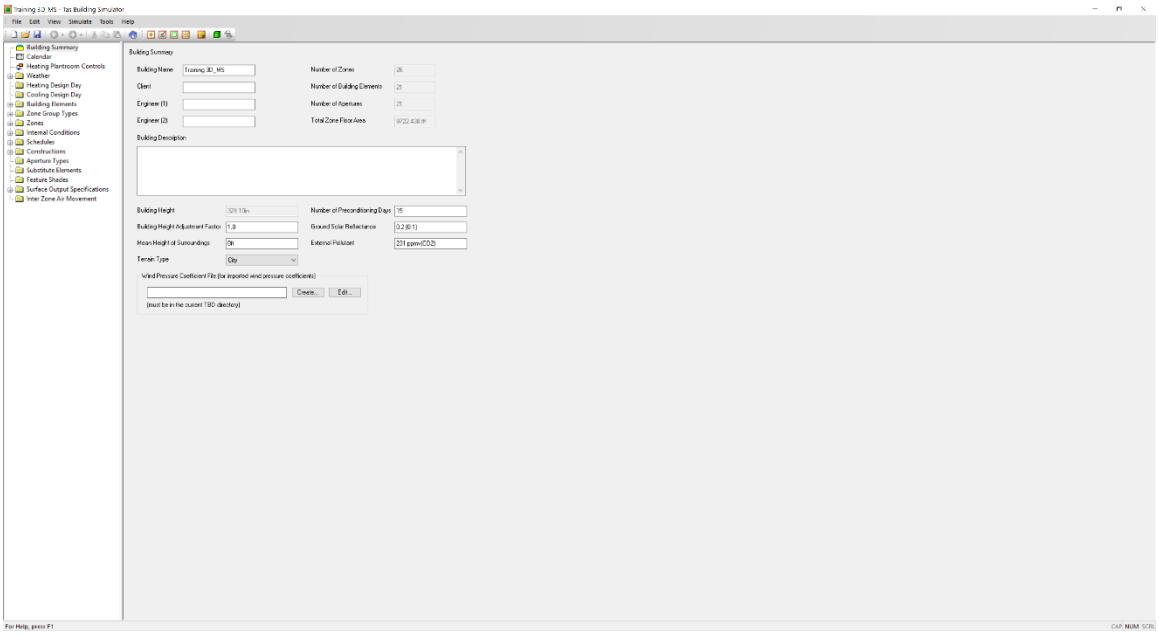
Key Points:

- When you export a 3D model from the 3D Modeller to the Building Simulator, a Tas Building Data (.TBD) file is generated.
- If the **Export Zone Sets** checkbox on the **Export** dialog box is enabled, the zone groups will be generated in your TBD file based on the existing zone sets in your 3D model.
- It is recommended that you export your geometry *without* shadow calculations at this point. The shadow calculations take a lot longer than just generating the surface data used in the Building Simulator and this information is deleted every time the model is exported. To save time, only do the shadow calculations when the model is ready to simulate.
- If a template has been used, Constructions and Internal Conditions will be automatically assigned at this step, based on the building element type and zone set, respectively.

Exercise:

1) Click on the **Generate Building** button. Export with zone sets. Check Auto-assign constructions and internal conditions. Perform shading calculations for the entire year.
2) Merge into the existing TBD file in your project folder.
3) Once the export is complete, save and close the T3D file.

Building Summary



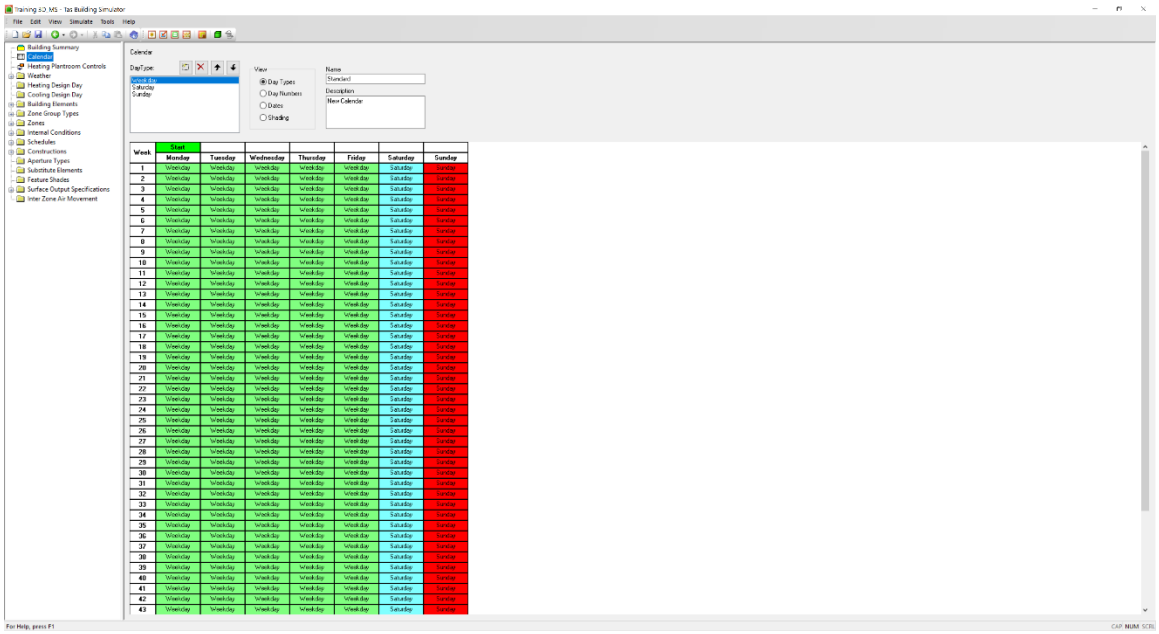
Key Points:

- In the Building Summary window see Number of Apertures. The number of apertures that are contained within a model includes any surface with an aperture type, or any surface which is defined in the 3D Modeller by the ***<Null>*** building element.
- Tas is a dynamic simulation modeller and as such, it models the thermal mass of a building. The results for the first hour of a simulation need to account for energy stored during previous hours. This is the purpose of pre-conditioning a simulation. Large thermal mass buildings need more pre-conditioning days.
- If the building is surrounded by water, then it may be appropriate to increase the ground solar reflectance, otherwise the default used by Tas is 0.2.
- Building Height Adjustment factor and the Mean Height of Surroundings are used for natural ventilation calculations; they have no effect on the shading.
- Terrain Type affects both natural ventilation and wind turbine calculations.
- “Wind Pressure Calculations File” should be blank other than when you are using the Passivent utility to model airscoops, where it will automatically generates a file.

Exercise:

1) Change the **Terrain Type** to ***City***.

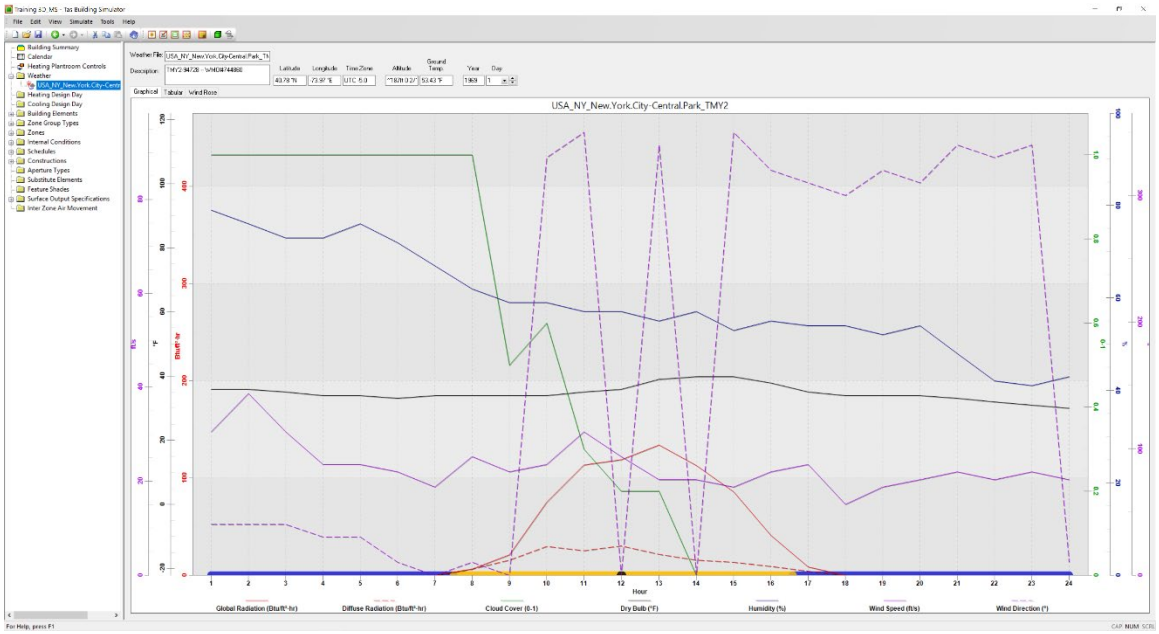
Calendar



Key Points:

- Templates include calendars
- Internal conditions, aperture types, feature shading, inter zone air movement and substitute elements are all applied to days types.
- The day types are applied to days of the year via the calendar.
- The user can add and delete day types.
- Day types can be applied to days of the year by the following methods:
-
    - Double clicking on the day of the year.
    - Selecting multiple days of the year with a marquee grab and then pressing return. A marquee grab is where there user holds down the left mouse button, selects a region then releases the left mouse button.
    - By left clicking in the region above the calendar table and day of the week header and pressing return.
- Day types, day numbers or dates can be displayed in the calendar.

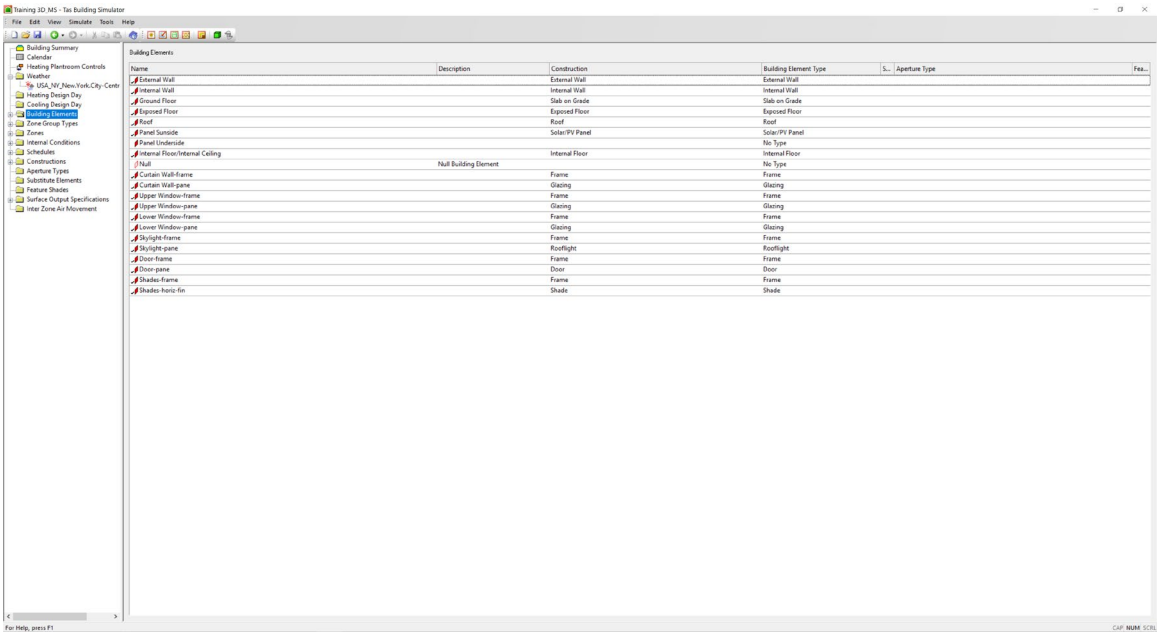
Weather



Key Points:

- When using a template, the selected weather file is automatically applied in the TBD file.
- Weather data can be obtained from the following sources:
  - http://www.edsl.net/main/Software/Downloads.aspx
  - https://energyplus.net/weather
  - http://www.meteonorm.com
- The hourly weather data can be viewed graphically or in tabular form.
- The wind speed and wind direction data can be viewed as a wind rose.

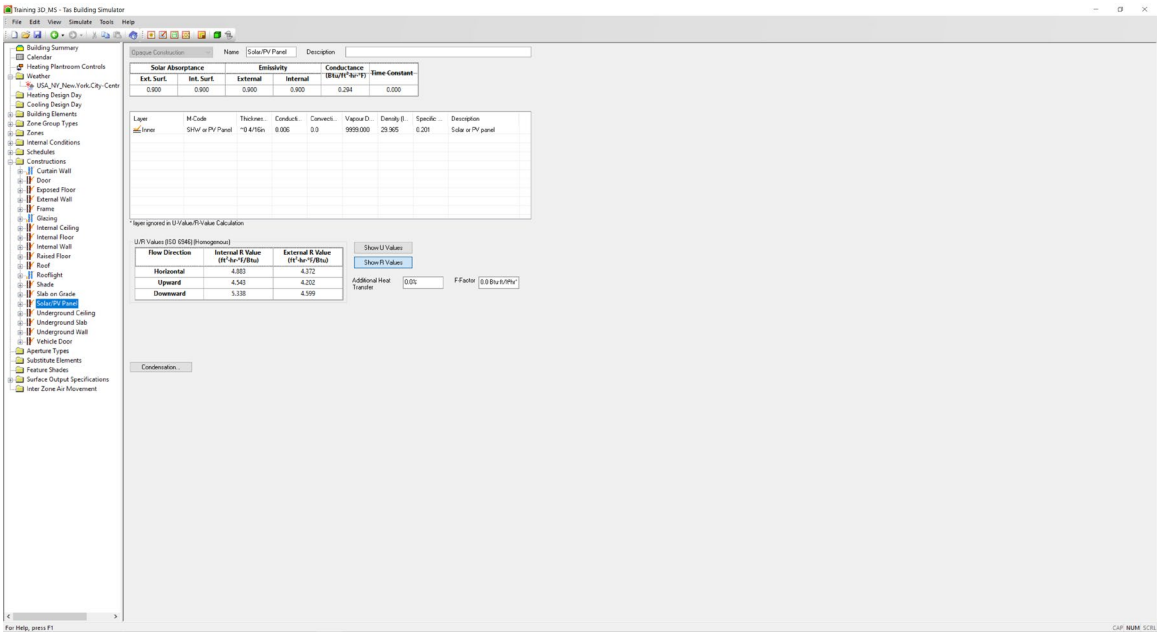
Building Elements



Key Points:

- The building element 'Internal Floor/Internal Ceiling' is created by the 3D Modeller by merging a ***<default>*** ceiling surface with the ***<default>*** floor surface directly above it.
- If the ***<default>*** building element was applied to any exposed ceilings (for example a roof), those surfaces now have the building element 'Roof'.
- If the ***<default>*** building element was applied to any exposed floors, (for example an overhang) those surfaces now use 'Exposed Floor'.
- The ***<Null>*** building element is a super-transparent component that allows air to flow through it. Constructions, substitute elements, aperture types and feature shades cannot be applied to the ***<Null>*** element.
- Windows and doors that were created in the 3D model are added to this list but are sub-divided into their pane and frame component parts.
- Shades that were created in the 3D model also appear in this list and are sub-divided into frame, horizontal fin and vertical fin component parts.
- If a building element, window or shade was created in the 3D Modeller but does not appear in this building element list, it means it has not been applied to a surface that is used in a zone.

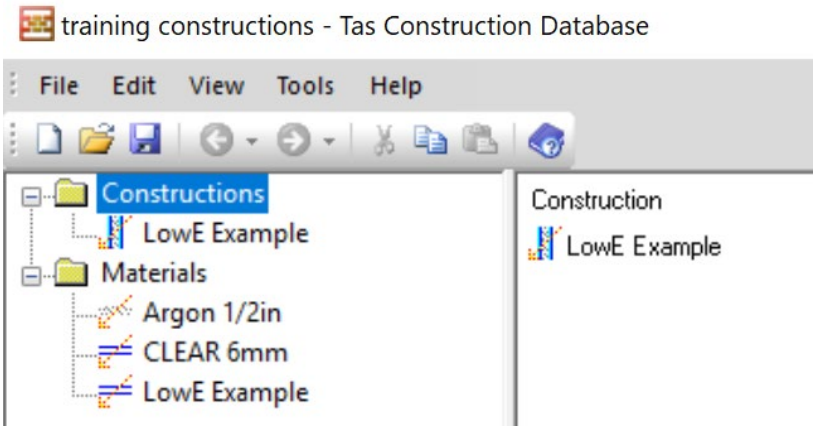
Constructions



Key Points:

- The Tas installation file includes eleven constructions databases, including:
    - 'Constructions' database, containing data from the BRE and from glazing manufacturers
    - International Glazing database, converted from an online database.
    - ASHRAE 90.1 Constructions (2007 & 2010). Used for LEED assessments.
    - NCM Constructions May be used for UK Part L2 building regulations.
- Every building element except for 'Null' must have a construction applied to it. The user can select constructions from any of the Tas construction databases.
- Every effort has been made by EDSL to ensure that the data we provide is accurate but some data like the NCM constructions database has been converted directly without alteration. Users should be careful and check that the construction values make sense.

Creating a New Construction



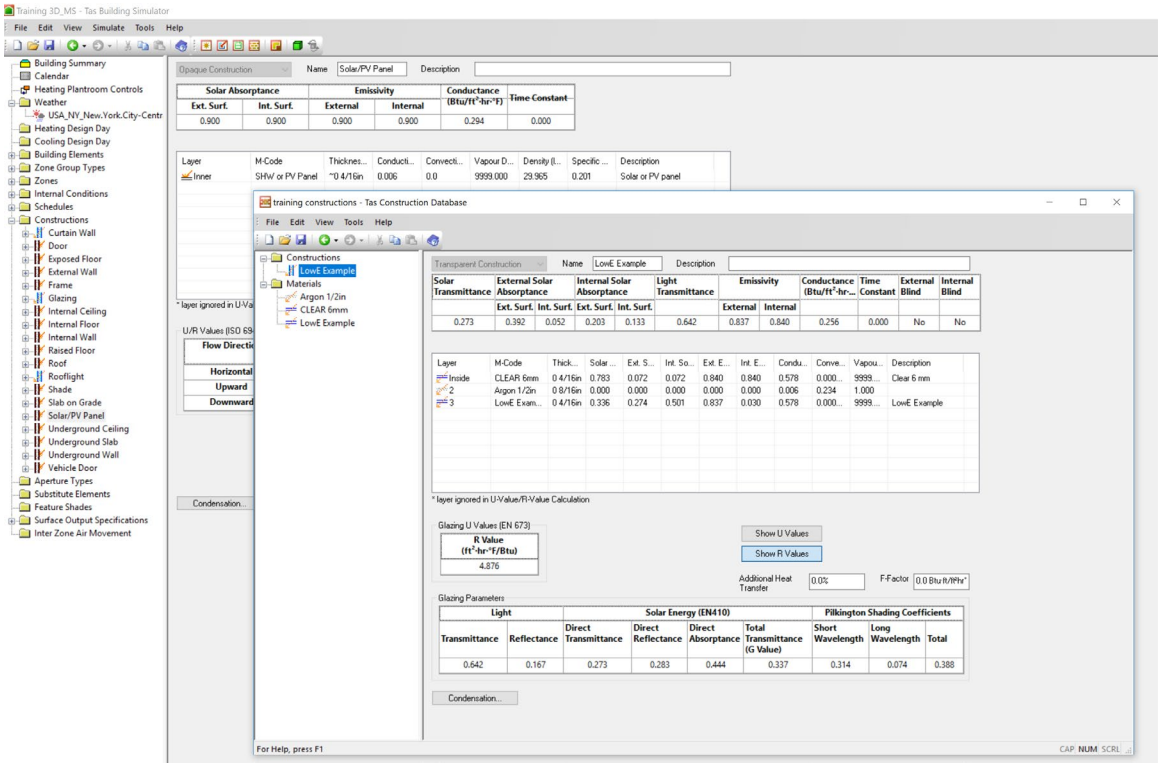
Key Points:

- The user can create their own materials, but if they do this for a Part L2 or EPC analysis they must justify the values they are using as part of the submission to Building Control.
- There are rules for creating constructions:
    - Transparent constructions cannot contain opaque materials and vice versa.
    - A Gas Layer cannot be placed as the first or last layer, or next to another Gas Layer
    - A Transparent Layer cannot be next to another Transparent Layer. There must be a Gas Layer between them.

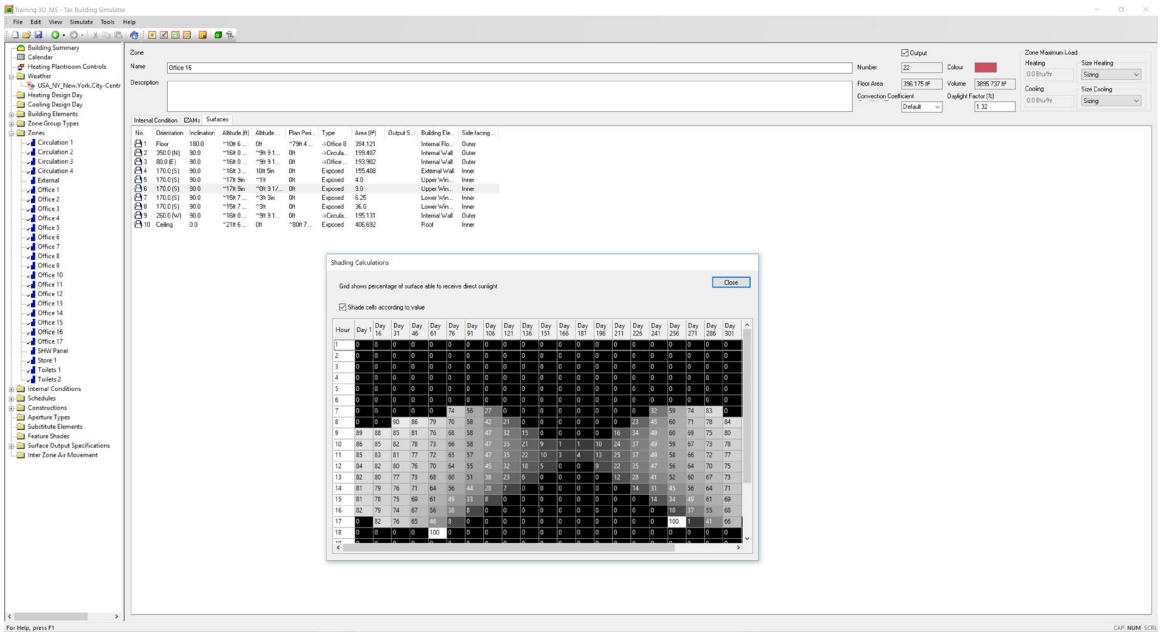
- When a construction is created, the order the materials are placed in is important. The first layer is called the “Inside” layer and the other are numbered. The user should follow these guidelines for orientation:
    - Constructions on the exposed envelope of the building, should have their inside layer as the layer internal to the building. This rule applies to exposed floors, external walls and roofs. E.g. if modelling an external wall, the exposed brick work would be the last layer.
    - Constructions touching the ground should have the inside layer as the layer internal to the building. E.g. when modelling a ground floor, the inside layer should be the flooring such as carpet. For Part L2 the soil layer must be “Notional\Reference Soil” which can be found in the “NCMConstructions_v4.1” Database.
    - Internal Floors/Ceilings should have the inside layer as the lowest layer of the construction. E.g. the first layer could be an acoustic tile and the last layer could be carpet.
    - Internal walls have the inside layer determined by which side of the wall was highlighted in red when using the “Set Wall Element” option in the 3D modeller.
    - Windows and doors are built in the same direction as the wall, ceiling, roof or floor they were applied to.

Exercise:

1) Open the ***Training Constructions*** database. The database can be found in "\Tas Data\US Training\"
2) In the ***Materials*** folder, create a new material.
3) Rename this new material ***Argon Gap 1/2in***
4) Set the **Material Type** to ***Gas Layer.***
5) Set the **Width** to 0.5in and **Vapour Diffusion Factor** to 1.
6) Use the convection calculator for glazing to set the appropriate convection for 0.5in Argon gap to be used in double glazing window.
7) In the ***Constructions*** folder, create a new construction. Rename it ***LowE Example*** and set as transparent.
8) Apply the following layers so that clear glass is the inside pane, the lowE example is the outside pane and the argon is between them
9) Drag the ***LowE Example*** construction from the database and into the **Constructions** folder of the **Tas Building Simulator**.
10) Close the constructions database, saving it as requested.
11) Apply the ***LowE Example*** construction to all the windows that are currently using the glazing construction.
12) Also apply the Solar/PV Panel construction to the Panel Underside building element



Zones



Key Points:

- When you click a zone name on the directory-tree on the left-hand side, key information about the zone is displayed on the right-hand side of the program window. For example, if an internal condition or an IZAM is applied to a zone, you can see on the right-hand side which internal condition has been applied, on which day types it will operate and information about the IZAM. Surface information is also given here.
- Surface information shows data on the dimensions, orientation, inclination and distance above the ground level.
- There are five different types of surface. These are useful to know in the instance that your results are not as you expected, as looking at this table can provide the user clues to the causes of a possible problem:

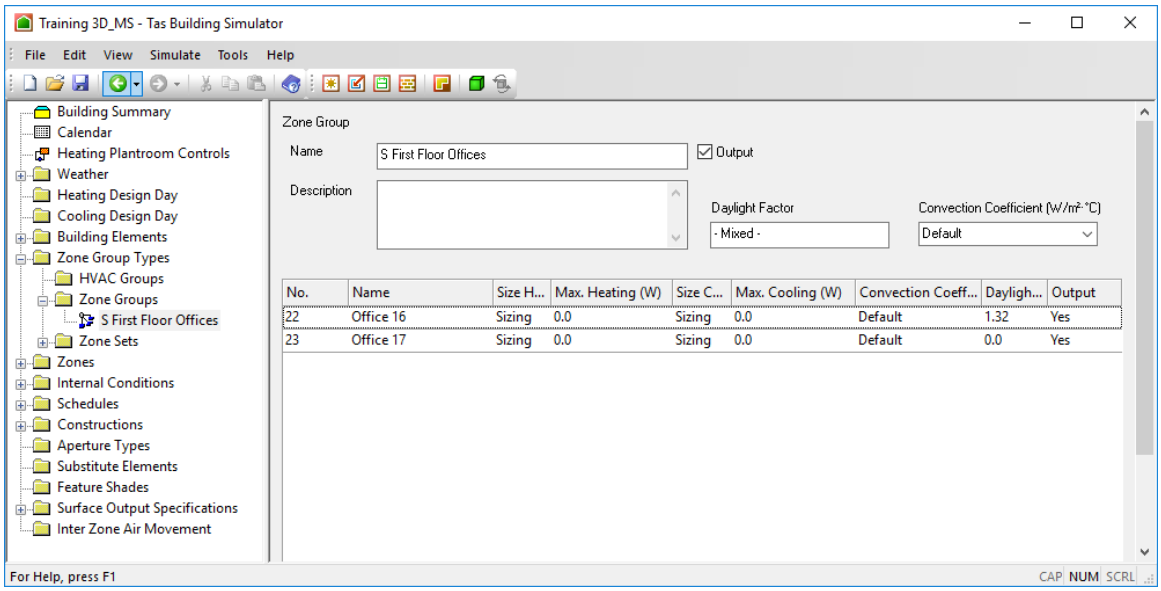
    - **Exposed**. The surface is exposed to the outside air. This should be seen for surfaces as external wall and window and for roof.
    - **Ground**: The surface is touching the ground. This should be seen for surfaces such as ground floors and basement walls.
    - **-> (Name of Zone)**: This type of surface forms a boundary between two zones. When modelling this type of surface, Tas takes into account the different air temperature as well as the thermal mass.
    - **Internal:** This type of surface has both sides touching the same zone. When modelling this type of surface, Tas takes into account the thermal mass and assumes the heat transfer is adiabatic.
    - **Null Link** This type of surface forms a boundary between a zone and unzoned area. When modelling this type of surface, Tas takes into account the thermal mass and assumes the heat transfer is adiabatic.

- Usually the convection co-efficient is either “external” for external zone or “default”. In some cases a zone represents something other than a room such as under floor ducts or a ventilated façade, in these cases there is an option to fix this value.
- It is possible to change the sizing options for the zones. The choices are:

  - **Sizing**. The zone will size its heating or cooling during the dynamic simulation. It will therefore always achieve the necessary heating and cooling loads.
  - **No Sizing**. The heating or cooling loads are fixed to the values in the zone maximum load heating and cooling load boxes.
  - **Design Sizing**. The zone will size its heating or cooling based on a design day. It will then fix these sizes when running a dynamic simulation.

- If the software sizes the heating or cooling (through **Sizing** or **Design Sizing**), then the sized value will be entered into the Zone Maximum Load box for heating or cooling, respectively.

Zone Groups



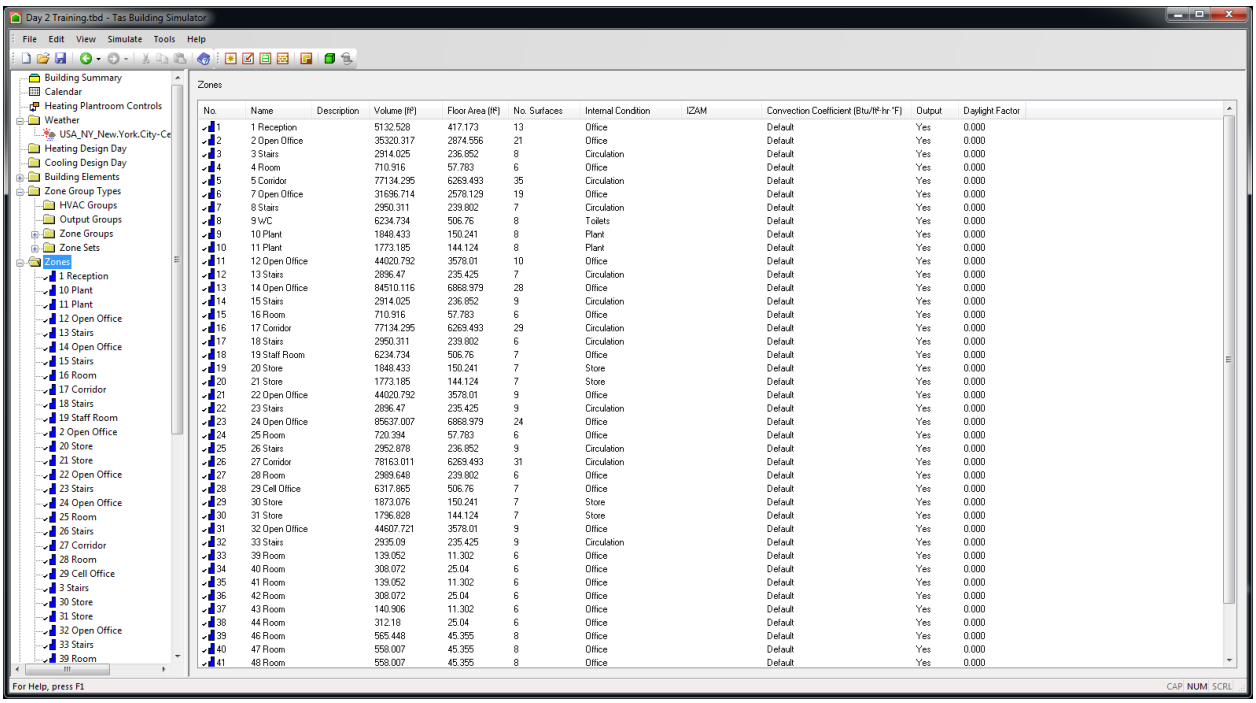
Key Points:

- Zone groups are useful for when you want to apply internal conditions and inter-zone air movements (IZAMs) to multiple zones. They can also be used for aperture control and for ordering results in the Post processing macros, UK Building Regulation Studio or the Results Viewer. Sizing and output options can be set on a zone group basis.
- There are four varieties of zone group:
    - **Zone Groups**: These are the standard group of zones. Zones can be added or removed from this type of group.
    - **Zone Sets:** These are created in the 3D Modeller so they exist before the geometry is even exported to the Building Simulator. Zones cannot be added or removed from these types of groups from within the Building Simulator itself but they can be edited or deleted in the 3D Modeller.
    - **Output Groups:** You are strongly advised to avoid creating Output Groups in current versions of the software. They are only included for the purpose of simulating legacy projects from earlier versions, which had limitations on the size of results files.
    - **HVAC Groups:** These should contain zones that exist on the same HVAC circuit. These types of groups are used in Tas Systems and the Regulation Studios and are used for the application of HVAC systems.

Exercise:

1) Create a **Zone Group** called ***S First Floor Offices***.
2) Apply ***Office 16*** and ***Office 17*** to the zone group.

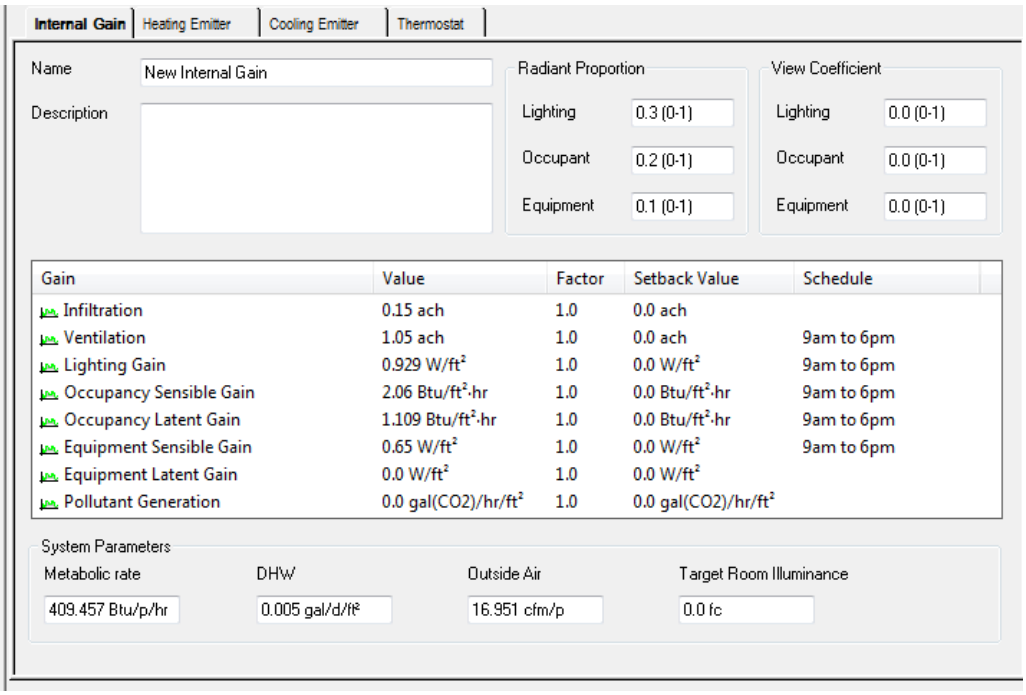
Viewing and Generating the Templates



Key Points:

- The TBD has been generated using a template. The template contains constructions, internal conditions and a calendar.
- The constructions are assigned to the building element based on their type. The construction's name must match that of the building element type for it to be applied.
- The internal conditions are applied based on the name of the zone's zone set. The internal condition must match the name of the zone set for it to be applied.
- Internal conditions will only be applied to a zone, if an internal condition has not already been applied to it. The same is true of constructions and building elements.
- To create a template from an existing TBD file, select **Export Template** from the **File** menu

Creating an internal condition - internal gains



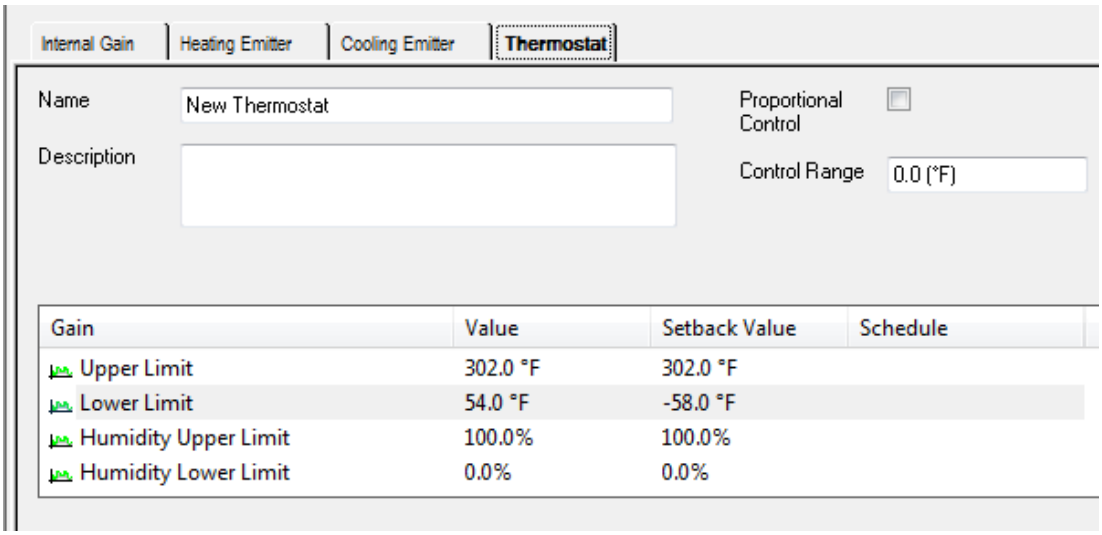
Key Points:

- When completing the internal gains table, the Schedule determines when a particular parameter is using its Value or Setback.
- If no Schedule is applied, then it is assumed to be using its Value for 24 hours.
- You can set a constant value, or an hourly or yearly profile.
- Ventilation and lighting parameters also have the option of a function being applied.
- The Factor is used to multiply the Value and Setback Value.
- Infiltration is leakage into the space, entering at outside conditions. Do not apply a schedule.
- Ventilation is also modelled as fresh air coming in from the outside. It can be used to model mechanical ventilation and trickle vents.
- When running an overheating analysis for buildings other than schools, the resultant temperature is used. There are two methods of calculating this temperature: Operative Temperature (user can feel radiation flux from other occupants, equipment, lighting and solar (diffuse) gain); Dry Resultant Temperature (does not take into account these figures).
- CIBSE use the dry resultant temperature in their overheating analyses.
- To model operative temperature, set the View Coefficients to appropriate values and include Solar in MRT.
- To model dry resultant temperature, set the View Coefficients to zero and do not include Solar in MRT.
- System Parameters (bottom of interface) only affect the results for Part L2.

Exercise:

1) Open the ***training IC.tic*** database which you will find in "\Tas Data\US Training\".
2) Create a new internal condition called ***Weekend***.
3) Set the infiltration at the rate of 0.15 ACH.

Creating an internal condition – thermostats



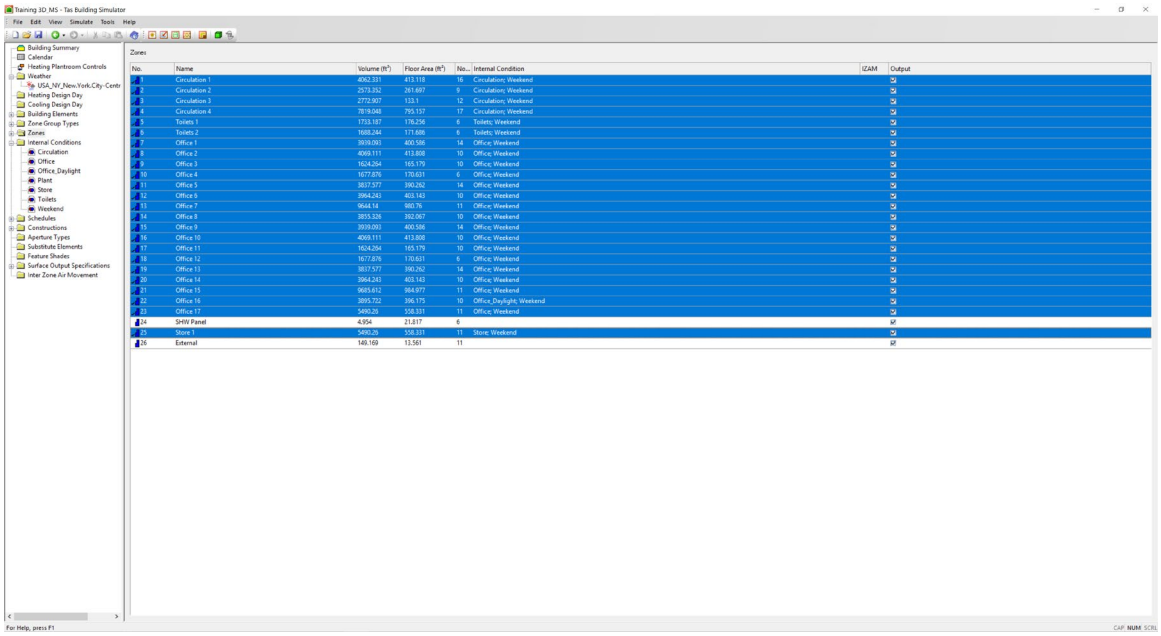
Key Points:

- The Upper Limit is set to the dry-bulb temperature you want the comfort cooling to cool to. If the space does not have comfort cooling, set this value to 302°F. Do *not* set this value to zero, otherwise it will cool to zero.
- The Lower Limit is set to the dry-bulb temperature you want the room to be heated. If the room should not be heated, then set this value to -58°F. Again, do *not* set it to zero.

Exercise:

1) Change the ***Weekend*** thermostat to match the screenshot.

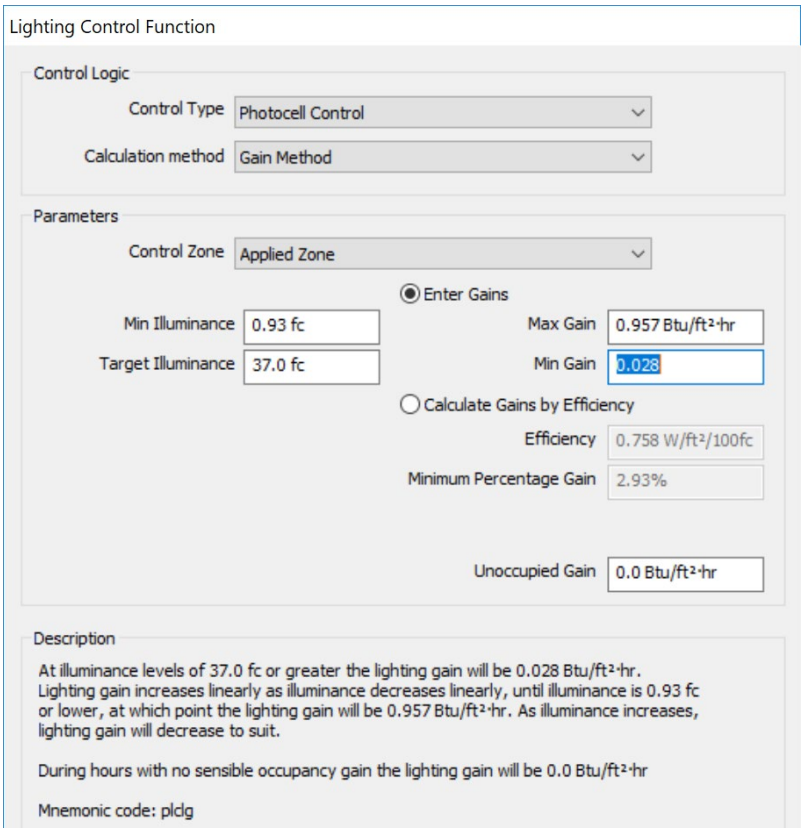
Applying internal conditions to zones



Exercise:

1) Drag the ***Weekend*** internal conditions from the ***Training Course IC*** internal conditions database to the **Tas Building Simulator**.
2) Where requested, apply the internal condition to ***Saturday*** and ***Sunday***.
3) Close the internal conditions database, saving when requested.
4) Apply the ***Weekend*** internal condition to all zones, except the SHW and External zones.

Lighting functions



Key Points:

- There are two lighting functions: for manual and photocell control.
- In both functions, there is a max and min lux value and a max and min gain value.
- The maximum lighting gain is used when the diffuse lighting in the zone is at or below the minimum lux level.
- The minimum lighting gain is used when the diffuse lighting in the zone is at or above the maximum lux level.
- Between these two values, the maximum lighting gain is inversely proportional to the lux level.
- If using the photocell control function, the max and min gain should include the parasitic power.
- If using a photocell control, unoccupied gain will be zero if using a timer clock. Otherwise it will be set to parasitic power mode.
- In the manual control function there is a parameter called Area Cut-Off. If a zone's area is greater than the area cut-off, then the maximum lighting gain value is used in all scheduled hours. If it is below, then it uses the function.

Exercise:

1) Create a copy of the ***Office*** internal condition. Call it ***Office Daylight***
2) Remove ***Office*** internal condition from ***Office 16*** and replace it with ***Office Daylight***
3) In the ***Office Daylight*** internal condition, set the lighting to use photocell dimming and set up the parameters as shown in the above screenshot.

Viewing Shading Data

Shading Calculations

Grid shows percentage of surface able to receive direct sunlight

Close

☑ Shade cells according to value

Hour	Day 1	Day 16	Day 31	Day 46	Day 61	Day 76	Day 91	Day 106	Day 121	Day 136	Day 151	Day 166	Day 181	Day 196	Day 211	Day 226	Day 241	Day 256	Day 271	Day 286	Day 301
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	81	75	63	50	50	0	0	0	0	0	50	65	78	85	88	0
8	0	0	93	92	91	89	87	84	79	72	62	50	50	56	69	78	85	88	91	92	94
9	96	96	95	95	94	93	92	91	89	87	84	82	81	83	86	89	91	93	94	95	96
10	98	97	97	97	96	96	95	95	94	93	91	91	90	91	92	93	95	96	96	97	97
11	99	99	98	98	98	98	98	97	97	96	96	95	95	95	96	97	97	98	98	99	99
12	100	100	100	100	100	100	100	100	100	100	99	99	99	99	99	99	100	100	100	99	99
13	98	98	99	99	98	98	98	97	97	97	96	96	97	97	97	98	98	98	98	98	98
14	97	97	97	97	96	96	95	94	92	91	89	89	89	91	92	93	94	94	95	95	95
15	95	95	95	94	93	92	90	87	81	73	62	56	61	72	80	84	87	89	91	92	92
16	92	92	91	90	88	85	77	60	50	0	0	0	0	0	50	50	65	76	82	85	87
17	0	87	85	82	75	57	50	0	0	0	0	0	0	0	0	0	0	50	50	63	75
18	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

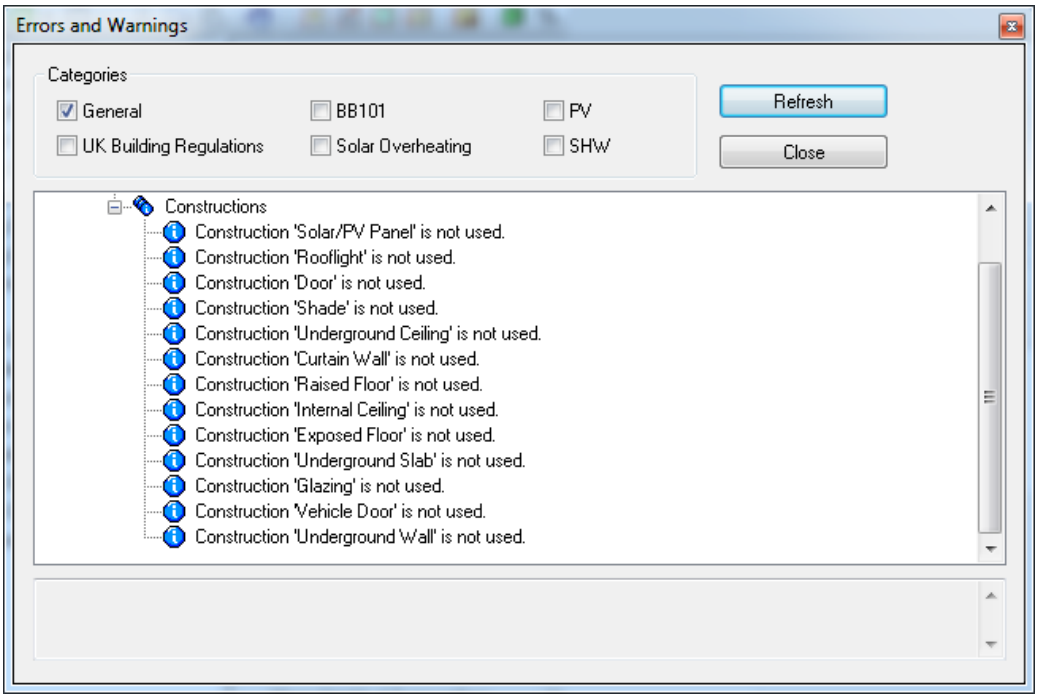
Key Points:

- The shading data can be found be going to the **Surfaces** tab in the **Zones** window and right clicking on a surface.
- This table will only appear if shading calculations were exported when generating the TBD file.
- The columns are the days, the shading calculations were done for and the rows are the hours in that day.
- The value is the proportion of the surface that is receiving direct sunlight.

Exercise:

1) Go to view ***Office 16*** zone data and click on the **Surfaces** tab.
2) Right click on the **Lower Window-pane** and select **Display Shading Data**.
3) Close the dialog box.
4) Go to view ***Office 5*** zone data and click on the **Surfaces** tab.
5) Right click on the west facing **Lower Window-pane** and select **Display Shading Data**.
6) Close the dialog box

Pre-Simulation Checks



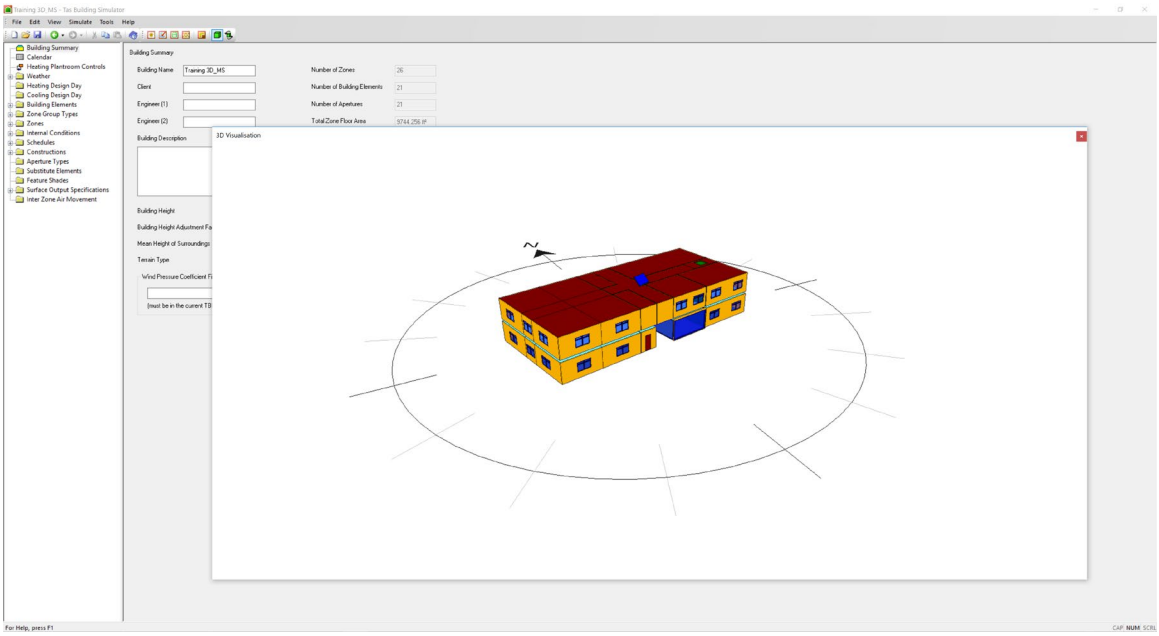
Key Points:

- The Pre-Simulation Checks provide you with a list of errors and warnings.
- This option should be used before simulating and before using Tas Systems or proceeding with the regulation Studios.
- Warnings are problems that will not prevent simulation however they may still have an impact on your results.
- You must check all warnings and determine if they will affect your results. If the effect is likely to be significant, then correct your TBD file setup to remove the warnings. Do **NOT** just ignore these warnings!

Exercise:

1) Run the **General** pre-simulation checks.
2) Correct any errors or warnings that do not appear in the screenshot above and refresh the checks.
3) Save the model.

4) *3D Visualization*



Key points:

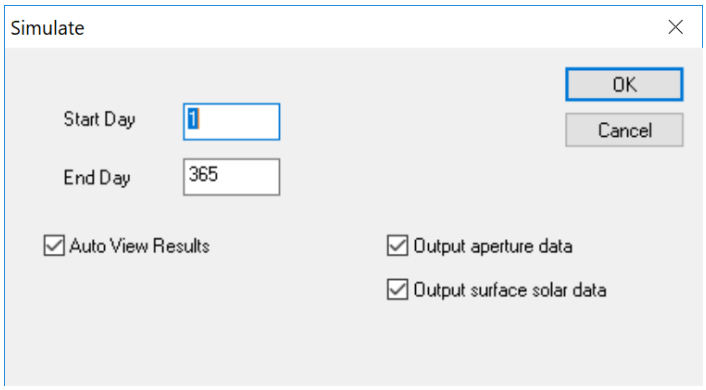
- To view the 3D Visualisation, click View | 3D Visualisation. Alternatively, click the toolbar button illustrated with a green cube. This will bring up the 3D Visualisation window.
- Very large models may use a significant proportion of system memory. For viewing large models it is recommended that your system has a reasonable amount of RAM (2GB) or a dedicated graphics card - graphics cards are of course much more efficient at handling this sort of thing.
- Holding the middle mouse button and dragging will pan the view.
- Holding Shift while middle-dragging will rotate the model about its central point.
- If you do not have a middle mouse button (e.g. using a laptop with a touchpad) the same effect can be achieved by holding Alt and dragging with the left mouse button - i.e. Alt+left-drag to pan, Alt+Shift+left-drag to rotate.
- The Lock Rotate button found on the toolbar can be toggled on. When this mode is enabled, middle-dragging will rotate the model even when Shift is not held down.
- Scrolling using the mouse wheel or the vertical scroll section of a touchpad will move the camera towards/away from the model.
- Pressing the Home button will reset the camera to its default position.
- Pressing F5 will refresh the model to take into account any changes that have been made to the model that are not displayed.
- Selecting an item in the Tree View while the 3D Visualisation is open will highlight relevant parts of the 3D model:
- If a Zone Group is selected in the tree, you may select one or more zones on the list of zones on the right hand side. This will cause the selected zones to be shown as opaque, and the non-selected ones in that zone group to be shown as semi-transparent.
- If a Zone is selected in the tree, you may select one or more surfaces on the surfaces tab on the right hand side. This will cause the selected surfaces to be shown as opaque, and the non-selected ones in that zone to be shown as semi-transparent
- Hovering over an opaque surface in the 3D Visualisation will display a tooltip showing the zone name and, if the model is coloured by building element, the surface number.

- Double-left-clicking an opaque surface in the 3D Visualisation will take you to the details page for the relevant zone, and therefore highlight it in the 3D Visualisation window.
- If the mouse cursor is not over any opaque surfaces, double-left-clicking will cause the list of zones to be selected in the tree view, and therefore the whole model will be displayed.
- Right-clicking anywhere within the 3D Visualisation window will bring up a menu to select display options

Exercise:

1) Open the 3D visualization window
2) Select zone ***Office 16***.
3) Select internal condition ***Store***.
4) Select internal condition ***Office***.
5) Select construction ***External Wall***
6) Close the 3D visualization window.

Running a simulation



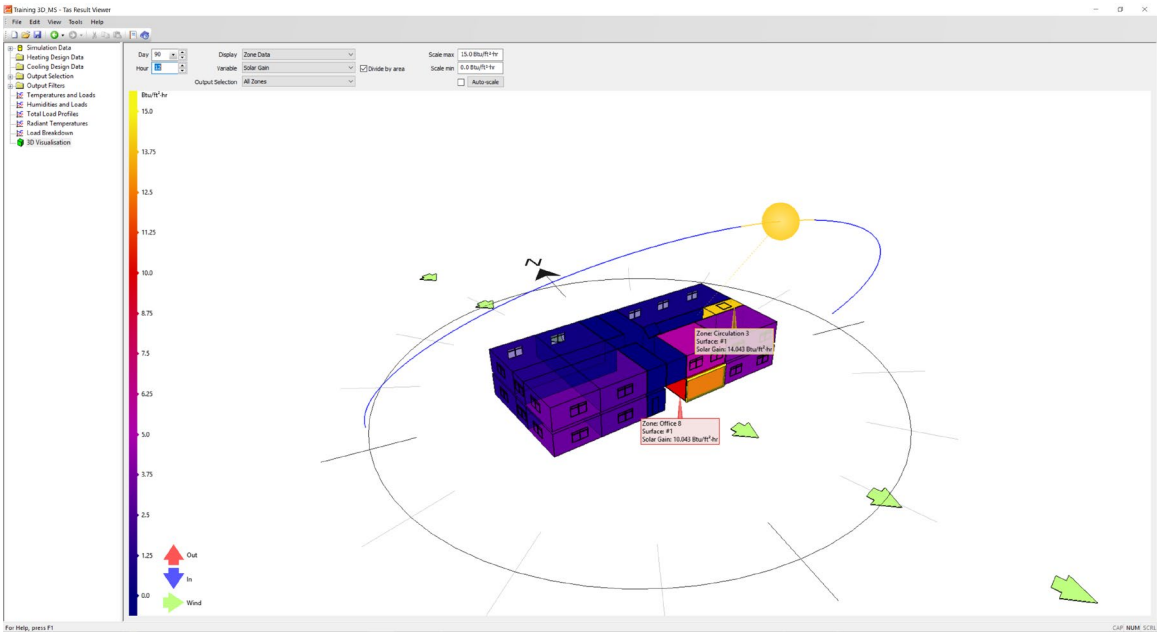
Key Points:

- "Output aperture data" will output the proportion of aperture opening and air flow for all apertures including Null surfaces between zones.
- "Output Surface Solar data" will output the solar gain absorbed by each surface of the building.
- If no output groups were created, then the results will be stored in one simulation data file.
- If output groups are created, then multiple results files will be created. The number of output groups will be equal to the number of results files.
- Weighting factors are a measure of a zones thermal mass. They are used to calculate how much energy is required to increase the zone dry-bulb temperature by 1 Kelvin.
- Weighting factors are used by the UK and ROI Building Regulations macro, Tas Systems, the UK Building Regulations Studio and the Plant Modelling macro. It is *strongly* recommended that you always leave this option enabled.

Exercise:

1) Run a simulation for the entire year, outputting aperture data.
2) Save your results file.

3D Visualisation



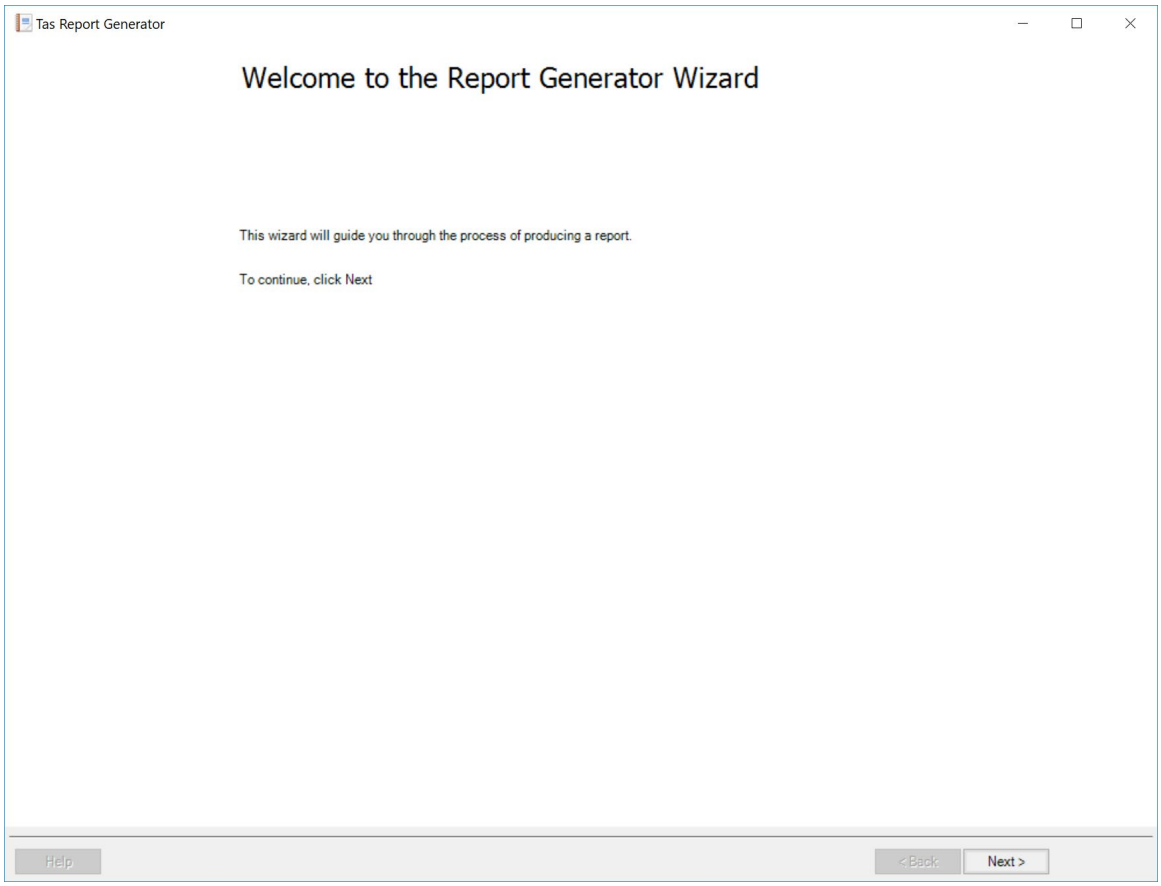
Key points:

- 3D visualisation uses the TBD file as it reads data from it.
- Use left mouse button to pan. Use <shift>+ left mouse button or middle mouse button to pan.
- Right clicking gives options to change the colours, drawing options and display arrows.
- The air flow arrows for aperture air flow will only appear for output selections that contain surfaces with aperture data outputted.

Exercise:

1) Save and close the ***Training*** TBD file.
2) View the solar gain for all zones for day 90, hour 12. Divide the gain by floor area.
3) Save and close the TSD file.

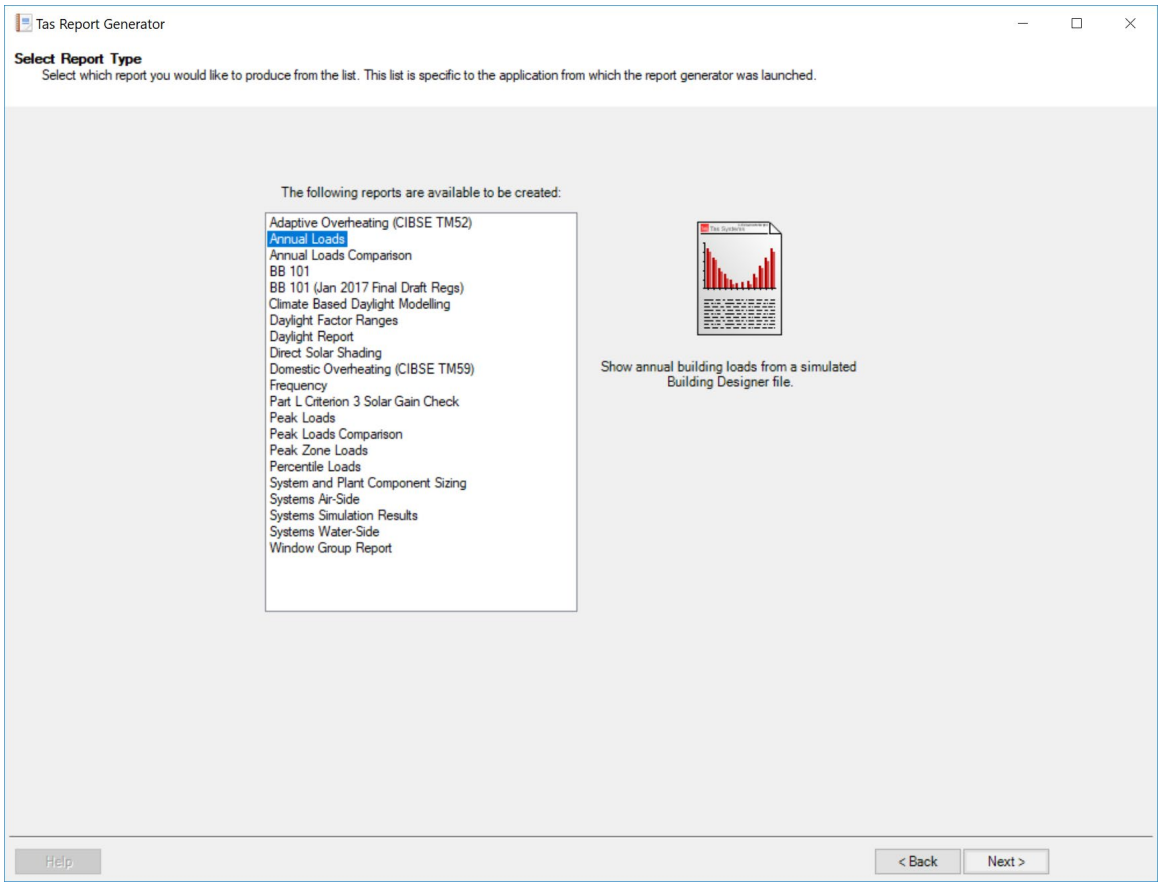
Running the Report Generator Wizard



Exercise:

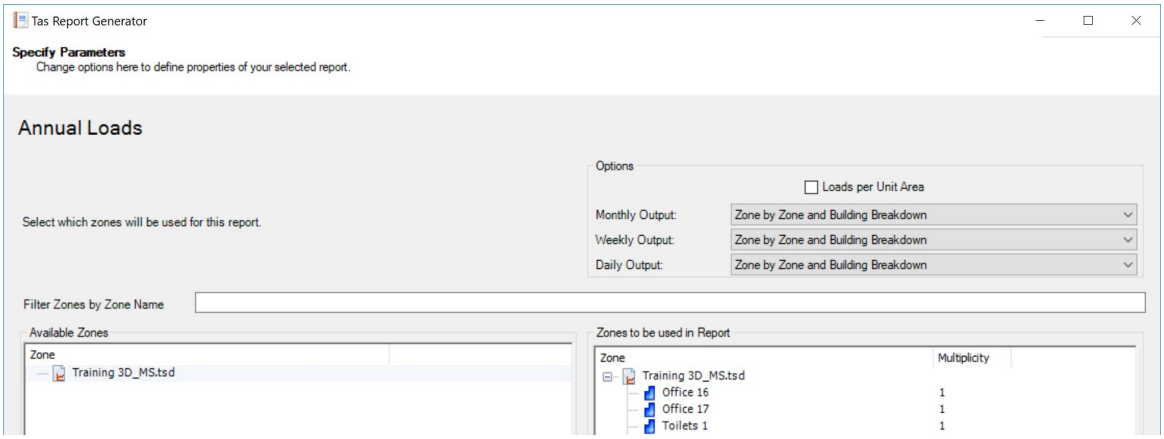
1) In **Tas Manager**, select **Create Report** to open the Report Generator.

Creating an Annual Loads Report

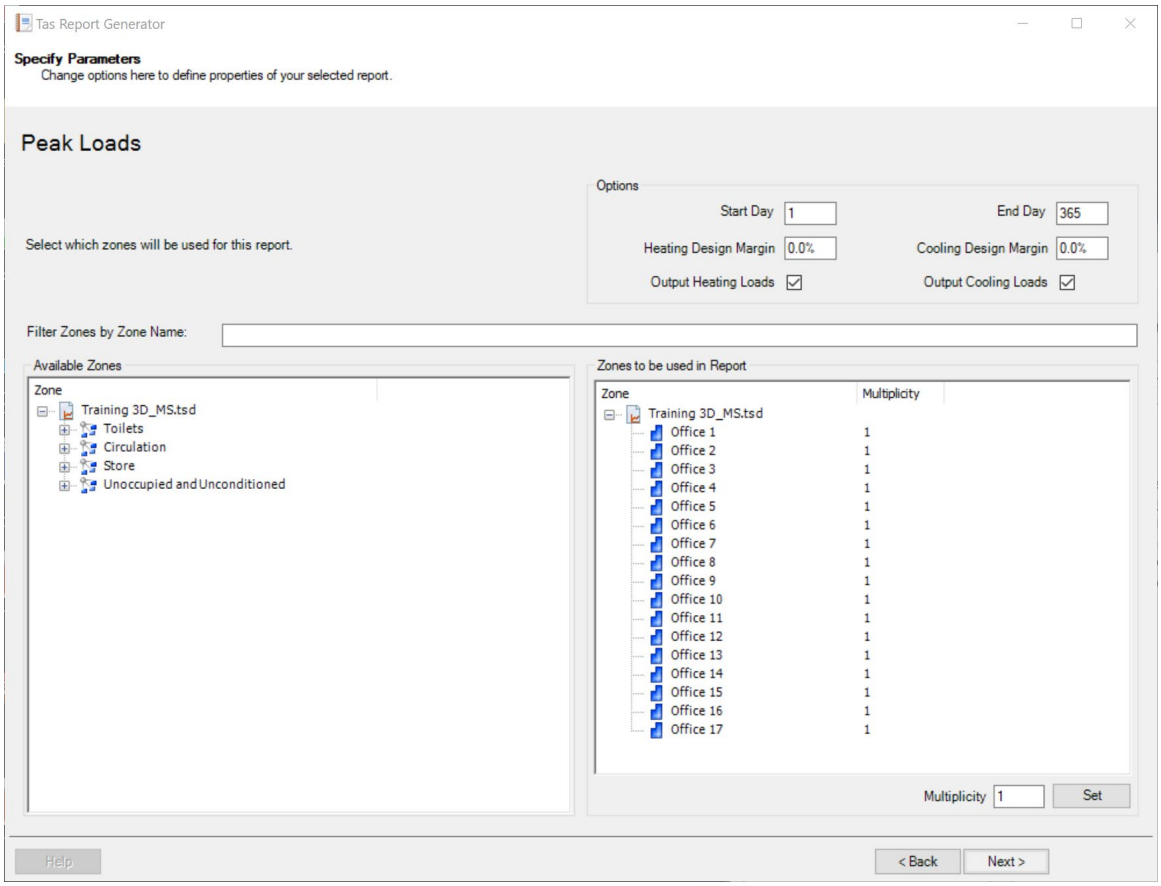


Exercise:

1) Run the Report Generator and choose an **Annual Loads** report for ***Training.tsd***.
2) Create a xls report that includes all zones in your building with zone by zone breakdown and a building breakdown (as below).
3) Save the report as to your project directory as ***Annual Loads.xls***. (should take less than 1 minute on a modern laptop).



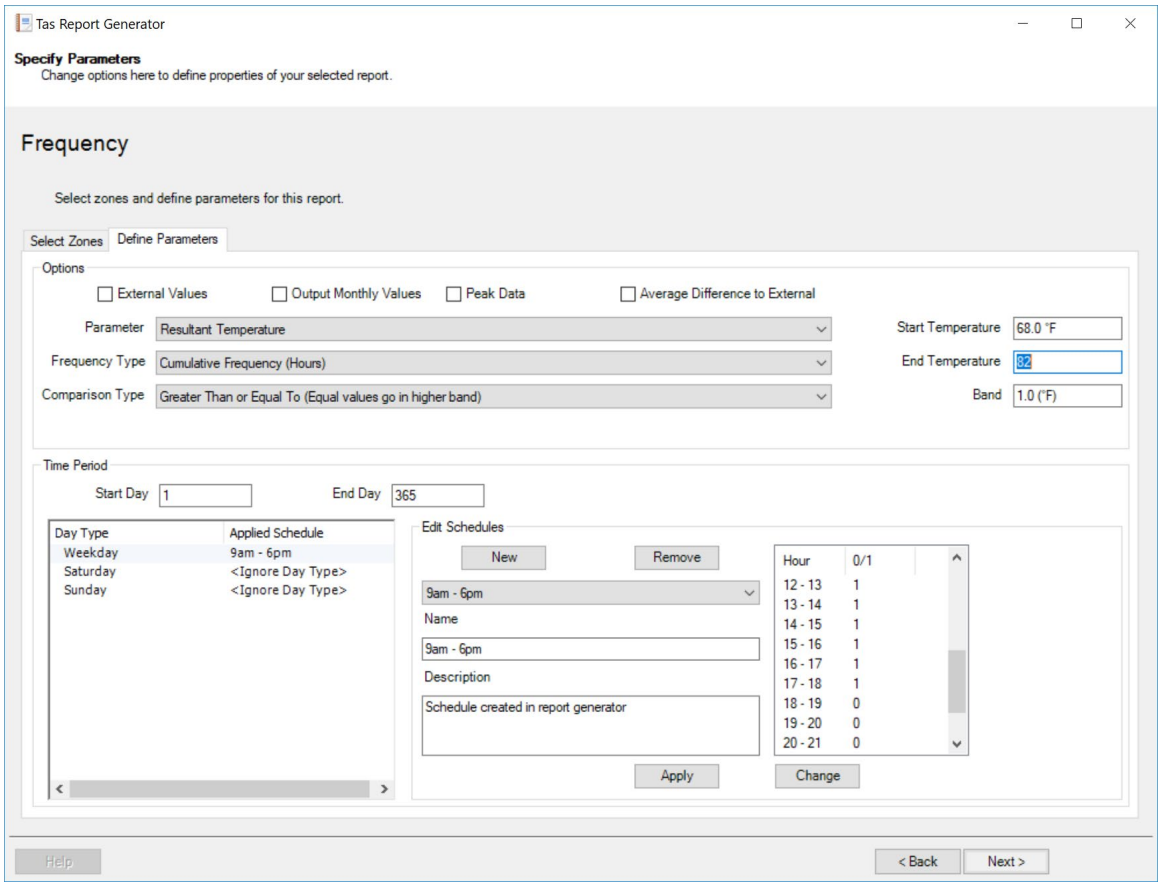
Creating a Peak Loads Report



Exercise:

1) Run the Report Generator again and choose a **Peak Loads** report for ***Training.tsd***.
2) Create an PDF report showing the peak loads for the ***Office*** zones for the year. Do not add a design margin.
3) Save the report to your project directory as ***Peak Loads.pdf***.

Creating a Frequency Report

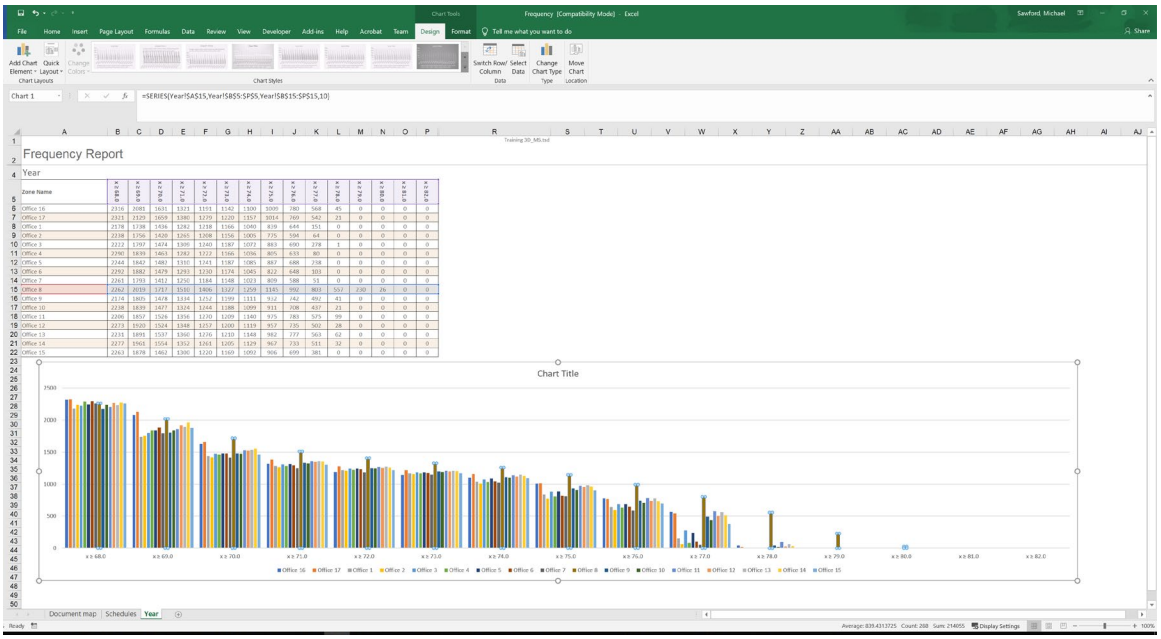


Key Points:

- The Frequency report can output the number of hours or days by which a zone exceeds either a temperature or a relative humidity.
- You can enable the “Display External Values” checkbox to display either external temperature or relative humidity.
- When displaying cumulative frequency information, the results will show the number of hours by which the selected zones exceed the start and end temperatures, for example 77 to 82°F inclusive.
- This means that the column displaying the number of hours *above* 77 degrees will *include* the number of hours by which the temperature (or relative humidity) *also* exceeds 78 degrees C, 79 degrees F, *etc*. The column displaying the number of hours above 77 degrees F will include the number of hours by which the temperature or RH exceeds 77 degrees F, 78 degrees F, *etc*.

Exercise:

1) Choose a **Frequency** report for ***Training.tsd***.
2) Generate a report showing Cumulative Frequency (hours) for Resultant Temperature between 9am and 6pm on all Weekdays for the ***Office*** Zones. Show the results for 68ºF to 82ºF.
3) Save the report as a xls named ***Frequency.xls*** in your project folder


Frequency Report
Year
Chart Title