Application Note

A Simple Illuminance Field Study

Figure1: Set-up for a typical illuminance field study, complete with floor-plan, table (30" ht.), and illuminance meter.

By assessing the amount of light striking surfaces, illuminance field studies provide useful information about the quantity and quality of light in a space. Gathering illuminance data can help determine whether the lighting in a space is adequate or if there is too much contrast across a work area for the completion of required tasks. When measuring horizontal illuminance, the density of luminous flux incident upon a horizontal plane, the illuminance meter is placed flat on the surface. The horizontal surface may be a desktop, gymnasium floor, dining table, etc. When measuring vertical illuminance, the density of luminous flux incident upon a vertical surface, the illuminance meter is held flat against the vertical plane. The vertical surface may be a wall, computer monitor, chalkboard, etc.

This application note contains step-by-step instructions for performing an illuminance study.

Getting Started

1. **Start with a floor-plan sketch of the area being studied with space to record the readings.** The drawing should include the placement of luminaires and the location of work areas.
2. **Divide the space into square sections, at even increments.** Mark this grid on the floor plan.
3. **For accurate readings, wait until the lamps have warmed for a few hours in order to reach maximum light output.**
4. **Using the Minolta Illuminance Meter, set the measuring node to "NORM".** Set the auto/manual selector to "AUTO". Set the response speed selector to "FAST". Leaving the cap over the sensor, switch the illuminance meter on. Wait a few seconds while it calibrates.
5. **Use a low stool, small table, or tripod (30 inches high) on which to place the meter.** Begin taking illuminance readings in the places that correspond to the grid intersections on the floor-plan sketch. The sensor is cosine corrected and measures down to 80 degrees from the zenith (see *Figure 2*). It is critical to avoid obstructing the sensor's field of vision while taking illuminance readings. This may be accomplished by crouching below the surface on which the meter is placed and then reaching up and pressing the hold button on the meter. The meter will freeze the reading. After collecting data, average the readings to find the average illuminance for the entire space.

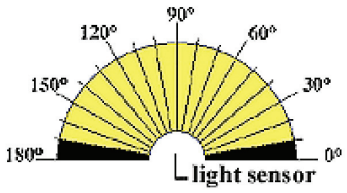

Figure 2: Diagram of illuminance sensor's field of vision. The sensor "sees" down to 80 degrees from the zenith. Darkened areas are beyond the sensitivity of the meter.

6. **For some applications including museums or retail spaces, vertical illuminance is also of interest within the space.** Divide the vertical surfaces in equally sized square sections and measure and record the illuminance at the grid intersections.

Task Specific Lighting

Central to any illuminance study is the fact that the lighting in a space must be tailored to the needs of the occupants. The lighting in an optometrist's office must be very different from lighting in a movie theater. Below are a few suggestions for illuminance studies in some common types of spaces.

For office spaces, the most important illuminance issues usually concern the workplane. Taking a few extra readings at a work space will provide useful information to the study.
Horizontal and vertical illuminance readings may need to be taken, depending on the tasks being performed at a particular work station. Remember to include both ambient and task lighting for the space. As a rule of thumb, the ratio of maximum illuminance to minimum illuminance on the workplane should not exceed 4:1. Glare, a common problem in office spaces, must be evaluated with a luminance meter.

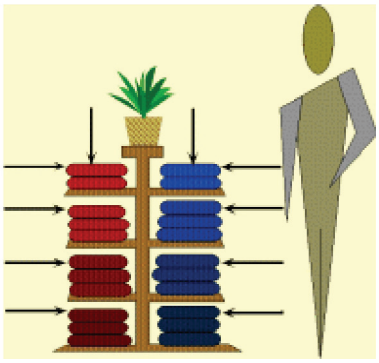

Figure 3: Schematic drawing of a retail display. Arrows suggest places to take illuminance measurements.

Display lighting is often the primary concern for retail spaces. Depending on the orientation and design of the display, both horizontal and vertical illuminance measurements may be important. (see *Figure 2*) Check to see if there is enough light for customers to evaluate colors and textures.
When studying illuminance in a warehouse facility, it is useful to take a few extra readings at points of interest, especially areas that appear to have relatively high or low illuminance levels. Places where tasks occur should also receive special attention.

Unit Conversions

If you have	Multiply by	To get
footcandles	10.76	lux
lux	0.0929	footcandles

footcandle = 1 lumen / sq. foot
lux = 1 lumen / sq. meter