

## **Lighting Setup:** **Normal Illumination**

### **Need:**

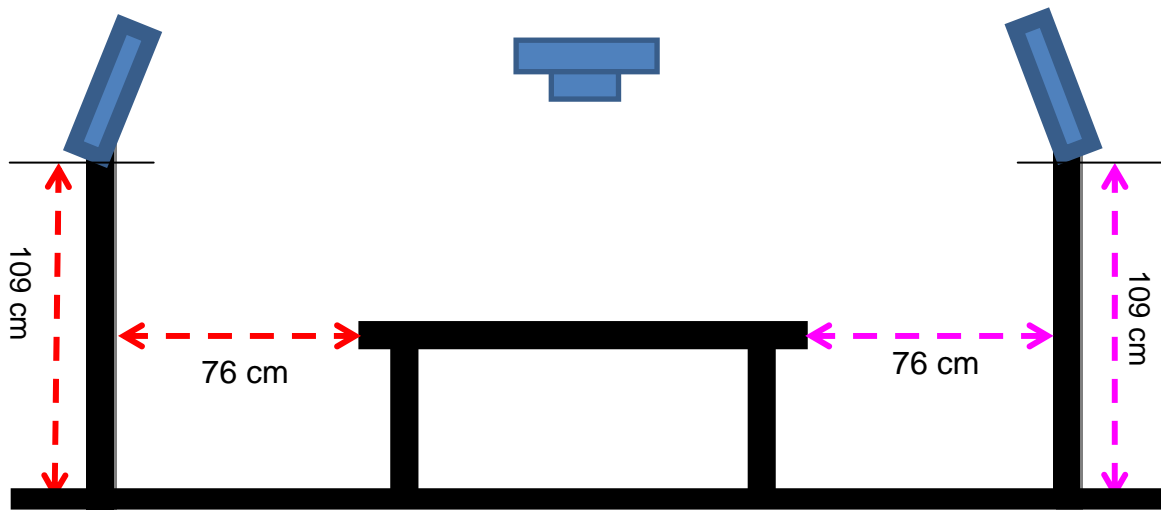
1. SpectraShop 4 software
2. X-Rite i1 Pro with connecting cable and ambient light filter and black cap (for CRI measurement)
3. Elsec light meter Angle finder
4. Measuring tape
5. A piece of white paper (preferably the size of the biggest object for this exhibition), center cut out
6. Masking tape for marking
7. Black paper (to cover the reflection from the column and the person handling the object)

### **Steps:**

1. **Make sure the camera is mounted at the center of the Keiser table and leveled.**

2. **Setup lights**

- 1) Set both lights to an appropriate angle using angle finder. The lighting angles from 25 to 45 degree are good for normal illumination. One can do some test shots to see which angle illuminates the condition better. In this project, we decide to use 25 degree angle. Keep this angle consistent throughout the entire project.
- 2) Set the distance of the lights and the height of the lights so the lighting path is to the center of the Keiser table (see the arrows in the following picture)
- 3) Record the distance of the lights. See illustration below.



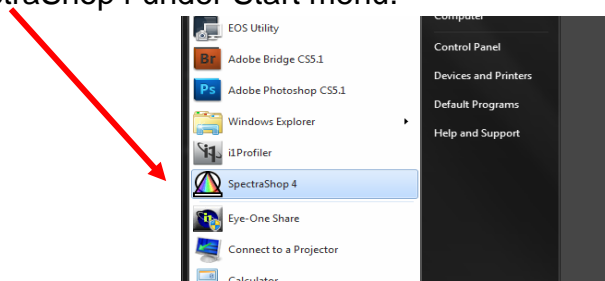
- 4) Place the white paper (with a hole in the center) in the center of the Keiser table by looking through the camera view finder.
- 5) Turn on only one light. Move the barn doors to focus the light toward the Keiser table without casting shadow on the white paper. Turn off this light and turn on the other light. Repeat the same step to check the barn door position.

### 3. Have both lights on for at least 10 minutes to stabilize.

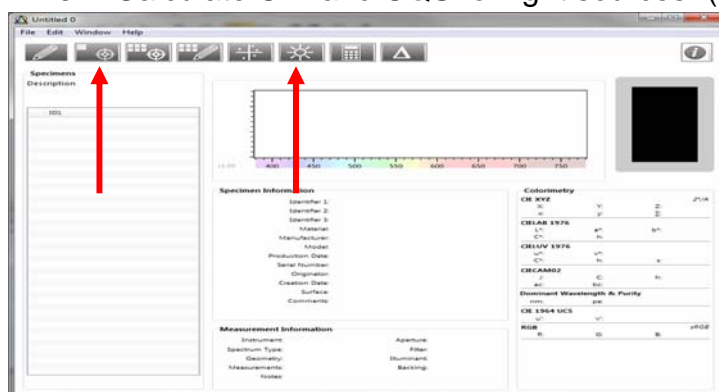
*TIP: One can set up the camera and computer while the lights are stabilizing. See handout "Setup Computer and Camera". Or calibrate the monitor.*

### 4. Measure the CRI of the lights.

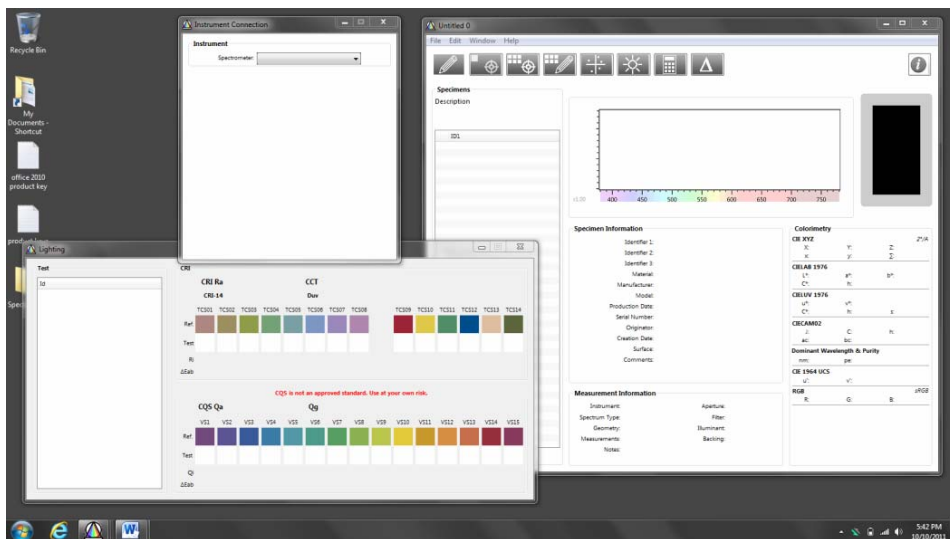
- 1) Connect i1 to computer (use USB cable + USB extension cable if computer is too far away)
- 2) Open SpectraShop 4 under Start menu.



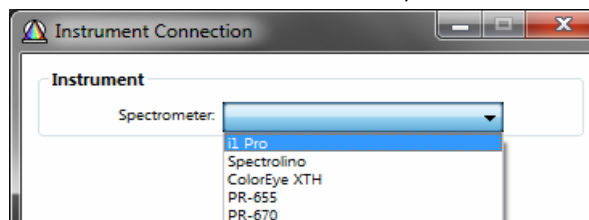
- 3) In the main window "Untitled 0", open two functions:
  - "Measure specimens" (second icon from the left)
  - "Calculate CRI and CQS for light sources" (third icon from the right)



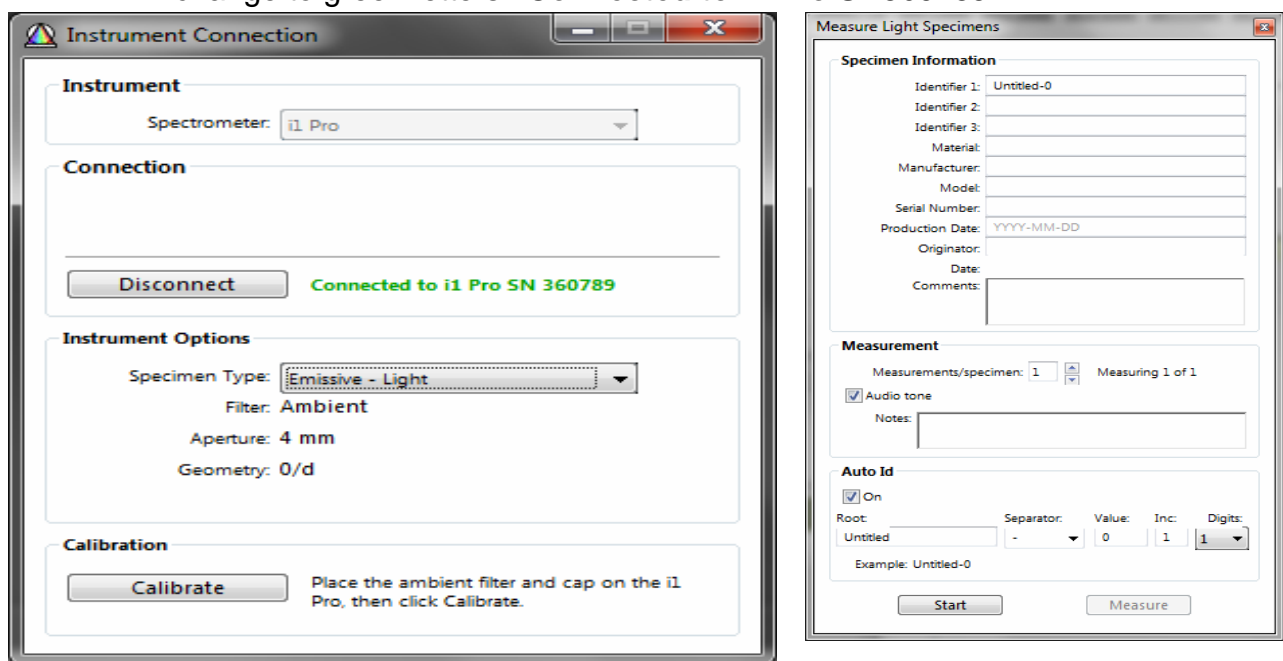
- 4) Arrange the three windows so all the data can be seen easily at the same time. See the illustration on the next page.



5) Under “Instrument connection” window, select **i1 Pro**.



6) Then click “Connect”. The red letters “No instrument connected” will change to green letters “Connected to i1 Pro SN360789”.



7) Select “Emmissive – Light” under **Specimen type**.

- 8) Put the ambient filter cap and the black cover on the i1. Click **calibrate**. “Measure Light Specimens” window will appear. See the illustration on the right of the previous page. Move this window to an appropriate place, such as the upper left corner of the screen, so it will not block the other 3 windows.
- 9) Hold the i1 to face the light.
- 10) Click **Start** and then **Measure** at the bottom of the window. See illustration on the right.
- 11) The instrument will beep after the measurement is complete. The data will show on the main window “Untitled 0”, as shown in the illustration below.

**Measure Light Specimens**

**Specimen Information**

Identifier 1: center  
 Identifier 2:  
 Identifier 3:  
 Material:  
 Manufacturer:  
 Model:  
 Serial Number:  
 Production Date: YYYY-MM-DD  
 Originator:  
 Date: 2011-10-10 17:54:43  
 Comments:

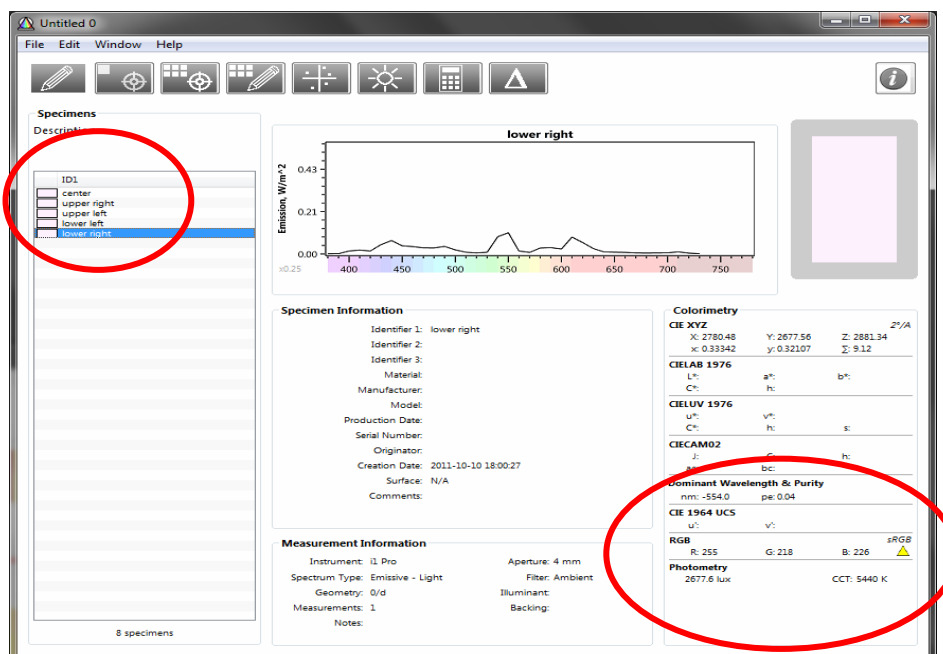
**Measurement**

Measurements/specimen: 1 Measuring 1 of 1  
☒ Audio tone  
 Notes:

**Auto Id**

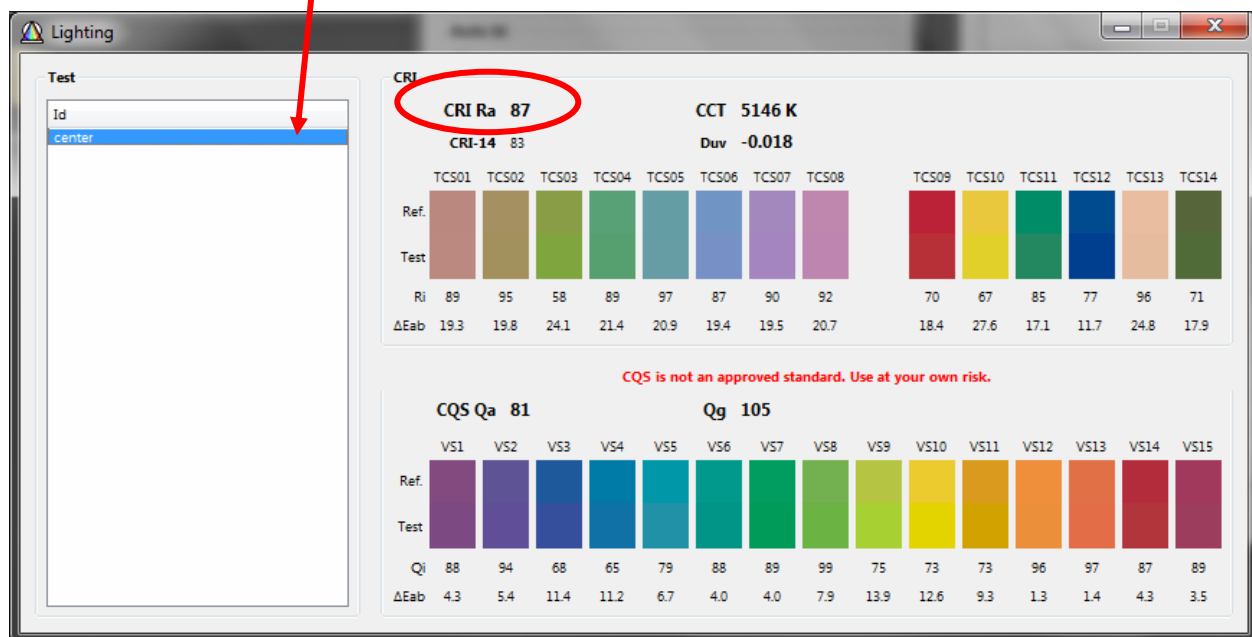
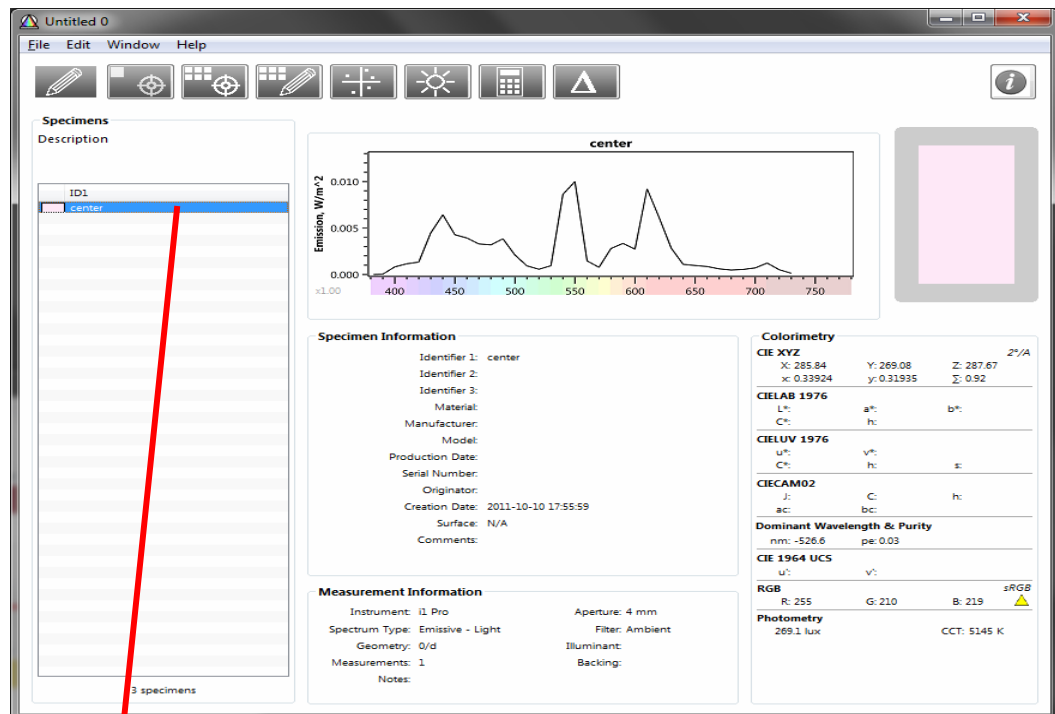
☒ On  
 Root: Untitled Separator: - Value: 2 Inc: 1 Digits: 1  
 Example: Untitled-2

Stop Measure



- 12) Highlight the measurement you just did (will be highlighted in blue). Drag it to the “Test” box under “Lighting” Window. The CRI will be automatically calculated and shown on the “Lighting” page. See illustration on the next page.

### 13) Record CRI = 91.



14) You can measure the other light as well to see if the CRI is the same.

### 5. Evaluate the Lighting with the Elsec light meter.

- Place the Elsec on the white paper and bush the yellow “Vis” button to measure the light.
- Place the Elsec in different locations to check if the lighting is even.

**Note: One can choose the units between footcandle or lux by doing the following steps.**

1. Press "SET" button
  2. by using the arrow up and down to select "**Unit**"
  3. Press "**set**" again
  4. both **footcandle** and **lux** will show.
  5. highlight the desired unit and press **set** to select.
- If the footcandle numbers differ from one corner to the other more than 2 Lux, adjust the barn doors so that the light is evenly distributed on the white paper.
    - Record the footcandle value= **175**

**IMPORTANT: These value should be maintained as the same in all documentation for this exhibition.**

### **To Repeat the Lighting Setup**

1. Position the light according to the recorded angle and distance, see page 1.
2. After the light has been turned on for at least 10 minutes, place the white paper at the center of the camera's field of view.
3. Use Elsec to measure the light at different corners on the white paper. The measurements at different corners should be the same and very close to the recorded value (175).
4. If the values varies significantly, check the setup again. Remeasure if necessary.
5. No need to repeat CRI measurement.