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Editorial Content Chief, *WOOD* magazine



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# bright ideas for workshop lighting

See the difference with these surefire strategies.

## Strategy 1: Take a two-fold approach to proper lighting

When setting up shop, most of us pay too little attention to lighting. We hang a few fixtures where convenient and hope the light produced fits our needs. Without good illumination, though, the fine details needed for top-notch woodworking and shop safety disappear.

As you'll see, our eyes perceive not just the quantity of light, but its quality, as well. To get the quantity and quality of light you need, consider the following:

### Light it bright

Lighting quantity—the amount of light reaching a surface—is measured in foot-candles (fc). The quantity of light needed for any task increases with the complexity of the task. For example, household chores can be accomplished comfortably with 30 fc. Reading requires 50 fc. Precision tasks, such as woodworking, require more.

How much more? We asked lighting expert Doreen LeMay-Madden.

She chairs the residential lighting committee for the Illuminating Engineering Society of North America, and is president of Lux Lighting Design in Belmont, Massachusetts. She suggests that those of us 40 years of age and older should light our shops to a uniform 80 to 100 fc.

Lighting needs change, too, as we age. Starting at about age 15, our eyes begin to deteriorate. To perceive the same amount of brightness at age 40 as you did at age 20, you'll need 50 percent more light. By age 70, you'll need twice as much light as you did at age 40. Older eyes also become more sensitive to glare.

### Provide quality illumination

Three factors determine the quality of light. These are color temperature, color rendering, and glare.

**Color temperature:** All lamps (bulbs to us laymen) receive a rating based on the color of light they produce. The rating is expressed as a temperature in degrees Kelvin (K). Manufacturers assign names to the temperatures, such as "soft white" (3,000° K), "cool white" (4,100° K), or "daylight" (6,500° K). Some lamps list the name or temperature, while others don't. See "Fluorescent Lamp Basics" on the next page, or ask the retailer for help if you can't decipher which types of lamps they sell.

**Color rendering:** Another rating for lamps indicates their ability to accurately represent the colors of the items they illuminate. For an explanation, see "Show your true colors," below. We often perceive bulbs that reproduce color better to be brighter, even though they don't actually put out a higher quantity of light.

**Glare:** If a surface is too reflective or contrasts with those around it, glare will result. LeMay-Madden suggests painting shop in flat or eggshell-sheen white. If you have natural-wood cabinets, coat them with satin finish, rather than gloss. And what about all those cast-iron surfaces on woodworking machines? Wax these surfaces or coat them with such commercial protectants as Boeshield T-9 to prevent excess reflection.

### Show your true colors

All fluorescent lamps are rated by how accurately they show the color of objects they illuminate. Lighting experts express this ability with a color rendering index (CRI) rating that measures from 0 to 100.

- 0 to 55 CRI = poor accuracy
- 55 to 65 CRI = fair accuracy
- 65 to 75 CRI = good accuracy
- 75 to 100 CRI = excellent accuracy

Lamps with a CRI of at least 65 offer the most pleasing light in a shop. As with color temperature, these ratings may not always be listed on lamps, but you can obtain them from retailers or manufacturers.



## Strategy 2: Use fluorescents for overall lighting

Fluorescent lights have a bad reputation among some woodworkers who say they won't start in cold weather and that they hum, flicker, and make colors look odd. But if you use the proper fixtures and lamps, you can prevent those problems.

Fluorescent fixtures are a smart choice because they're three to four times more efficient than incandescent bulbs and last about 10 times longer. Fluorescent fixtures have become downright cheap to purchase, too. And you'll find a wide variety of styles suited to shop environments. The most common types are shown in the "Fixture Basics" chart, below.

### Find the right ballast

All fluorescent light fixtures use a device called a ballast to supply the high initial voltage necessary to start the lamps and to regulate the voltage lamps receive while operating. This prevents flickering. You'll find two types: magnetic and electronic, shown above right.

Magnetic ballasts cost about half the price of electronic versions, but often generate more noise (producing that telltale hum). Magnetic ballasts also may cause annoying flickering and perform poorly—or not at all—at temperatures below 50° Fahrenheit. Electronic ballasts are quiet, stable, and operate at temperatures as low as -10° F.

### Install the correct lamp

Once you choose fixtures, you'll need lamps to bring them to life. Home centers stock a large array. Use the "Fluorescent Lamp Basics" chart, below, to cut through the confusion and make sure you pick the correct type for your needs.

Lamps with higher temperature and CRI ratings cost more than run-of-the-mill cool white versions, but perform better. To see the difference in the light produced by these

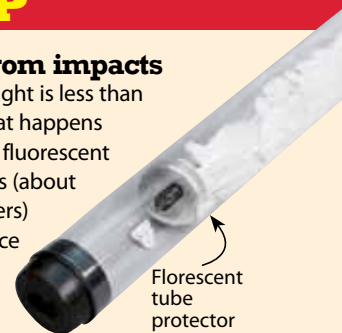


Look at ballast labels for two important ratings: Minimum starting temperature, shown in degrees, and noise rating, where A ranks quietest.

## SHOP TIP

### Protect lamps from impacts

If your shop ceiling height is less than 10', you may know what happens when a board meets a fluorescent lamp. Plastic protectors (about \$2 to \$3 at home centers) provide cheap insurance against showers of broken glass.



## FIXTURE BASICS

You'll find fluorescent fixtures in many sizes and shapes. For shop use, look for the following types:

### Standard Strip

- Best use: General lighting
- Construction: Two or four open lamps located below a metal housing
- Location: Mount directly to a finished ceiling
- Styles: 4' and 8' long, plug-in or hard-wire
- Price: \$10 and up (less-expensive models use magnetic ballast)



### Industrial

- Best use: General lighting
- Construction: Similar to a standard strip, but flanked by reflectors. Some feature protective screening (shown).
- Location: Suspend below a high or unfinished ceiling
- Styles: 4' and 8' long, plug-in or hardwired
- Price: \$10 and up



### Under Cabinet

- Best use: Task lighting
- Construction: Single lamp inside a metal housing with an opaque diffusing cover
- Location: Mount under a cabinet or shelf
- Styles: 13 to 48" long, plug-in or hardwired
- Price: \$8 and up



## FLUORESCENT LAMP BASICS

Looking to buy fluorescent lamps for your shop? Here's what you need to know:

- **Sizes:** Lamps for ceiling-mount fixtures come in 4' and 8' lengths. Two diameters are common: T8 (1") and T12 (1½").
- **Power:** Full-wattage 4' T12s are rated at 40 watts, 8' versions at 75 watts. Ratings for economy versions are 34 and 60 watts, respectively.

- **Common names:** While more varieties exist, look for the following for shop use:

### Cool White

- Color temperature: 4,100° K
- Approximate CRI rating: 70
- Cost (4'): \$1.50+
- Acceptable for overall shop lighting



### Natural Sunshine

- Color temperature: 5,000° K
- Approximate CRI rating: 90
- Cost (4'): \$1.50+
- Great for overall shop lighting



### Spec 35/Full Spectrum

- Color temperature: 3,500-5,000°-K
- Approximate CRI rating: 90
- Cost (4'): \$4.00+
- A good choice for finishing areas

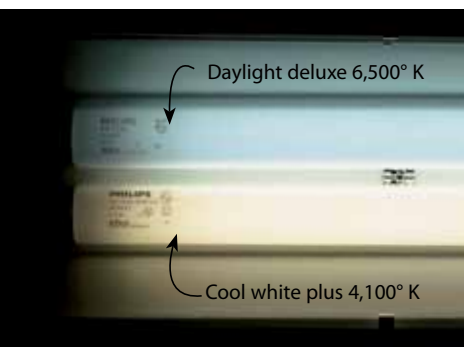


### Daylight Deluxe

- Color temperature: 6,500° K
- Approx. CRI rating: 85
- Cost (4'): \$5.00+
- Good for those who need more light







A cool-white lamp (bottom) seems bright, but a higher-temperature "daylight" lamp gives more perceived light and better color.

lamps, check out the photo, above. Higher-priced lamps last longer as well.

### Locate fixtures for best lighting

As the final step in lighting your shop, you need to decide where to put the fixtures. To get the most from your lighting layout, locate fluorescent lights using the guidelines in "Perfect fixture positioning made simple," right.

### Perfect fixture positioning made simple

To ensure adequate illumination without shadows or dark spots, use these formulas to determine fixture locations. Note: These formulas assume the use of continuous rows of two-lamp fluorescent fixtures.

- Measure (A), the distance from your main work surfaces to the ceiling (or to the desired height of suspended fixtures—usually 8' to 10' above the floor). The distance between fixtures (B), should be equal to or no more than 1.5 times (A).
- The distance between a fixture and the wall (C) should be no more than one third to one half (B).

Let's translate that to a typical two-car garage shop that measures 24x24' with a 9' ceiling and work surfaces 36" high. We'll use 16'-long rows of fixtures (either two 8' or four 4' placed end-to-end):

A=72" or 6'  
 B=72"×1.5=108" or 9'  
 C=108"×.5=54" or 4f'

If we place two rows of fixtures 9' apart (B), they'll each be 7f' (C) from the side walls—way more than the 4f' maximum. The sides of the shop will be too dark.

If we center one row, then add two more rows spaced 8' apart (B=8), then the outer rows will be 4' (C=4) from the walls. This layout lights the shop well.

### Strategy 3: Examine options for supplementary lighting

Well-placed fluorescents provide great overall lighting. But you'll want additional light over such places as your workbench, band-saw, and finishing area.

#### Get task-light right

Standard incandescent bulbs work well for task lighting, LeMay-Madden says. They cast more shadows, which can highlight contrasts and make blades and layout lines more visible.

To get better lighting quality, replace an incandescent with a "halogena" lamp.

Compact fluorescent lamps work in any fixture that takes a standard screw-in bulb. They operate more economically, but don't offer quite as much contrast as an incandescent or halogena.

We recently discovered a new halogen fixture that offers promise for shop lighting, above far right. It's a cinch to install thanks to adhesive backing on the power strip. The fixtures clip onto the strip so you can move them to exactly where you need lighting.

#### Automate your lights

For the ultimate in lighting convenience, add



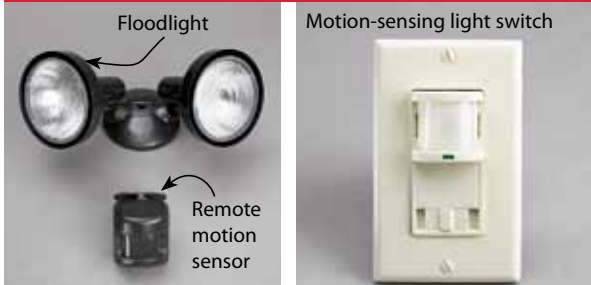
You can replace an incandescent bulb with a compact fluorescent, which costs less to run, or a screw-in "halogena" that lasts longer.

motion sensors, such as those at right. Use one to simply turn on a single light to illuminate your path when you enter the shop, or to flip on all of the lights. Try putting one over your lumber rack so you can better examine boards, or above your mitersaw station. You'll have light every time you cut, without having to

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### GOING THROUGH THE MOTIONS



This floodlight (\$40) has a wireless remote sensor to allow mounting options.

Motion-detecting switches can turn on overhead fixtures when you walk in the room.