Week 7

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Solar Radiation:

- Solar radiation from the sun provides heat, light, and energy necessary for all living organisms and provides the necessary heat and light for life on Earth.
- Without solar radiation, Earth's surface would be about 32°C colder. It is electromagnetic energy. Infrared radiation supplies heat to all habitats, on land and in the water.
- Solar irradiation on a planar surface is measured by a pyranometer and is a type of actinometer and it is designed to measure the solar radiation flux density (W/m^2) from the hemisphere above within a wavelength range 0.3 μm to 3 μm.

Every location on Earth receives sunlight at least part of the year. The amount of solar radiation that reaches any one spot on the Earth's surface varies according to:

- Geographic location
- Time of day
- Season
- Local landscape
- Local weather.

- The power density of the sun out of the atmosphere of the Earth is **1367** W/m2 and **1000** W/m2 on the Earth's surface.
- The radiation that crosses the atmosphere could be either dispersed or absorbed.
- The solar radiation that reaches the Earth's surface without being diffused is called direct beam solar radiation.

Scattering:

The process of scattering occurs when small particles and gas molecules diffuse part of the incoming solar radiation in random directions without any alteration to the wavelength of the electromagnetic energy. Scattering does, however, reduce the amount of incoming radiation reaching the Earth's surface.

Absorption:

Is the process by which radiant energy is transferred to matter. If the matter is a gas, radiation can affect it in a number of ways. The ways it can absorb energy depends on the size and complexity of the gas molecule.

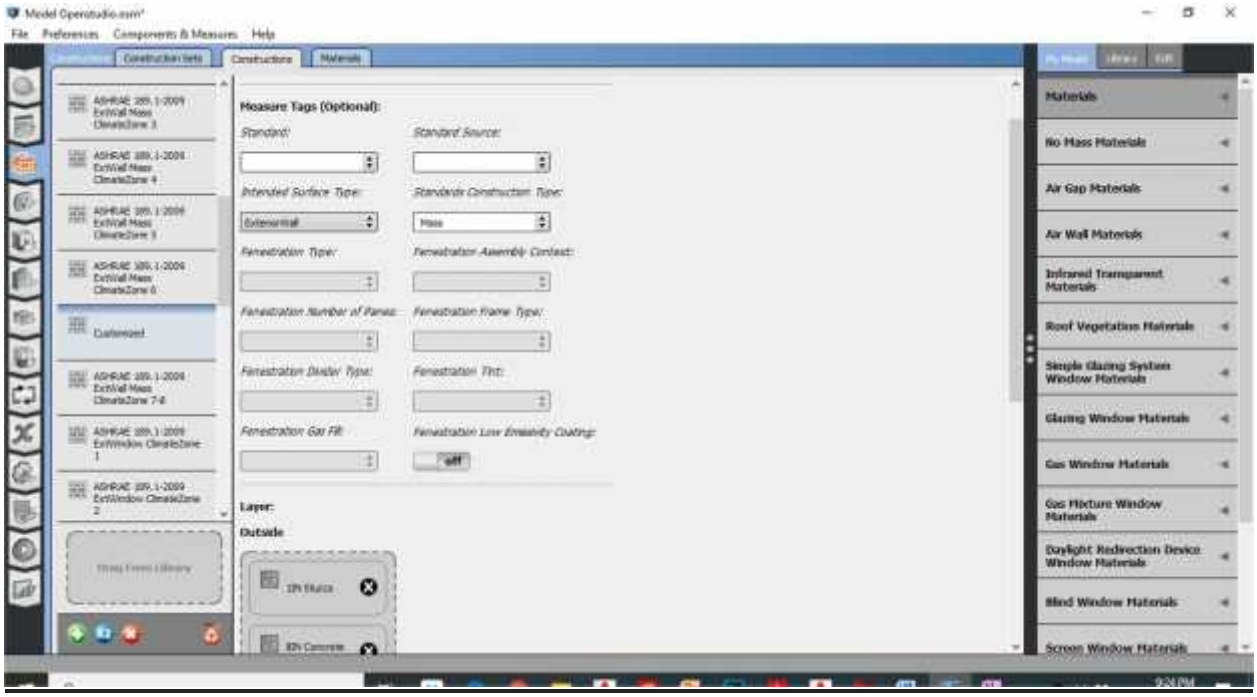
The gas molecule can be rotated and a variety of vibratory modes can be excited depending on the nature of the molecule. If the energy is strong enough the molecule can be broken apart.

Each mode of energy absorption occurs at a specific narrow band of the solar spectrum. Gases, therefore, are not like black bodies that absorb equally and completely at all wavelengths. Rather, they absorb only at specific, often narrow ranges of wavelengths.

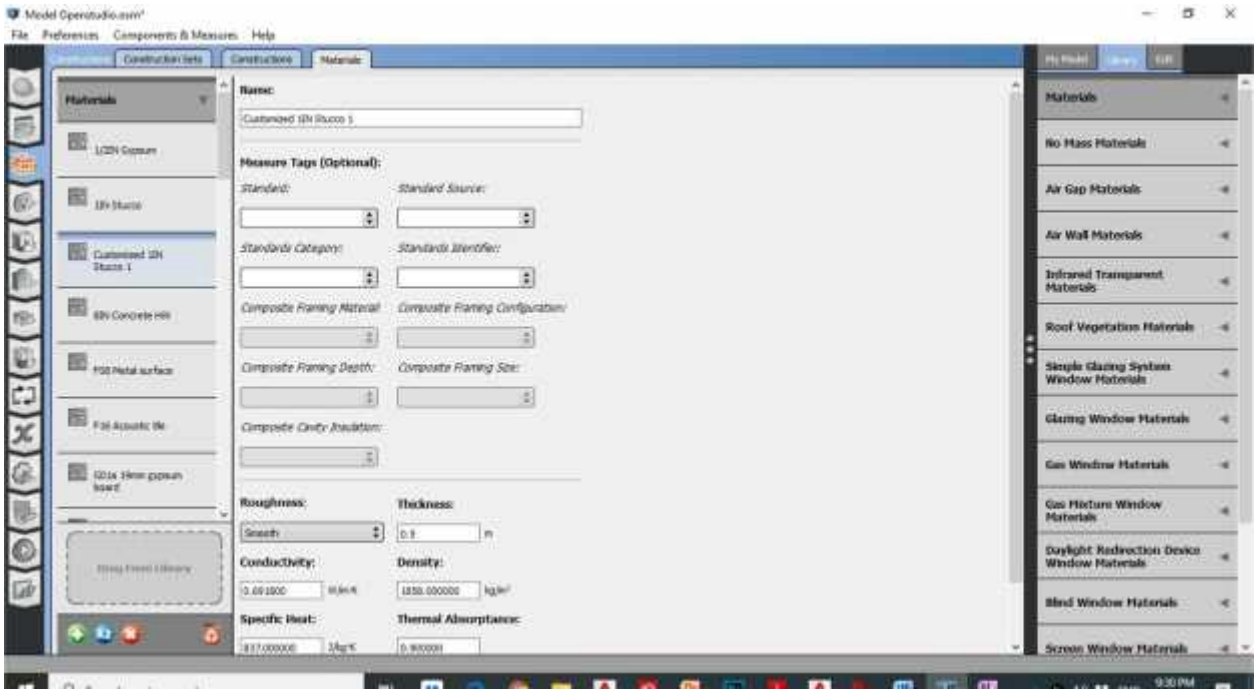
- The smaller molecules of oxygen and nitrogen absorb very short wavelengths of solar radiation while the larger molecules of water vapor and carbon dioxide absorb primarily longer infrared radiant energy.

Task 2: Openstudio:

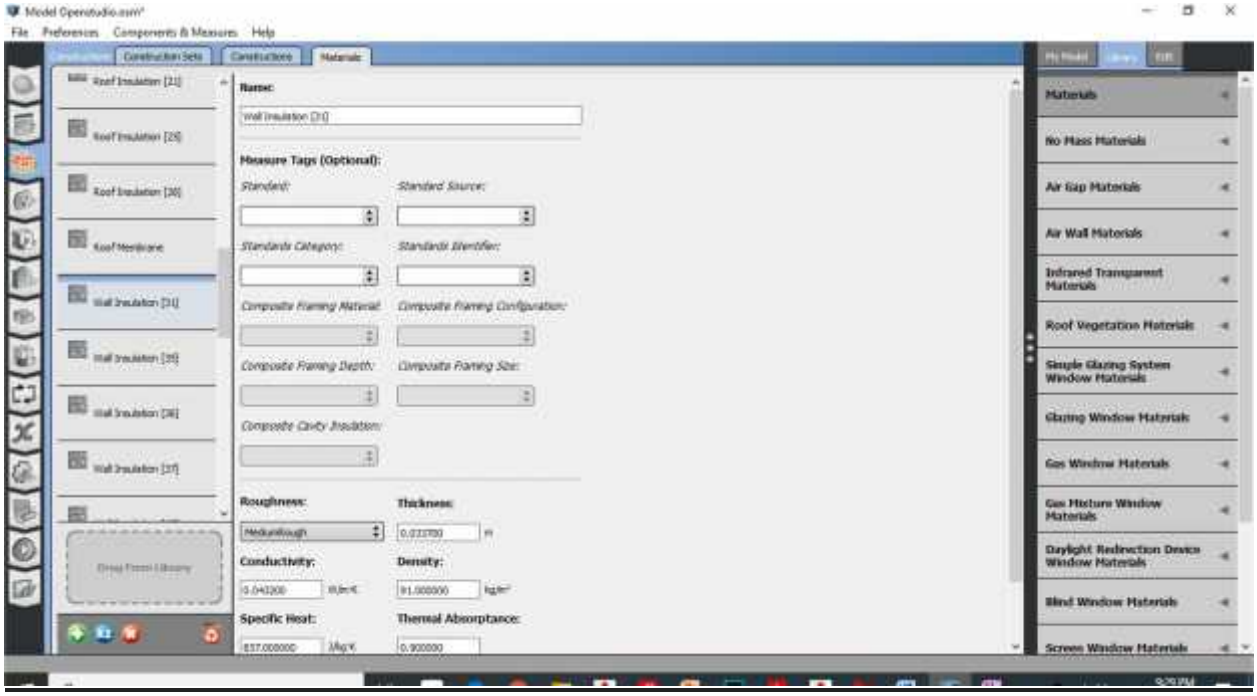
Open openstudio file and go to construction, copy the wall by X2 and rename it.



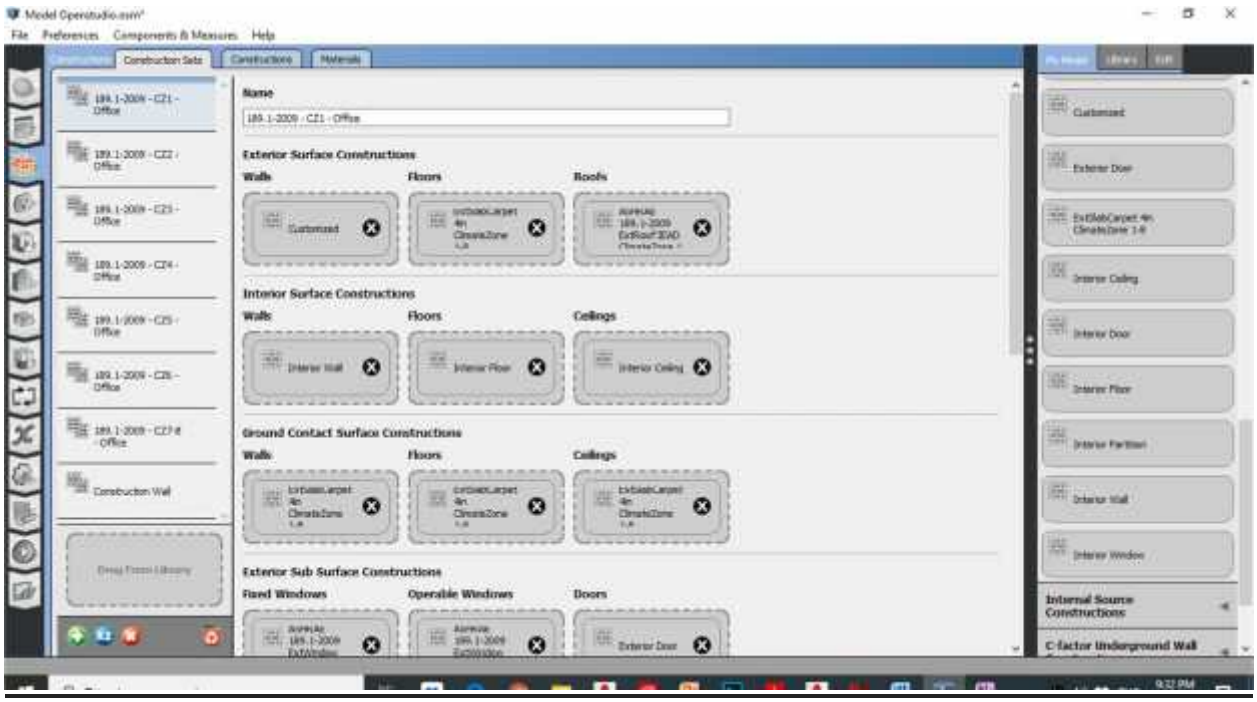
On the construction tab change the layers of the wall according to your design by removing the old layers and dragging new ones from the Library materials.



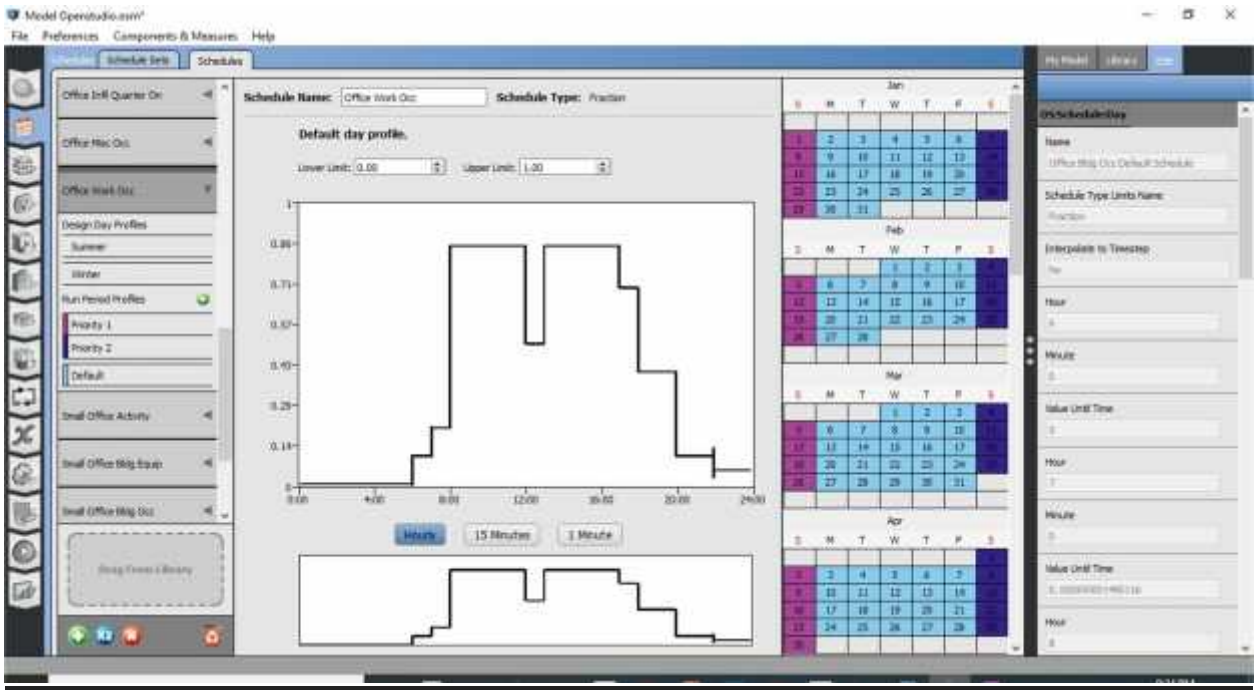
In the materials tab, you can see the characteristics of the materials you have chosen for the wall, and can also edit and change them according to the thickness or properties of them.



Also choose the type of insulation you want to choose for your wall.



Go back to construction set and add the new construction wall by dragging it and putting it under the exterior walls category.



You can check the diagrams and graphs from Schedules tab.