Standard Mode – 3D Model Generation/Placement

Field Logic, Inc.

Version 1.0

Contents

1. Introduction

About This Document (Tutorial)

HelioBase® is an application that predicts the generated output of the photovoltaic system.

This document describes how to generate a 3D model, output the model in the STL format, and how to use the model in *HelioBase®*. A 3D model can be a building or a frame that can be placed in the "3D Model" screen. A simple form of the 3D model can be generated using *Google SketchUp* and an STL output plug-in. This document also describes how to use the 3D model generated in *HelioBase®*.

◇NOTE◇

Plugin file used:

The following plugin file is used in this document.

  skp_to_dxf.rb

You can download this plugin from following URL.

http://www.guitar-list.com/download-software/convert-sketchup-skp-files-dxf-or-stl

Please copy this plug-in in the "Plugins" folder below the installation folder ("C:/Program Files/Google/Google SketchUp 8" folder) of Google SketchUp, and start Google SketchUp.

Data file used:

The following data file is used in this document.

① 3DModel_Tutorial-01.stl: STL format file of the factory model.

② 3DModel_Tutorial-01.skp : *Google SketchUp* file in which the example of this tutorial is saved.

③ 3DModel_Tutorial-01.pvx : *HelioBase®* file in which a 3D model is placed in the 3D model.

④ 3DModel_Tutorial-02.pvx : *HelioBase®* file in which a PV array model is placed in the 3D model.

2. Starting *Google SketchUp*

Start *Google SketchUP* and select a template to use.

① Click the Windows [Start] button, click [All Programs], then click Google [SketchUp8] - [Google SketchUp].

② [Welcome to SketchUP] appears.

　* If [Welcome to SketchUP] does not appear, see "[Welcome to SketchUP] does not appear".

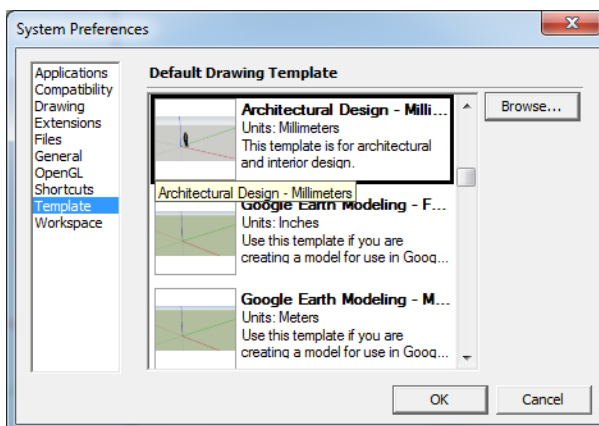③ Click the [Select Template] button. Select [Architecture – millimeter].

◇NOTE◇

[Welcome to SketchUP] does not appear

In the menu, select [Window] – [Preferences]. The [System Environment Settings] window opens.
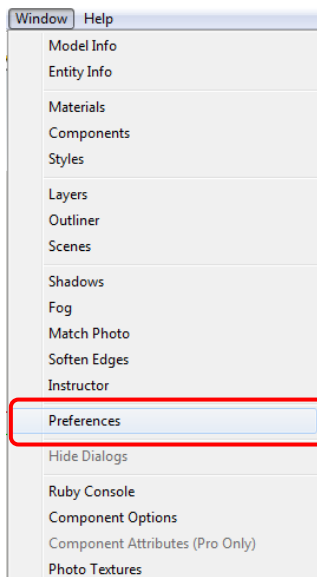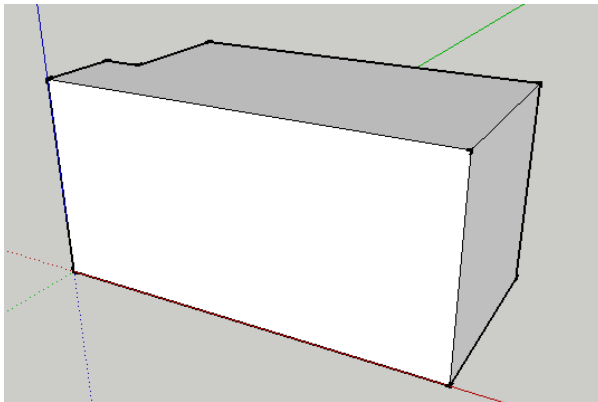

Select [Template]. Select [Architecture – Millimeter].
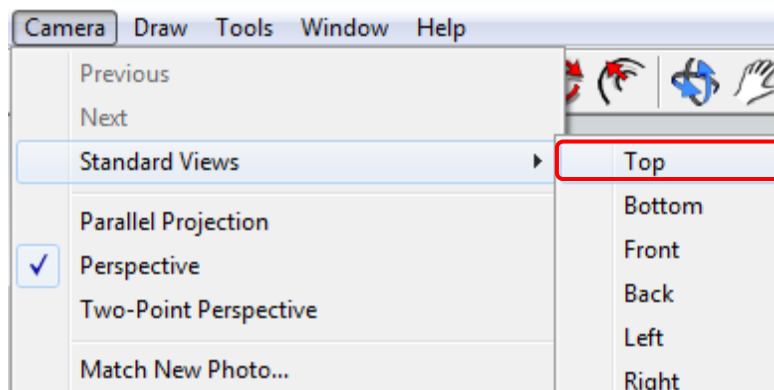
3. Generate a simple 3D model of a factory

Generate a simple 3D model as shown below in *Google SketchUp*.
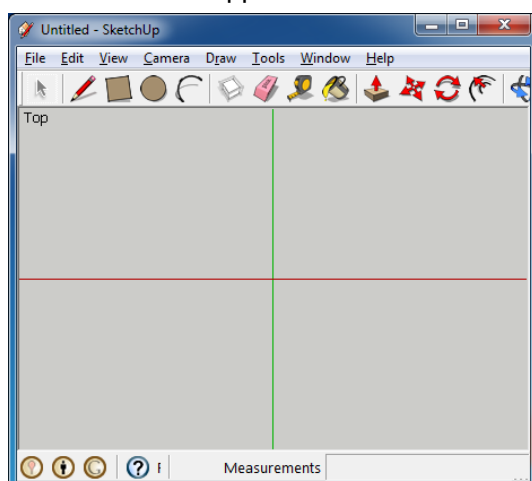

Generate a 3D model

First, draw a shape of the factory as viewed from the top. Use the [Line] tool.

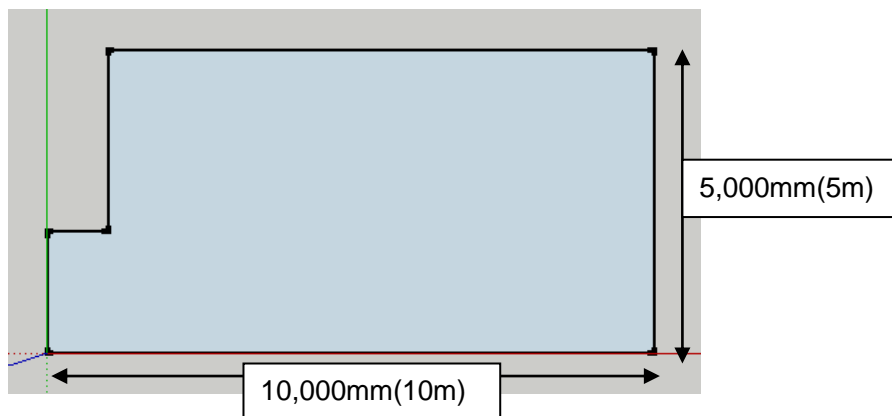In the menu, select [Camera] – [Standard Views] – [Top].

The zenith view appears as shown below.

Select the [Line] tool in the toolbar.

Draw a figure as shown below.
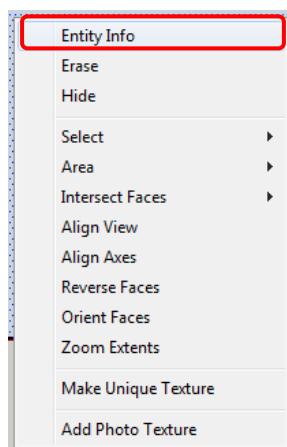
5,000mm(5m)

10,000mm(10m)

Set the color for the figure drawn to distinguish the back and front.

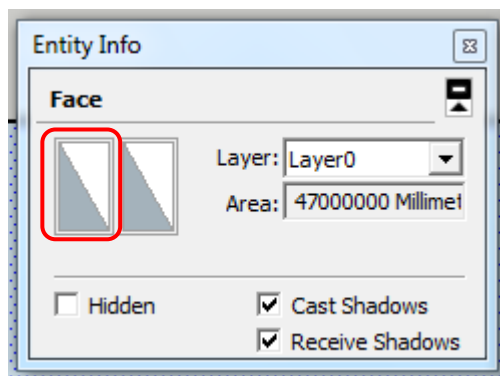Select the [Select] tool in the toolbar.

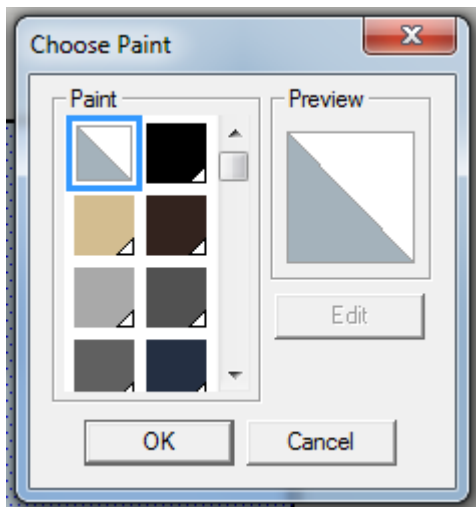Click and select the figure drawn. (A stripe pattern is drawn in the selected figure.)

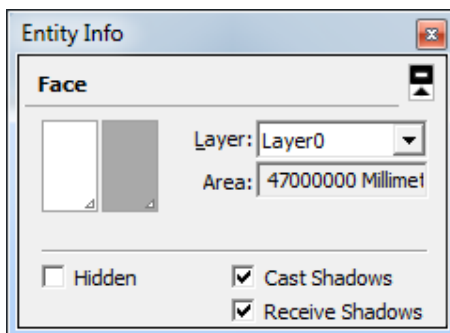Right-click in the selected figure. The context menu appears. select [Entity Info (I)].

Entity Info
Erase
Hide

Select   ▶
Area   ▶
Intersect Faces   ▶
Align View
Align Axes
Reverse Faces
Orient Faces
Zoom Extents

Make Unique Texture

Add Photo Texture

The [Entity Info] window appears. Click the left box under [Face].

Entity Info

Face

Layer: Layer0
Area: 47000000 Millimet

☐ Hidden   ☑ Cast Shadows
                  ☑ Receive Shadows

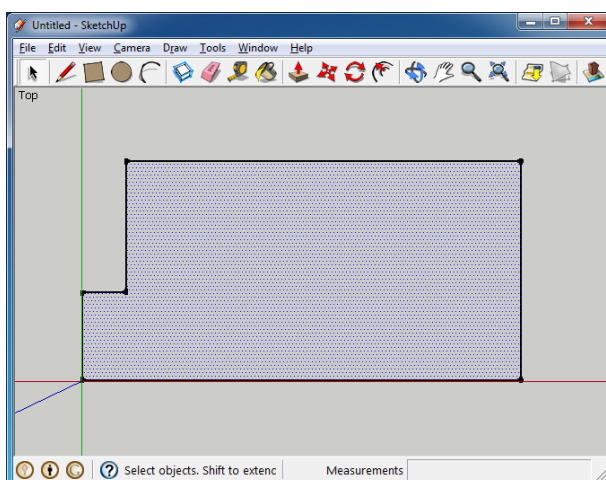The [Choose Paint] window appears. Select a color. This color is the color of [Face].

Next, clcik the right box under [Face] ([Entity Info] window). Select a color. This color is the color of [Back].

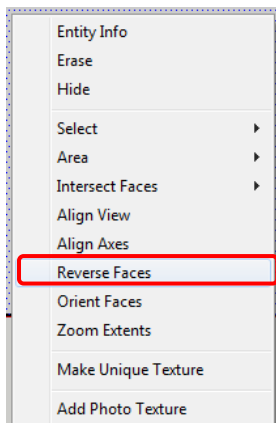([Entity Info] window - [Surface]: White, [Back Surface]: Khaki)

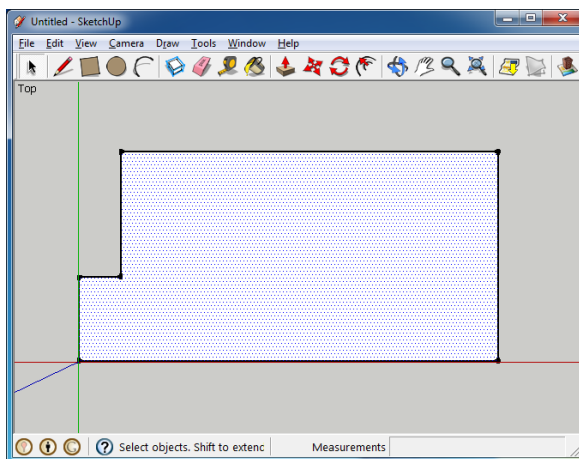The surface color setting is done. Close the [Entity Info] window.

(Face color setting completed)

This figure shows the back side. The top side must be shown.

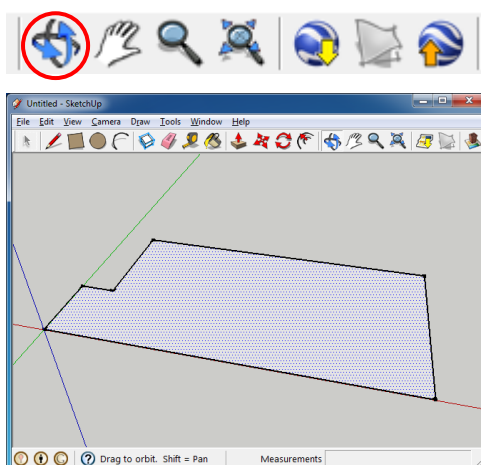Right-click on the selected figure. The context menu appears. Select [Reverse Face].

The reverse surface in white appears.

Next, raise the figure height by using the [Push/Pull] command.

The current camera position does not show the height.

Select [Orbit] in the toolbar to move the camera to show the height.



(Move the camera to show the height.)

After moving the camera, select [Push/Pull] in the toolbar.

The icon shape is changed to . Move the mouse cursor on the figure and click.

Move the mouse cursor up or down to transform the figure in the vertical direction.

Here, the height of the figure is raised. Move the mouse cursor upward. Enter "5000.0" in the right box of the status bar at the bottom of the screen. The figure is transformed to have 5m height.
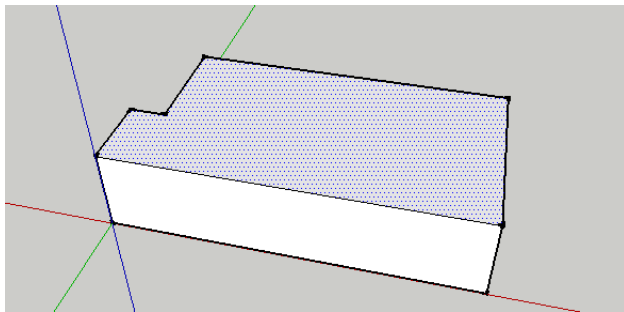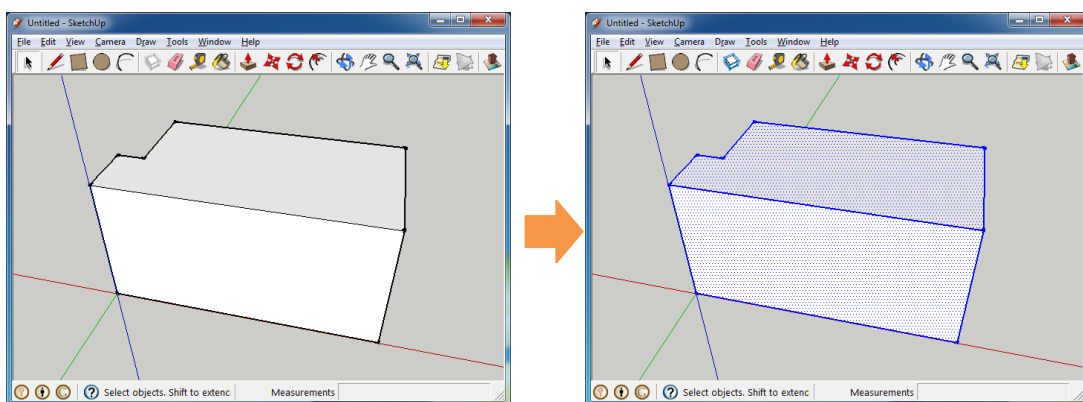

(Move the mouse cursor upward.)

(Enter "5000.0" from the keyboard and press [Enter])

A simple 3D model is drawn.

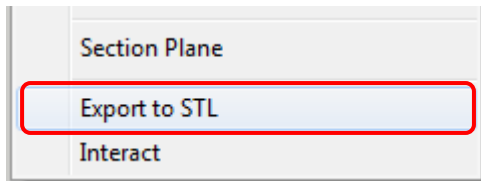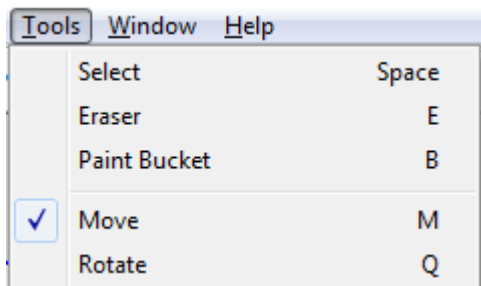## Output the factory 3D model as an STL file

Output the generated factory 3D model as an STL file to use the model in *HelioBase®*.

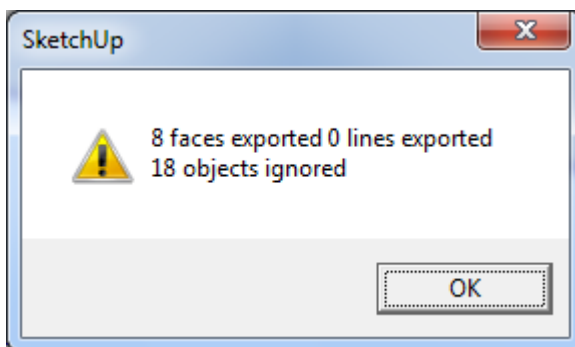Select the whole figure using the [Select] command.

(Enclosing the whole figure selects the figure.)

In the menu, select [Tool] – [Export to STL].

The [Stl file location] dialog appears. Specify the location (folder) to save the file, enter the file name (with ".stl" file extension) and save the file.

When the file is saved correctly, the following message appears.

The figure drawn is output (exported) as an STL file.

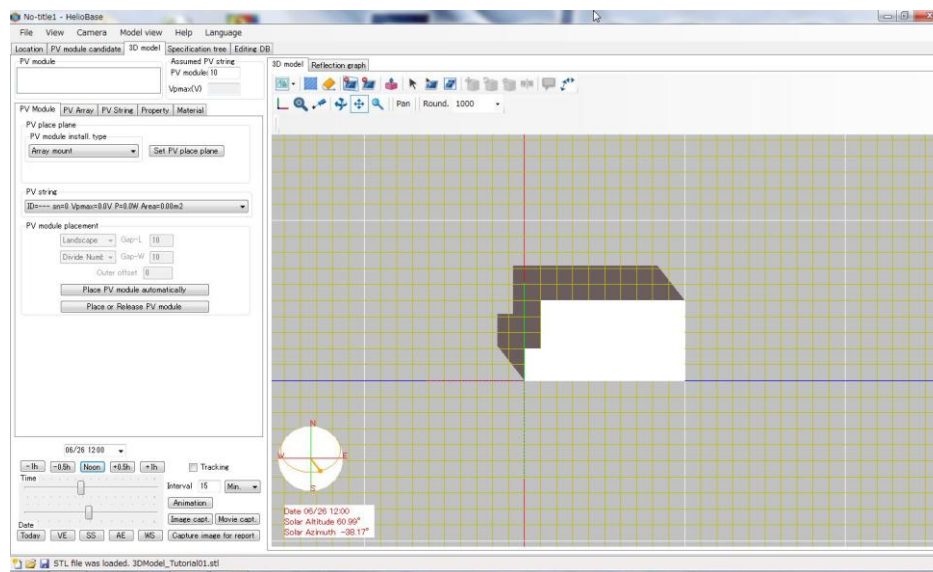# 4. Place the Generated 3D model in [3D Model] Screen in *HelioBase®*

Place the 3D model generated in the previous chapter in the [3D model] screen in *HelioBase®*.

Read the 3D model

Operation: Read the generated 3D model into *HelioBase®*.

Open the [3D model] tab in *HelioBase®*.

In the menu, select [Model View] – [Import STL File] to read the generated 3D model.

Place the 3D model

Operation: Rotate, move the 3D model and place it in a location.
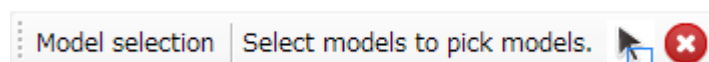
Select the 3D model

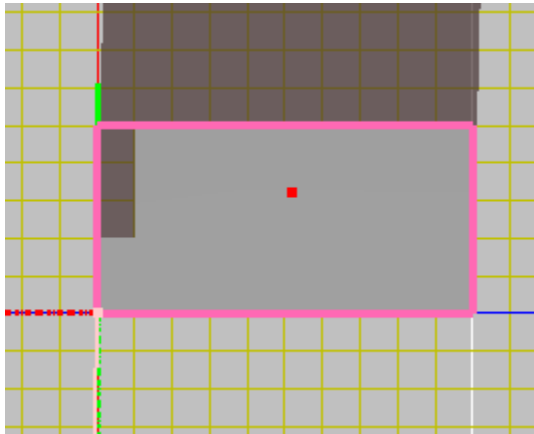Select the 3D model read into the center of the screen.

Click the [Select Object/Model] icon in the toolbar.

The mode is changed to [Mode selection]. Move the mouse cursor to a location in the 3D model and click.

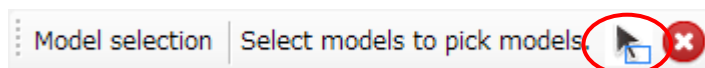The clicked 3D model is enclosed by the pink border lines as shown below.
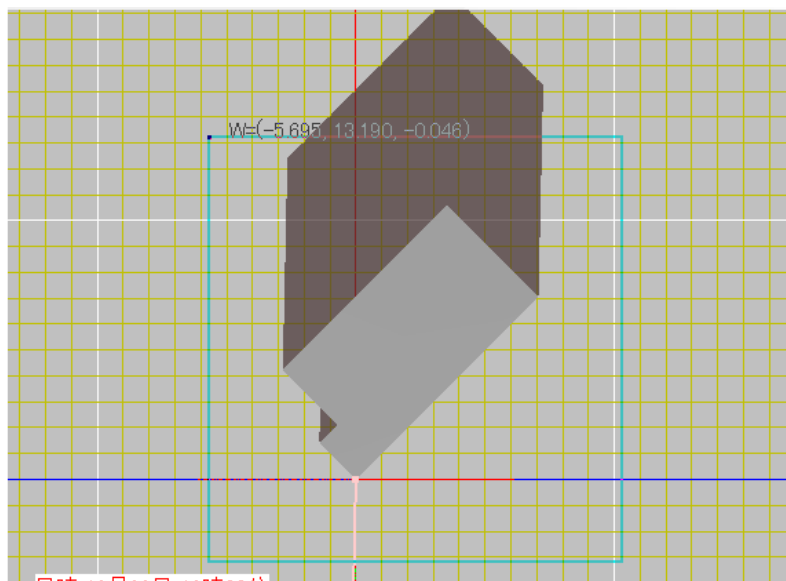

The 3D model is selected.

◇NOTE◇

Version 2.0.1.0 or later allows specifying an area and selecting a 3D model in the area.

The following icon is added in the toolbar in the [Model selection] mode. Click the icon.

The mode is changed to [Select models to pick models]. Drag the mouse on the displayed 3D model.

While the mouse is being dragged, a rectangle that encloses the current dragged positions appears. After the drag. the object in the dragged area is selected.
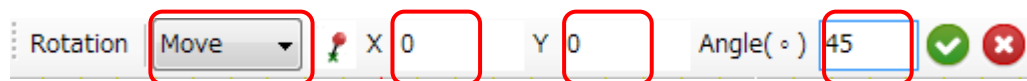
Rotate the 3D model

Rotate the selected 3D model

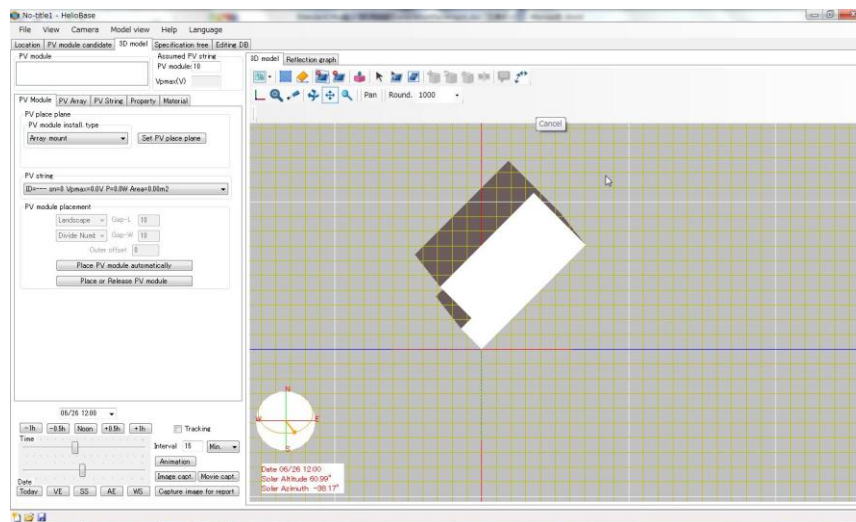Click the [Selected Object/Rotate] icon in the toolbar icon.

The mode is changed to the [Selected Object/Rotate] mode. Enter the coordinates of the center of rotation in the [X] and [Y] boxes and the angle of rotation in the [Angle] box. (Here, enter "0" both in [X] and [Y] because the model is rotated around the origin. Enter "45" in [Angle].) Click [OK] .
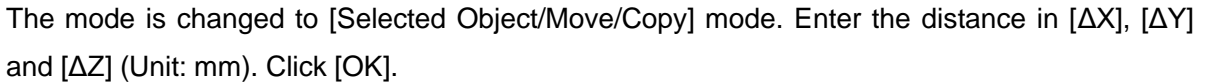

Click [cancel] to finish rotate mode.

The following shows the model after being rotated.

Move the 3D model

Move the 3D model to the upper right.

Select the 3D model as in the previous section.

Click the [Selected Object/Move/Copy (Relative)] icon.

The mode is changed to [Selected Object/Move/Copy] mode. Enter the distance in [ΔX], [ΔY] and [ΔZ] (Unit: mm). Click [OK].

Here, enter "-10000" in [ΔX], "10000" in [ΔY] and "0" in [ΔZ] to move the model to the upper right

(northwest), and click [OK] .

Click [cancel] to finish move/copy

The following shows the mode after being moved.

◇NOTE◇

If the target is lost because, for example, an object is moved outside the screen, press [F8] (keyboard) to initialize the camera. All objects placed are displayed.

Copy the 3D model

Operation: Copy the 3D model placed in the [3D model] screen.
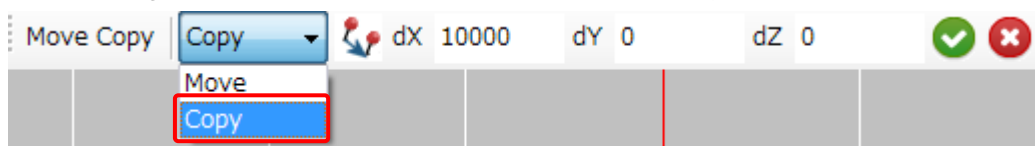
Select the 3D model using the [Select Object/Model] command.

Copy the selected 3D model using the [Selected Object/Move (Copy)] command.
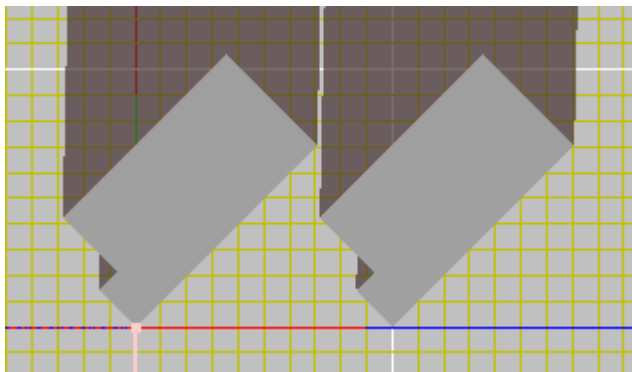

Here, change the list box (left side of the toolbar) to [Copy] from [Move].

Click [OK] .   The copied 3D model is moved to the destination as shown below.
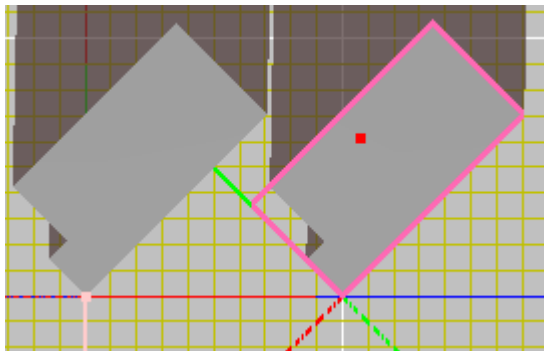
Click [cancel] to finish move/copy mode.

Delete the 3D model

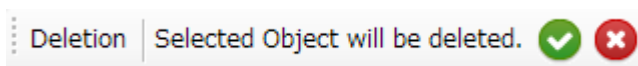Operation: Delete the unwanted 3D model placed in the [3D model] screen.

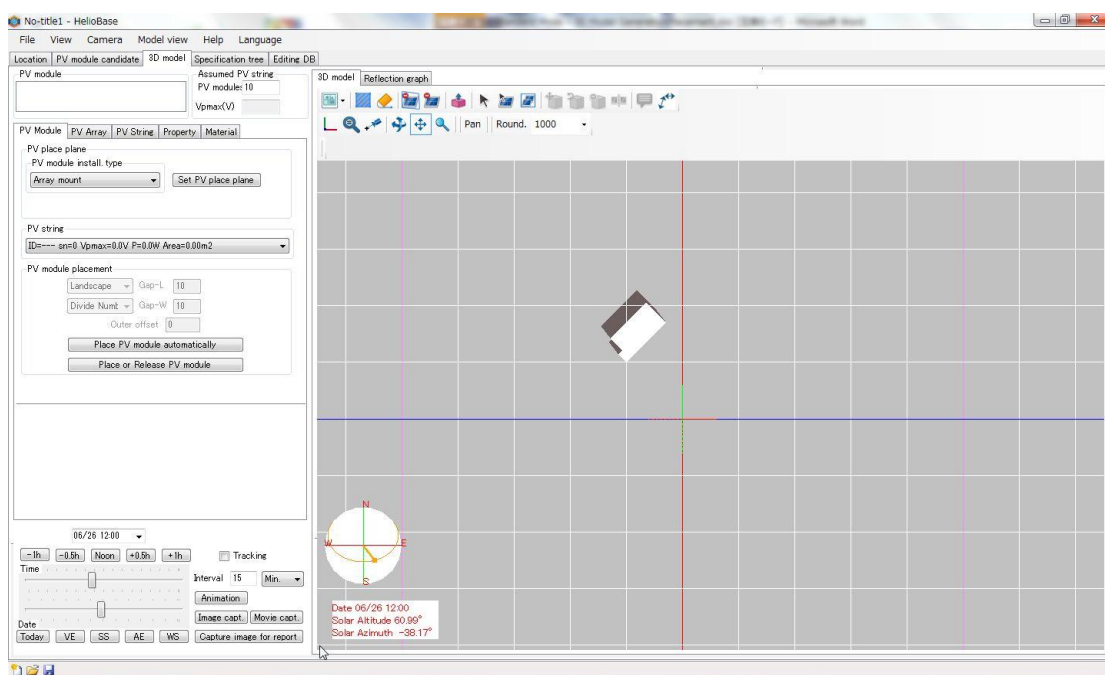Select the 3D model (copied in the previous section) using the [Select Object/Model] command.

Select the [Selected Object/Delete] command.

The toolbar shows a message to delete the object. Click [OK] .


The selected 3D mode is deleted.

5. Adjust the Position of the PV Array Placed in the [3D Model] Screen

Operation: Move/delete the PV array placed in the [3D model] screen.

Move the model according to "3DModel_Tutorial-02.pvx" (appendix).

Place the PV array on the 3D model generated in Chapter 3.

First, from the menu, select [File] – [Open] to import "3DModel_Tutorial-02.pvx". The [3D model] tab opens.
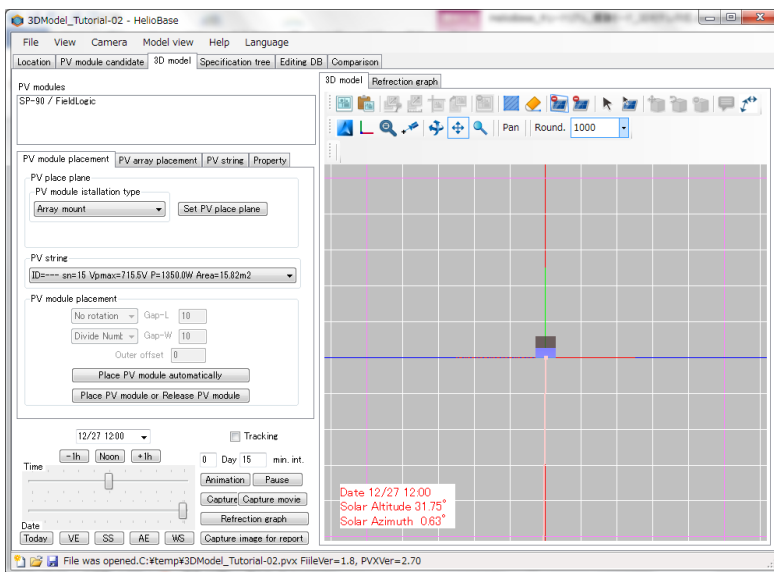
(After the file is imported, the [3D model] tab is opened.)

Select the PV array

In the previous chapter, the 3D model is selected using the [Select Object/Model] command. Use [Select Object/PV Array] to select the PV array.
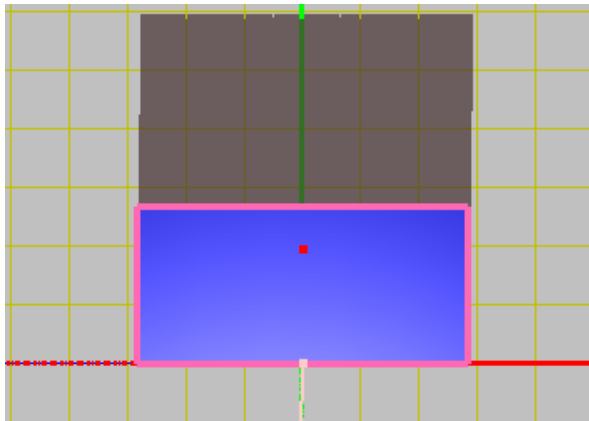
◇NOTE◇

The PV array model consists of multiple [PV module] models and a placement frame model (a set of PV modules and a frame). As a result, if a model is selected by the [Select Object/Model] command, only some of the models are selected. Using the [Select Object/PV Array] command allows selection of all models that configure the PV array.

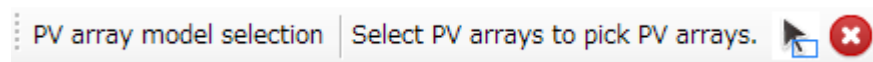Click [Select Object/PV Array] in the toolbar icon.

Clicking the PV array encloses the PV array with pink border, and the PV array is selected.
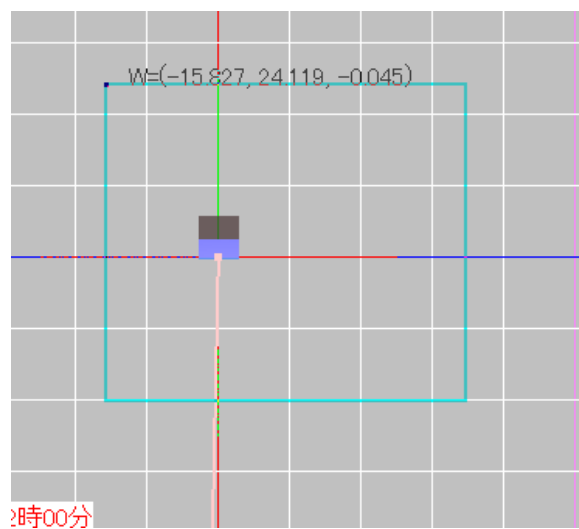

◇NOTE◇

It is possible to select one or more PV modules by range selection.

To use the range selection, click the icon shown below.

The mode is changed to [PV array model selection]. Drag the mouse on the 3D model displayed. While the mouse is being dragged, a rectangle that encloses the current dragged positions appears.

After the drag. the PV array in the dragged area is selected.

Move the PV array in the vertical direction for the 3D model height
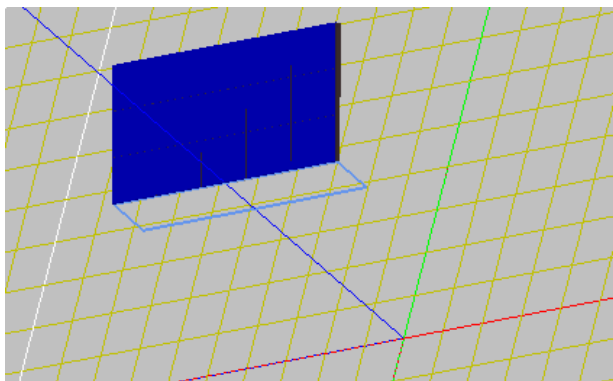
Click [Selected Object/Move/Copy (Relative)] in the toolbar.

Enter "0" in [ΓΔX] and [ΔY]. Enter "5000" (model height) in [ΔZ].

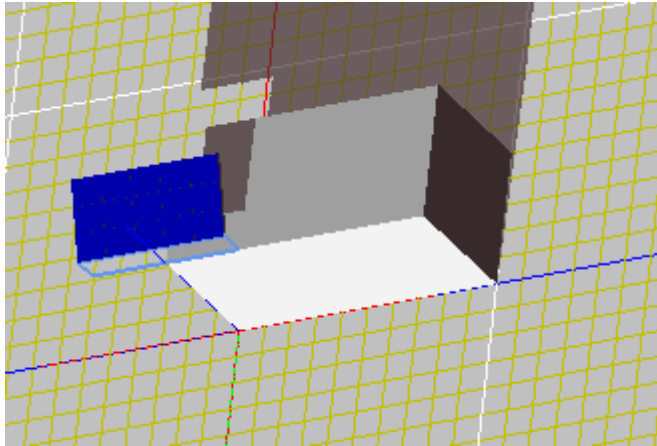Click [OK] . The PV array moves in the vertical direction.

(3D display after the move)

Import the 3D model

As described in Chapter 4, import the 3D model.

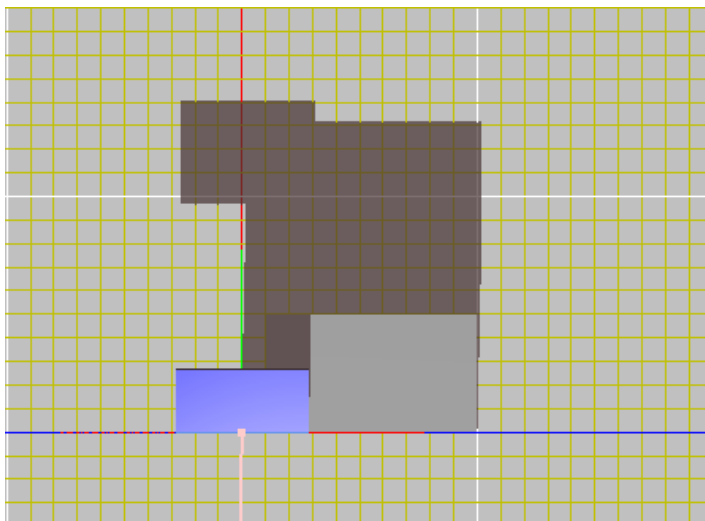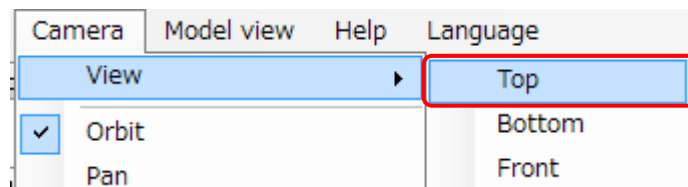The PV array sits on the 3D model as shown below.

Fine-adjust the PV array position

Currently, the PV array protrudes from the rooftop of the 3D model. Fine-adjust the PV array position so that the PV array is placed in the center of the rooftop.
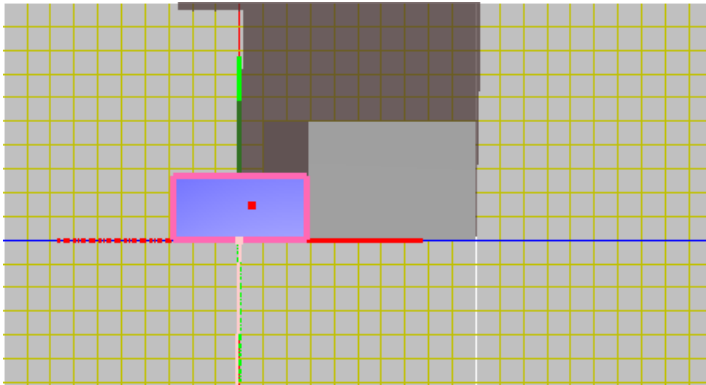
Change the camera view for easier fine-adjustment.

In the menu, select [Camera] – [View] – [Top] to move the camera position to the zenith.
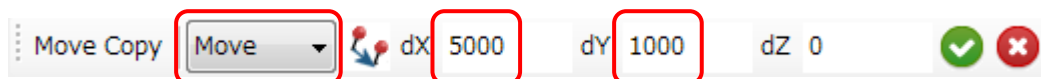

(Display after changing the camera position)

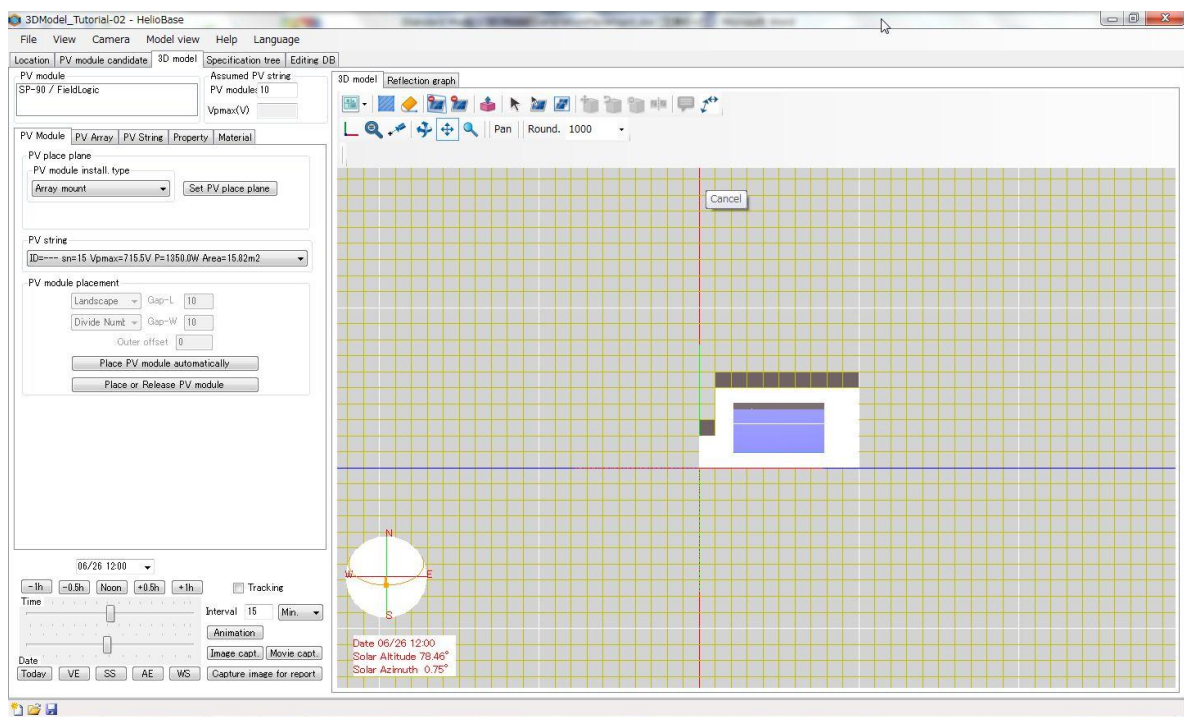Next, select the PV array using the [Select Object/PV array] command.

By counting the lines in the grid in the 3D drawing, measure the distance to move the PV array.

(In the above drawing, 5 lines (X-direction) = 5 m and 1 one (Y-direction) = 1m.)

Move the PV array using the [Selected Object/Move/Copy (Relative)] command.

The following shows the screen after moving the PV array.

The PV array position is fine-adjusted.