
PIER LRP Project 6.2 SPOT Software

Under the PIER LRP Project 6.2, Architectural Energy Corporation is creating a software package, *SPOT—Sensor Placement Orientation Tool*. The tool is intended to assist a designer in establishing the correct photosensor placement relative to the daylighting and electric lighting design of a given classroom, using an Excel interface to interact with the Radiance engine. To the majority of users, the Radiance engine will remain largely invisible, operating behind the scenes, calculating and analyzing the input and output data the user views through Excel. For the more sophisticated user, it will be possible to control and program the Radiance engine directly for more complicated or custom applications.

The Radiance engine, as managed by Excel, performs 3 main functions: a design tool, a photosensor analyzer, and an analysis tool. The design tool provides the preliminary portion of the program that takes the architectural and lighting inputs and provides initial feedback on nighttime illumination levels and the range of extreme daylight contribution (maximum and minimum) throughout the year. The photosensor analyzer allows the user to test the performance of various photosensor placements and luminaires zone combinations each as defined by the user. It provides feedback on how well correlated the photosensor signal is to the associated luminaire zone and the workplane illuminance levels that result throughout the year. The analysis tool takes the user selected photosensor placement and luminaire zoning combination and provides annual illuminance averages and energy performance data to allow the user to evaluate their design.

The SPOT tool is being created to analyze the photosensor selection and placement in classroom applications to maximize user comfort and daylight harvesting. Classroom designs differ and associated daylight factors are determined by geometry, solar orientation, electric lighting layout, surface reflectance's and window design, to name a few. For more information about this new software tool, visit www.archenergy.com/lrp.

Screen Shots

The design tool provides photosensor location recommendations and allows the user to define their own photosensor scenarios. Multiple photosensor scenarios can be defined and get listed in a table and shown graphically on a 3d isometric of the space, as illustrated in Figure 1.

Figure 2 presents a screen shot of the photosensor analyzer page. A table is located in the upper left corner with a row for each luminaire zone defined. The user can then define which photosensor, chosen from a pulldown menu of previously defined photosensor scenarios, to assign to each luminaire zone. The user specifies the control type to use for the photosensor system from a pulldown menu at the top of the page. Depending on the control type the columns in the table will change, adding high and low setpoints, bandwidth settings, or others as needed. The user then specifies the appropriate signal setpoint(s) or assigns the Luminaire as "on" for each Luminaire zone. Recommended starting setpoints are provided for reference. Upon assigning each luminaire zone a photosensor scenario, the graph and the last couple of columns of the table are updated to reflect the current settings. The graph shows the resulting workplane illuminances for each day that has been calculated.

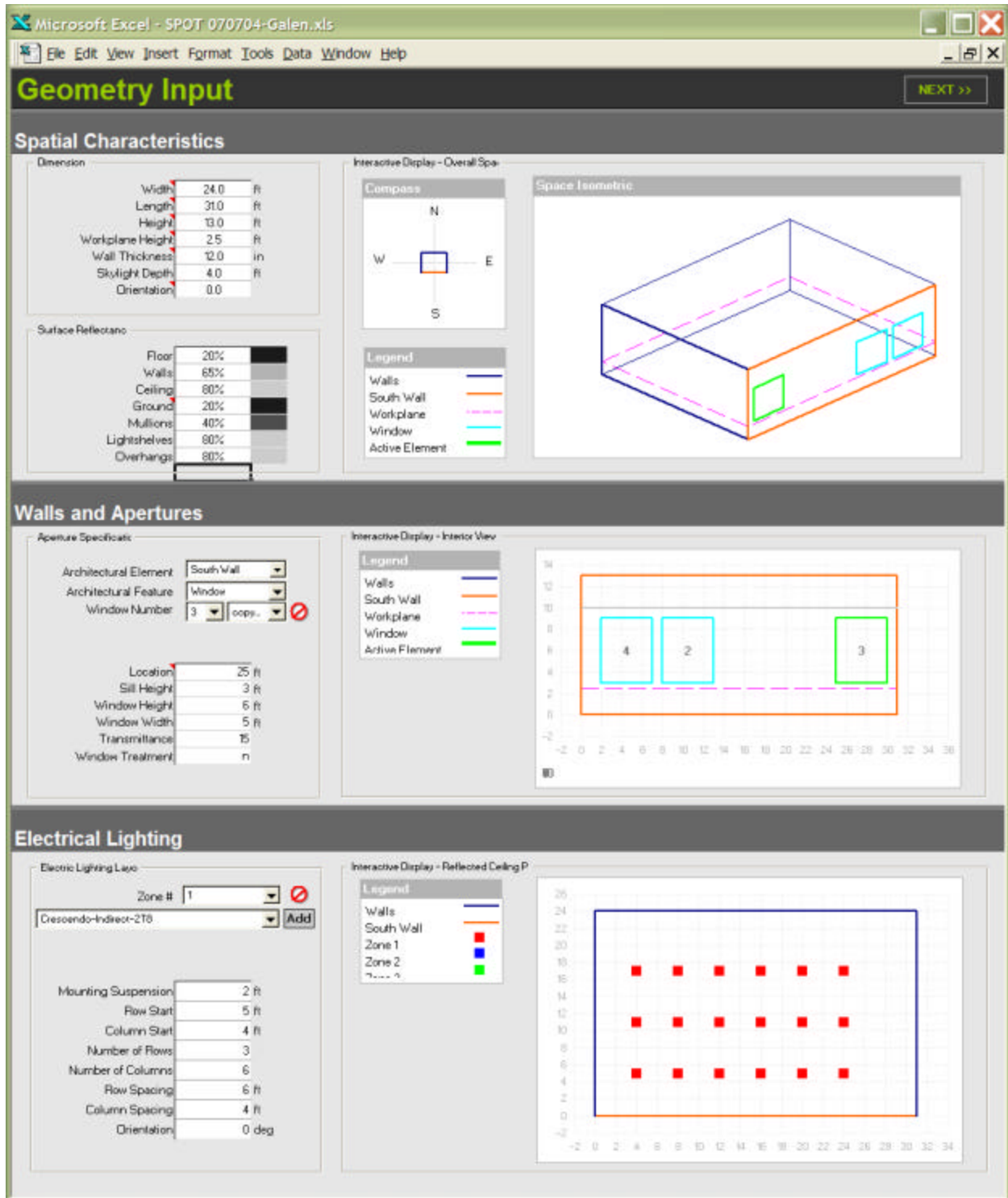


Figure 1: Photosensor Generator Screen Shot



Figure 2: Photosensor Analyzer Screen Shot