

Tutorial: Using Type 67 and Type34

In this tutorial, we are going to modify the project found in the directory 'TRNSYS16\Examples\SunSpace\SunSpace.tpf', in order to take into account shading from far away objects (Type67) and overhangs and wingwalls (Type34).

Modifications to the building description file

Starting from the project layout in the Studio, right click on the icon for Type56 and select 'Edit building'. This will open TRNBuild.

1. Create a new orientation:

Go to the 'Project' window (See Figure 1). In order to set a new orientation, click on 'Other' and type 'SOUTH_SHADE'. After you click OK, a new orientation will be shown in the 'Orientations' list.

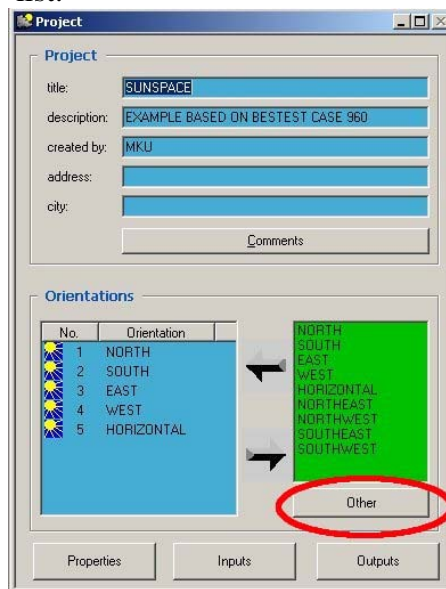


Figure 1. Project window.

2. Assign the new orientation to a wall and window:

Go to the 'TRNBuild Manager' window, and select the zone 'SUNZONE' (See Figure 2).



Figure 2. TRNBuild Manager window.

In the window 'SUNZONE', select the wall 'BST_H_EXT' (See Figure 3). The orientation for this wall was set to 'SOUTH' and it contains a window with an area of 12 m². Change the orientation of the wall from 'SOUTH' to 'SOUTH_SHADE'. TRNBuild automatically updates the orientation of the window.

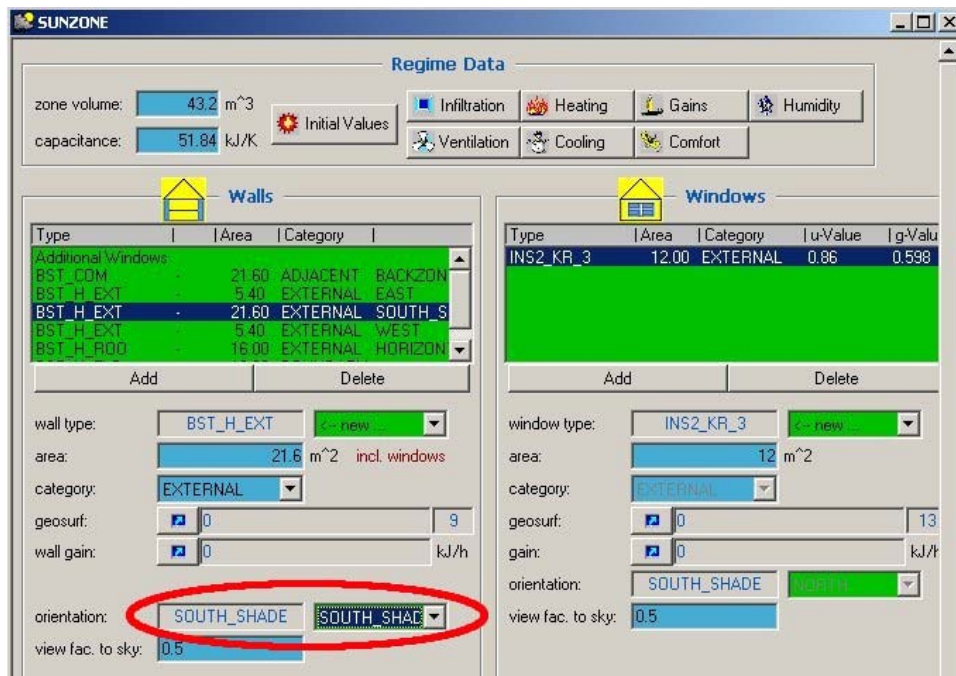


Figure 3. SUNZONE window

Close TRNBuild, and go back to the Studio.

Modifications to the project file

1. Update building inputs:

Right click on the building icon, and select 'Update building variable list' (See Figure 4). This option recognizes the new orientations defined in the building description file.

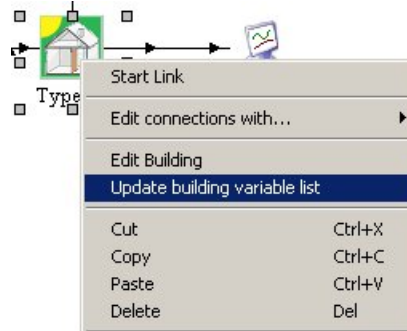


Figure 4. Right click on Type56 icon.

2. Add overhang and wingwalls:

Go to the 'Access tree', and select the icon corresponding to Type34 from the group 'Loads and Structures/Overhang and Wingwall Shading'. Modify the parameters corresponding to the geometry of the shading device. You may want to use the plug-in accessible from the lower left corner.

If you are only considering shading from overhangs and/or wingwalls, set the parameter 1 (Upstream component mode) equal to 0. If you are considering combined shading from far-away objects and overhangs/wingwalls, set parameter 1 equal to 1.

3. Connect Type34 to Type56.

Make the following connections :

- Incident receiver radiation → 9-IT_SOUTH_SHADE
- Beam radiation on receiver → 15-IB_SOUTH_SHADE
- Angle of incidence → 21-AI_SOUTH_SHADE

4. Connect Type109 (Weather data reader and radiation processor) to Type34:

Case 1. Shading from overhangs and wingwalls:

If you only want to study the effect of overhangs and wingwalls, you only need to connect Type 109 to Type34:

Make the following connections:

- Solar zenith angle → Solar zenith angle
- Solar azimuth angle → Solar azimuth angle
- Total radiation on horizontal → Total horizontal radiation
- Sky diffuse radiation on horizontal → Horizontal diffuse radiation
- Beam radiation on tilted surface-2 → Beam radiation on surface
- Angle of incidence for tilted surface-2 → Incidence angle of direct radiation

Remember to set the parameter 1 of Type34 equal to 0.

Your project should look like Figure 5.

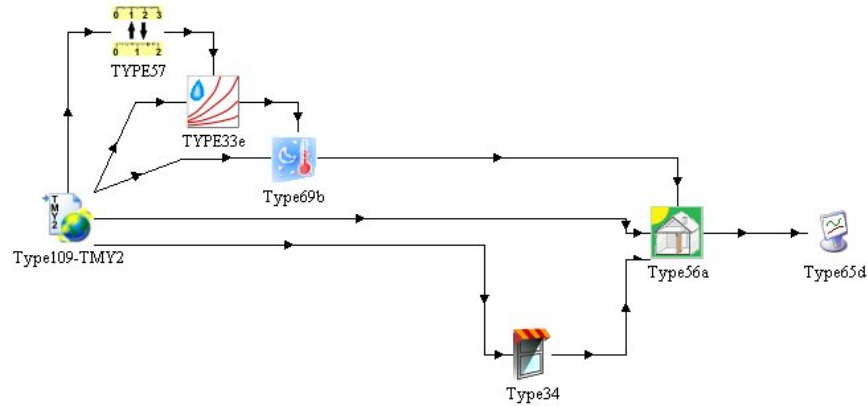


Figure 5. Project layout with Type34.

Case 2. Shading from far away objects, overhangs and wingwalls:

If you want to consider the effect of far-away objects as well as overhangs and wing walls, you need to connect the radiation processor (Type109) to the shading mask component (Type67), before the radiation is sent to Type34, as shown in Figure 6.

1. Connect Radiation processor (Type109) to Shading mask (Type67):
 - Solar zenith angle → Solar zenith angle
 - Solar azimuth angle → Solar azimuth angle
 - Total radiation on horizontal → Total radiation on horizontal
 - Sky diffuse radiation on horizontal → Diffuse radiation on horizontal
 - Beam radiation on tilted surface-2 → Beam radiation for opening

2. Connect Type109 (Radiation processor) to Type34(Shading component):
 - Solar zenith angle → Solar zenith angle
 - Solar azimuth angle → Solar azimuth angle
 - Angle of incidence for tilted surface-2 → Incidence angle of direct radiation

3. Connect Type67 (Shading mask) to Type34:
 - Shaded beam rad. for surf. → Beam radiation on surface
 - Shaded diffuse rad. on horizontal → Horizontal diffuse radiation
 - Shaded total rad. on horizontal → Total horizontal radiation

4. Calculate total diffuse radiation on the opening:

Add an equation component, and define two inputs: Idiff_sky and Idiff_ground.
 Define a new equation:

$$\text{Idiff_tot} = \text{Idiff_sky} + \text{Idiff_ground}$$

Connect Type109 to this equation:

 - Sky diffuse radiation on tilted surface-2 → Idiff_sky
 - Ground reflected diffuse radiation on tilted surface-2 → Idiff_ground

Connect the equation to Type67:

- Idiff_tot → Diffuse radiation for opening

Remember to set the parameter 1 of Type34 equal to 1.

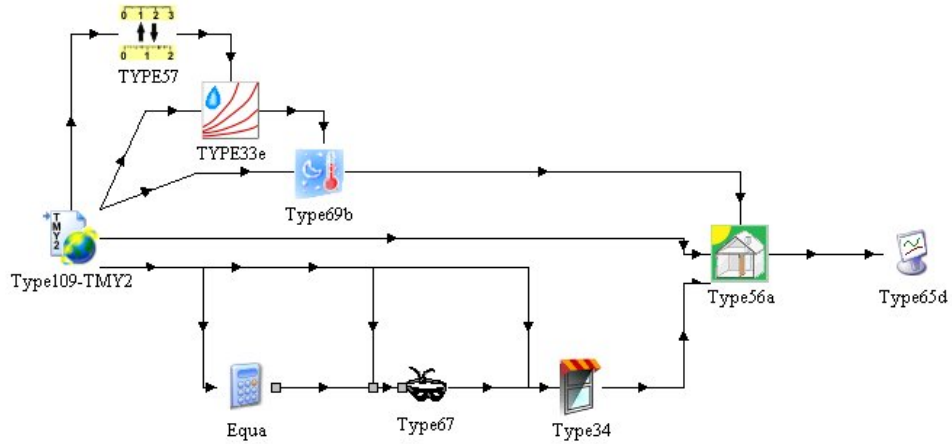


Figure 6. Project layout with Type67 and Type34.