

## **WEEK-7**

**Q1:**

**PROVIDE A SUMMARY OF THE MAIN CONCEPTS THAT WENT THROUGH ABOUT SOLAR RADIATION (FORMULAS ARE NOT NEEDED)**

**ANS: SUMMARY**

### **SOLAR RADIATIONS**

It is an energy radiated from the sun in the form of electromagnetic waves, including visible and ultraviolet light and infrared radiation. The energy that comes to the earth is modified due to the phenomenon of dispersion and absorption.

### **DISPERSION**

When the Sun's rays are not perpendicular to the surface of Earth, the energy becomes dispersed or spread out over a greater area. If the available energy reaching the atmosphere is constant and is dispersed over a greater area, the amount of energy at any given point within the area decreases, and therefore the temperature is lower. Dispersion of insolation in the atmosphere is caused by the rotation of Earth.

### **SCATTERING**

About 25% of the incoming solar radiation is scattered or diffused by the atmosphere. Scattering is a phenomenon that occurs when solar radiation passes through the air and some of the wavelengths are deflected in all directions by molecules of gases, suspended particles, and water vapor. These suspended particles then act like a prism and produce a variety of colors. Various wavelengths and particle sizes result in complex scattering effects that produce the blue sky. Scattering is also responsible for the red Sun at sunset, varying cloud colors at sunrise and sunset, and a variety of optical phenomena. Scattering always occurs in the atmosphere but does not always produce dramatic settings. Under certain radiation wavelength and particle size conditions all that can be seen are white clouds and a whitish haze. This occurs when there is a high moisture content (large particle size) in the air and is called diffuse reflection. About two thirds of the normally scattered radiation reaches earth as diffuse sky radiation. Diffuse sky radiation may account for almost 100% of the radiation received by polar stations during winter.

## **SOLAR RADIATION DENSITY**

The solar constant GSC is a flux density measuring mean solar electromagnetic radiation (solar irradiance) per unit area. The solar "constant" is not a physical constant, is an average of a varying value. Its value is  $1367 \text{ W/m}^2$ .

## **ATMOSPHERIC ABSORPTION**

The absorption of solar radiation is due to the atmospheric components, in particular ozone, water and carbon dioxide, which absorb the incident radiation in absorption bands, consequently modifying its energy spectrum. The stratospheric ozone absorbs almost all the ultraviolet component of solar radiation.

## **REFLECTION**

Reflection is the process whereby a surface turns a portion of the incident back into the medium through which the radiation came. A substance reflects some insolation. This means that the electromagnetic waves simply bounce back into space. Earth reflects an average of 36% of the insolation. The percent of reflectivity of all wavelengths on a surface is known as its albedo.

**Solar energy depends on,**

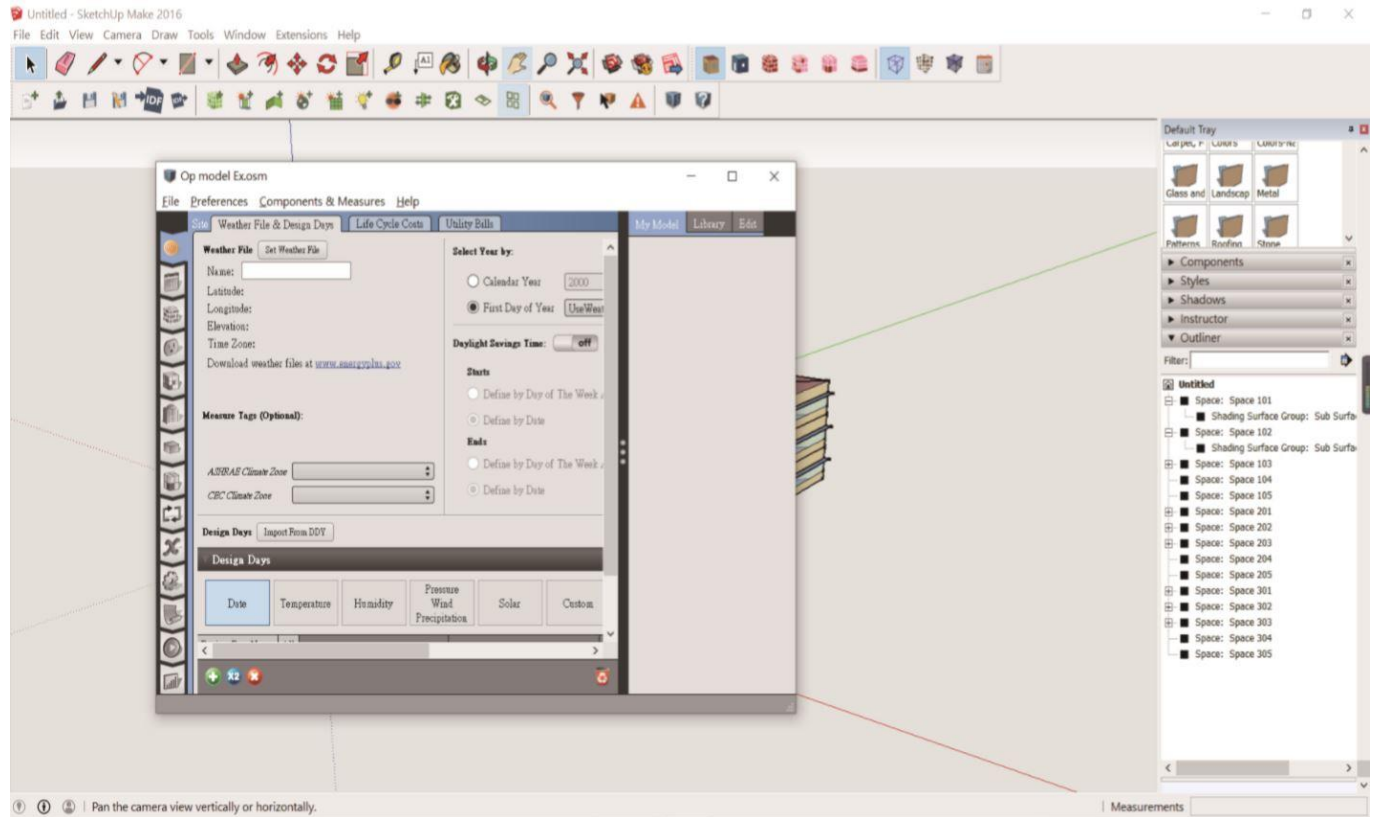
1. position of the sun
2. the weather condition
3. the site altitude over the sea level
4. length of the day

**Q2:**

**Create a pdf file with screenshots of all of the steps we went through in the second lesson on Open Studio and explain briefly the reason behind the use of each step.**

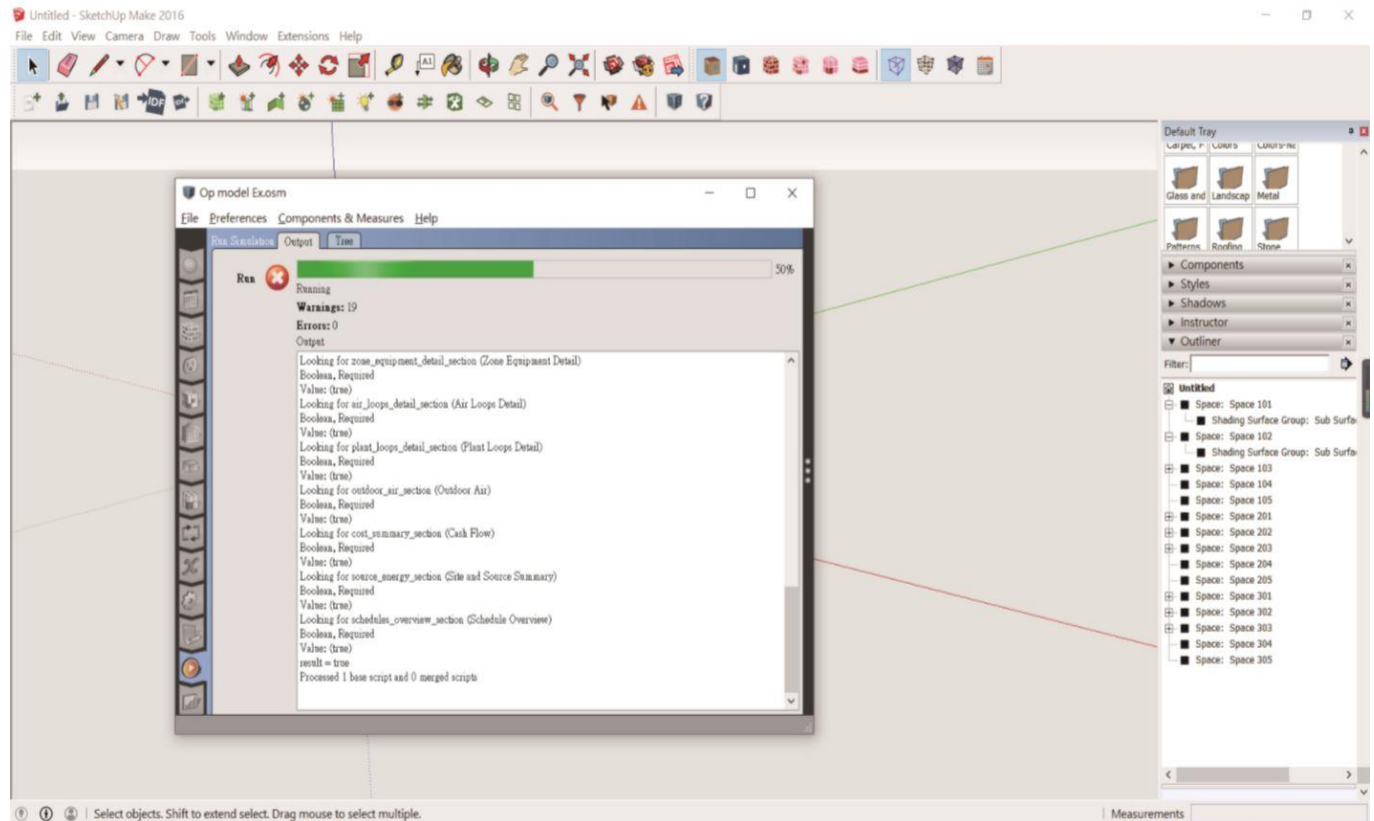
## Step-1

### Add the climate data of Piacenza to open office



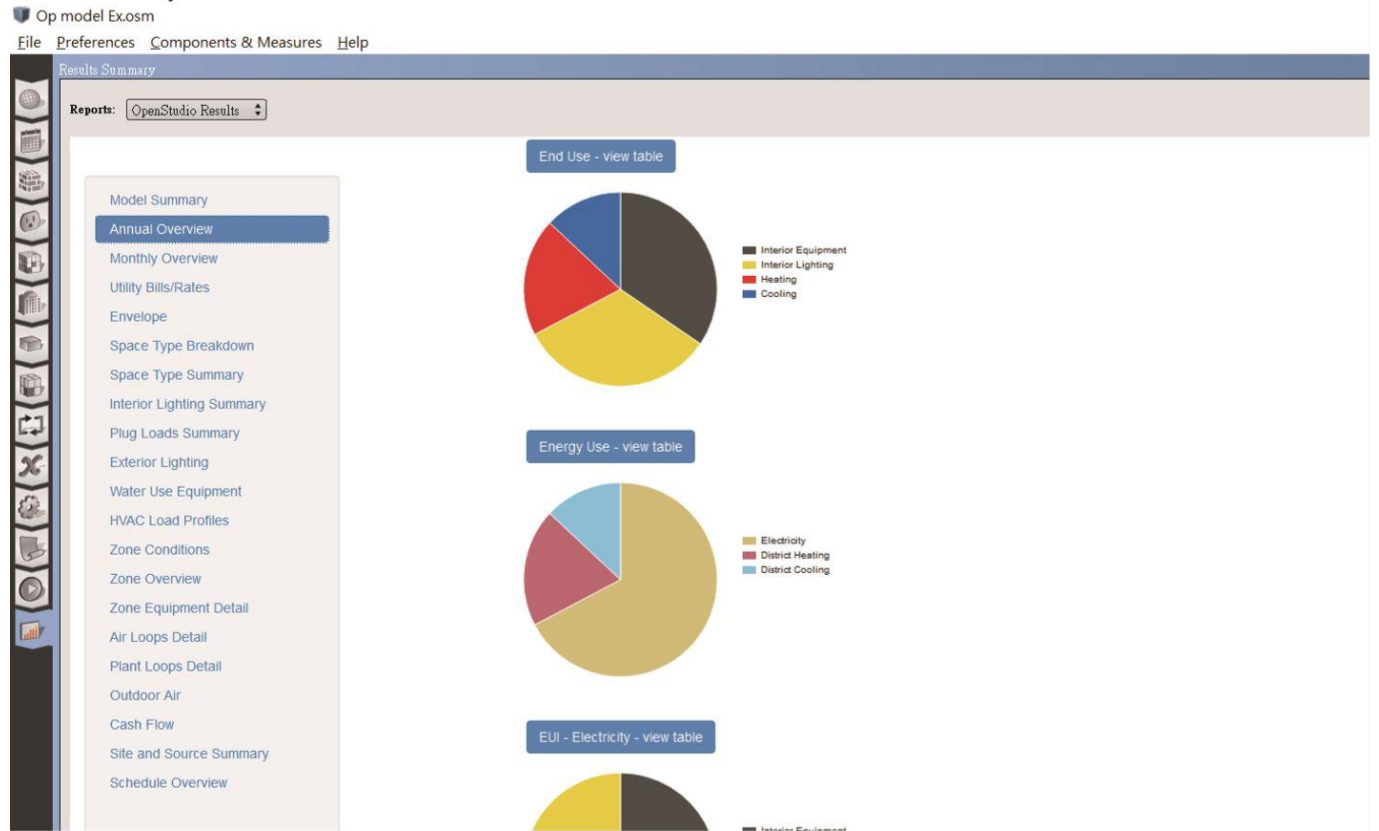
## Step-2

### Click on run to update the data uploaded to the model



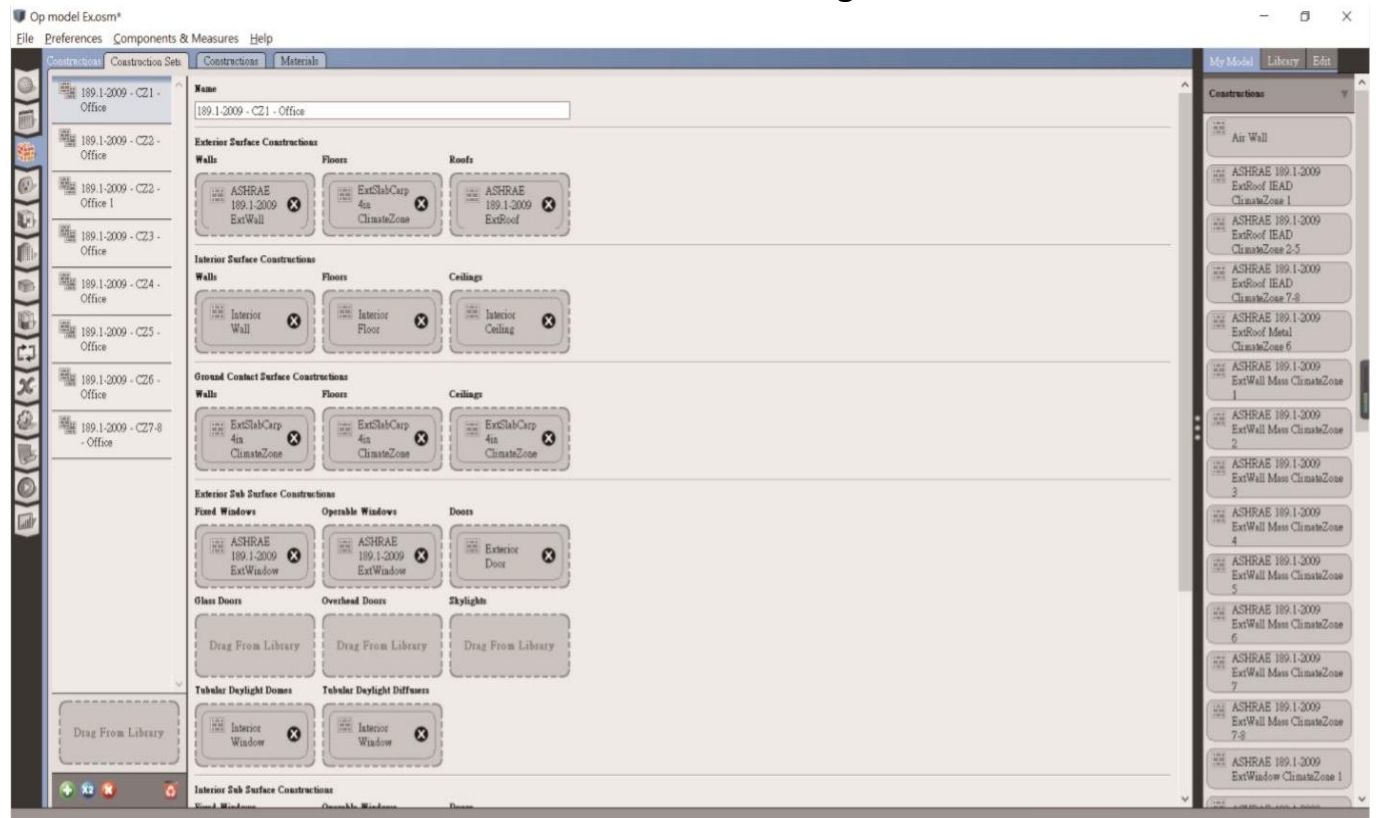
### Step-3

Click on analysis overview – find the analysis in graphical form



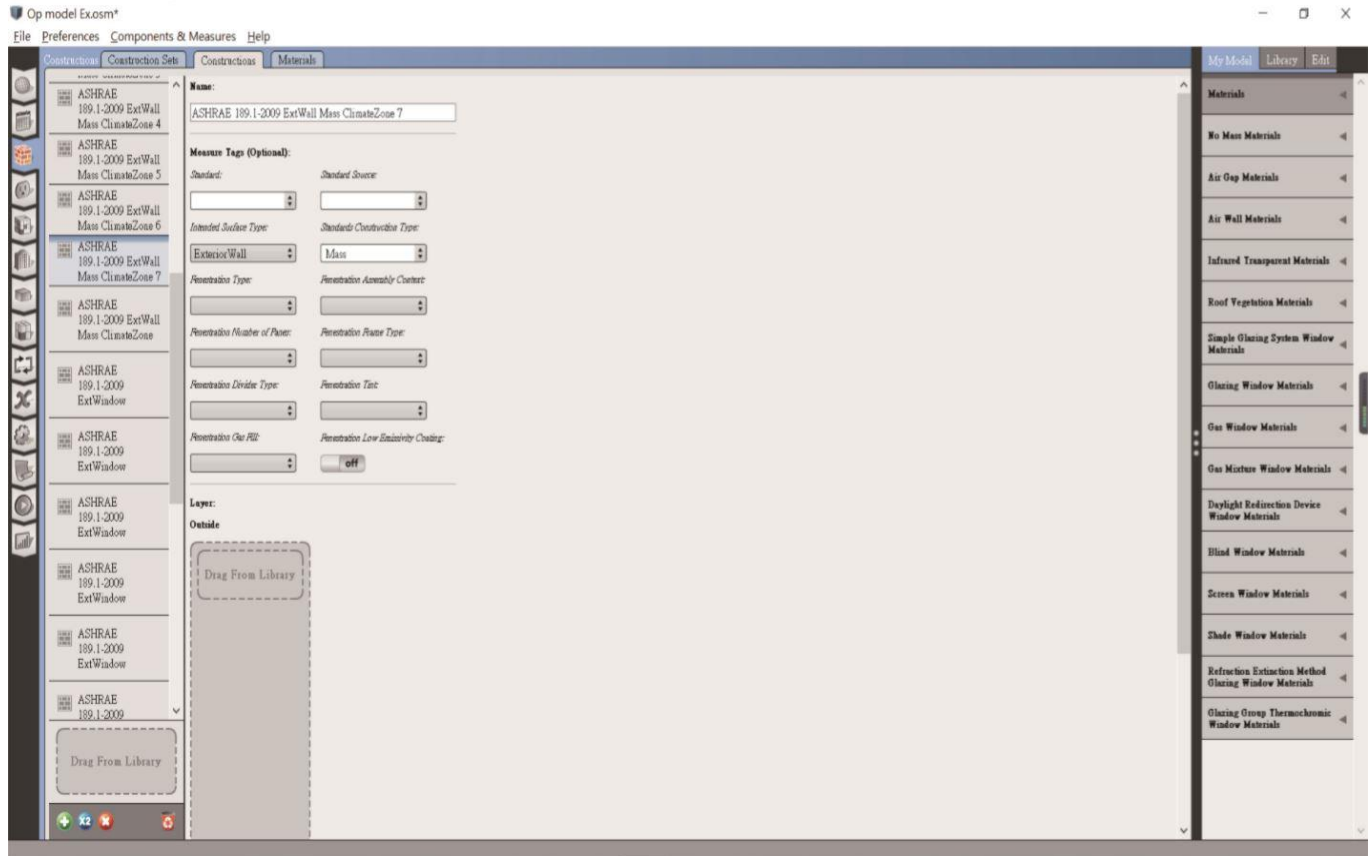
### Step-4

Go to the construction sets and customize the building and rename it



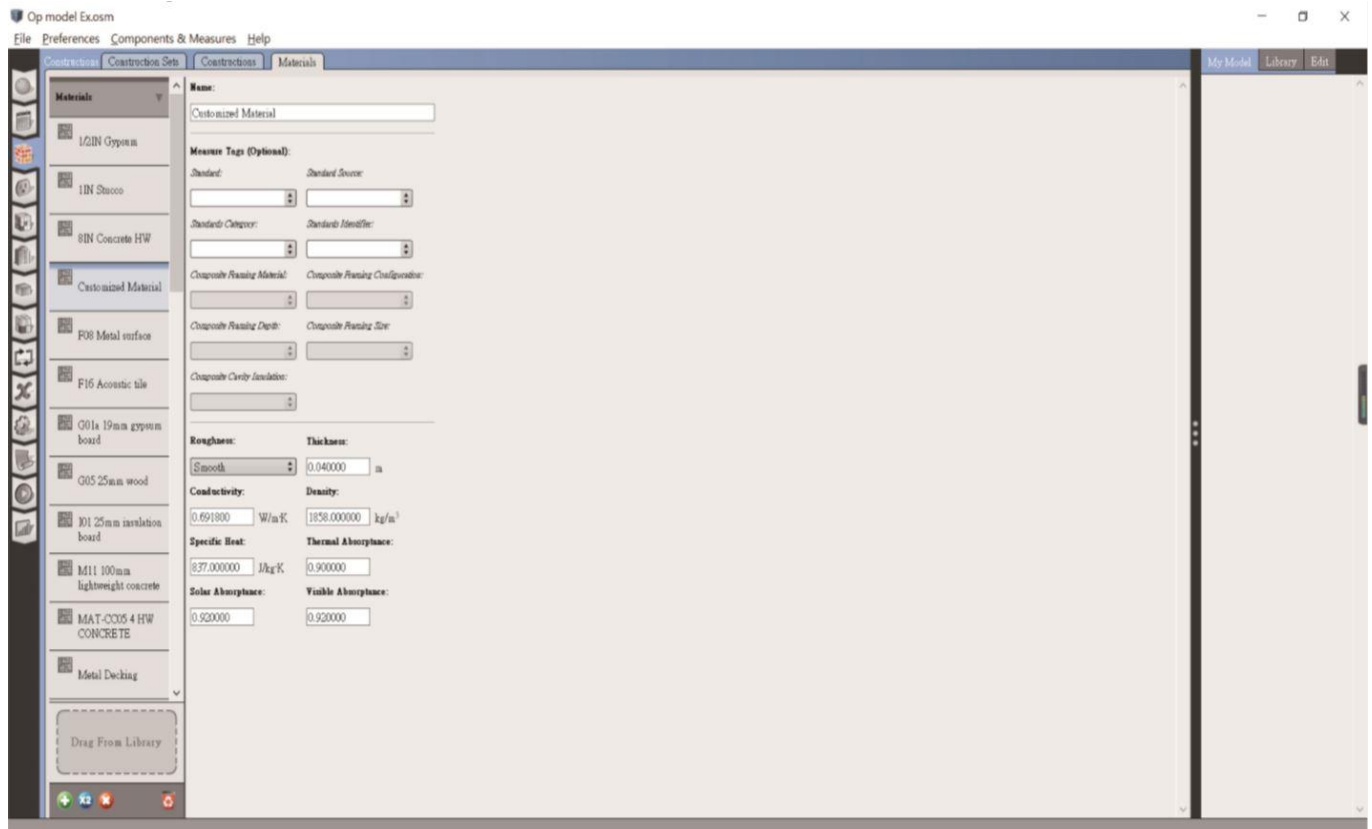
## Step-5

### Start customizing the wall package in the “construction sets” window



## Step-6

### Start adding materials to the walls



## Step-7

To change and check the characteristics of the materials we have to go to the material tab. If we want to change the properties of the existing one, or we can create a new one, by duplicating one of the existing again.

Start adding materials to the walls

