

The Lighting Power of LEDs

Strip tape is revolutionizing the way designers light countertops, built-ins, and architectural details

BY DAVID K. WARFEL

As a lighting professional, I have come to think of good lighting as a means to many ends. Not only does it help us see what we are doing so we can perform tasks comfortably and safely, but it also allows us to navigate a space by illuminating where we are and where we are going. Light sets a mood, makes us feel alert in the morning, and can help us relax in the evening. It assists in times of transition—whether it's the turning of the seasons or the aging of our eyes. Studies have shown that light can even aid in the healing process. By focusing light on things that are important to us, such as fine craftsmanship, high-quality materi-

als, or a crayon drawing by a favorite niece, it is also a wonderful medium for expressing our personal style. So how can you harness all this potential and differentiate your projects from others? The answer is to focus first on what great lighting can do for a home, not on where to put the 6-in. cans. Then understand what you want the light to do; its function will help determine where to put it—under, inside, above, or in some combination. Finally, tap into the limitless possibilities inherent in LED strip tape. □

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GET TO KNOW LED STRIPS

All LED strip tapes work the same basic way, essentially functioning like miniature Christmas lights. But instead of bulky green wire, two flat conductors sit on a piece of tape, and LED chips sit on top of those. There are lots of options on the market, so before you shop, it's helpful to understand a bit about lumens, channels and lenses, pixel pitch, and more.

I often use OpticArts' FlexConnect tape products because they have a wide range of options. Other manufacturers—including Modalight, City Theatrical, and Juno Lighting—carry similar systems with variations in models and accessories.

LUMENS To get a good level of light on the counter, use 200 lumens per ft., which is typically 3w per ft. This provides enough light on the counters at night without the need for downlights. Lower lumen output will not fill in the shadows during the day and may be insufficient at night. If your tape light has fewer lumens, consider installing two parallel rows under each cabinet to double the brightness.



CHANNELS AND LENSES LED tape is ugly and can be easily damaged, so adding an aluminum channel and acrylic lens is a great way to protect the investment. Channels are typically sold in 3-ft. lengths and come in a variety of shapes. Flangeless shallow profiles are ideal for undercabinet projects, and a diffused lens will hide some of the diode bright spots, delivering a more even light.

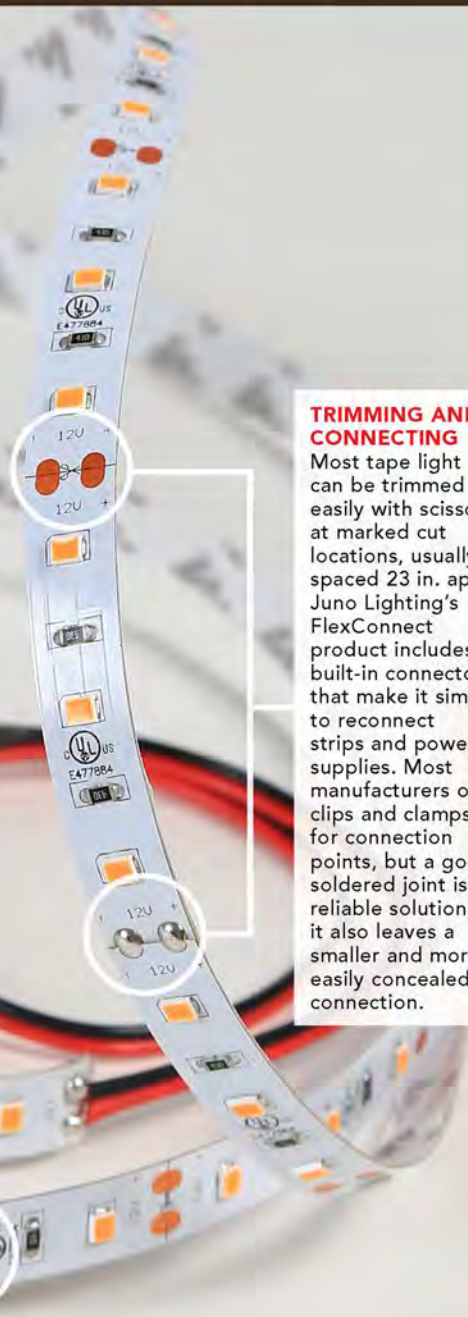


COST FACTOR There are many high-quality products in the \$15 to \$25 per ft. range, such as OpticArts' warm-dim tape with tight diode spacing and multiple lumen packages and channels. At the higher end, Modalight offers a wide selection, and CityTheatrical's Qolorflex RGBW tape is good for color-changing effects.

SWITCHING Always switch tape light separately from other light sources—clients appreciate the ability to use the tape on its own. Also, test compatibility of dimmers, drivers, and tape before starting a large installation project.

SPACING LED diodes, or "chips," located every $\frac{3}{8}$ in. or less eliminate individual bright spots, creating a more even spread. The OpticArts STP (supertight pitch) product has chips that are just 0.1285 in. apart, which is optimal for tight details. The spacing of its DC products can range anywhere from 0.32 in. to 1.30 in.

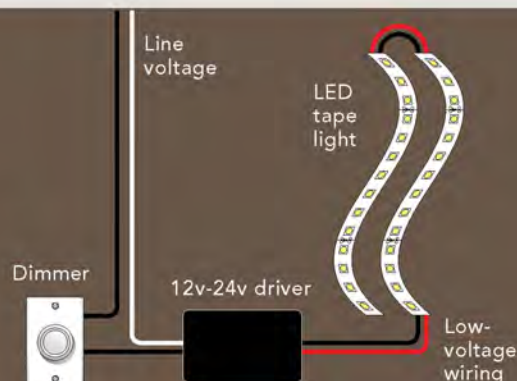
TRIMMING AND CONNECTING Most tape light can be trimmed easily with scissors at marked cut locations, usually spaced 23 in. apart. Juno Lighting's FlexConnect product includes built-in connectors that make it simple to reconnect strips and power supplies. Most manufacturers offer clips and clamps for connection points, but a good soldered joint is a reliable solution; it also leaves a smaller and more easily concealed connection.



WIRING LEDs

There are some 120v line-voltage tape products available, but most of them operate at either 12v or 24v and require a remote driver, which essentially works as a transformer to step down the voltage. The 24v systems often use fewer home runs, which is handy when illuminating a very long strip of crown or cove.

Locating drivers close to the tape can help minimize voltage drop, which I like to keep under 5%. (Voltage drop can be calculated if you know the length, wire resistance, and loads, but many manufacturers offer handy tables online.) There are often nearby places to hide drivers, such as inside cabinets or in blind corners, and it is best to install them in a ventilated, easily accessible space, if possible.



LIGHTING COUNTERTOPS AND



Put the LED strip near the front of the cabinet and centered above the counter. Run it continuously along the length of uppers. If there is a deep lip underneath the front edge, move the tape back 12 in. to avoid dark shadowlines. If it's a solid-bottomed cabinet, dado a shallow channel (about 1/8 in. deep for bare tape) to fit the strip. For a finished appearance, install the strip inside an aluminum channel with a frosted acrylic cover. Then conceal transformers and drivers in an accessible location as close to the tape as possible.

THE RIGHT BRIGHT SPOT



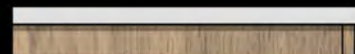
NO

Mounting behind a face frame can reduce countertop reflection, but it shadows the counter and puts the bright spot where it's least needed.



NO

Deep recesses or frames shield fixtures but leave deep shadowlines on the counters.



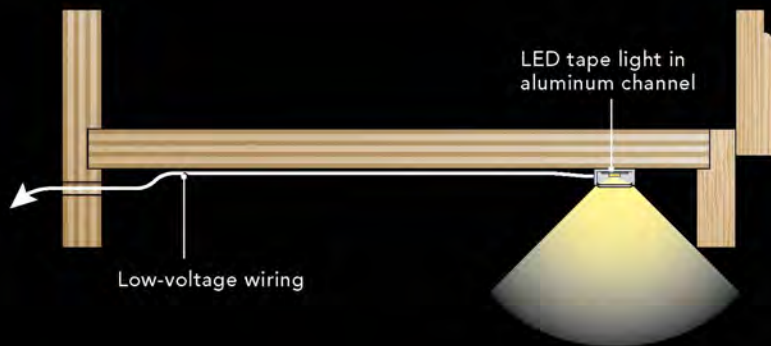
YES

A well-placed shallow recess allows light to spread out across the counter and puts the bright spot right where it's needed.

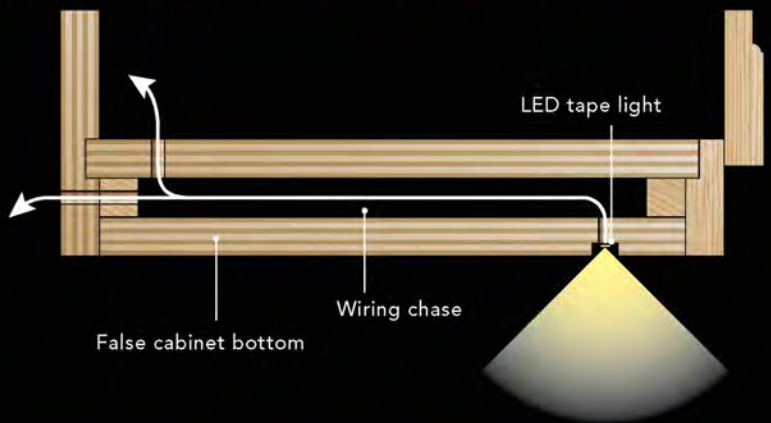


CABINETS

BASIC UNDERCABINET WIRING

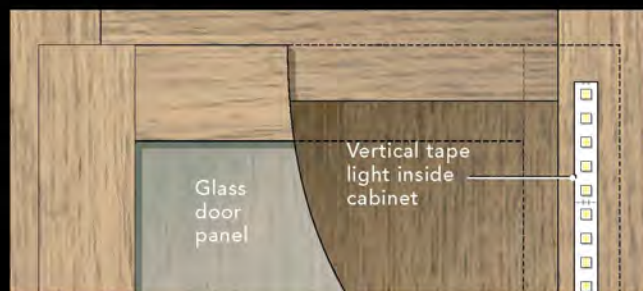
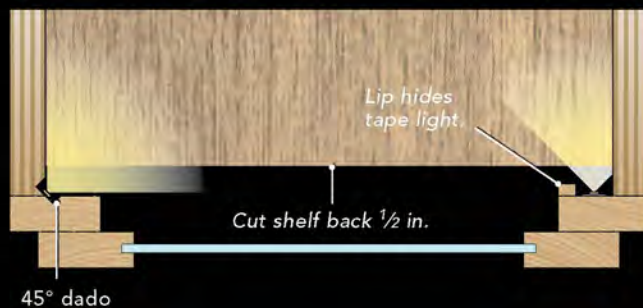


GET A CLEAN LOOK WITH A FALSE BOTTOM



LOCATING STRIPS INSIDE CABINETS

Cabinet interiors can be lit by running tiny LED strips vertically behind the face frame. Another option is to route an angled groove into the back of the face frame, leaving a small lip to obstruct the view of the tape light. This provides even illumination from top to bottom.



Choosing the right lights

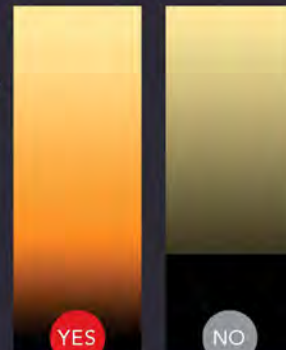
COLOR TEMPERATURE

Warm color temperatures, such as 2700K and 3000K, are typically best for traditional homes with rich wood tones, natural fabrics, red brick, sandstone, and tan limestone—any material with warmer tones. Temperatures in the range of 3500K or 4000K are better suited for ultra-modern spaces with glossy white finishes.



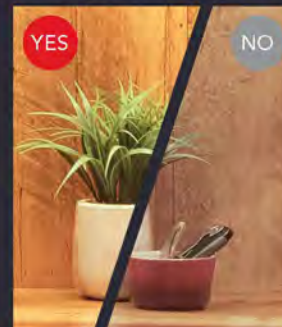
DIMMING

Choose systems that dim smoothly from 100% to 1% or less before switching off. This limits the unsightly and distracting dropout typical of poor-quality dimmers. One percent dimming can be achieved with ELV, MLV, 010v, and DMX dimmers but must be carefully coordinated so that dimmer, driver, and LED are fully compatible. Electronic low voltage or magnetic low voltage (ELV/MLV) dimmers work for most controls; 010v and DMX, a digital language, are for very precise dimming control. Warm-dim tape is ideal for shifting warm white (2700K) to very warm (1800K) as it dims.



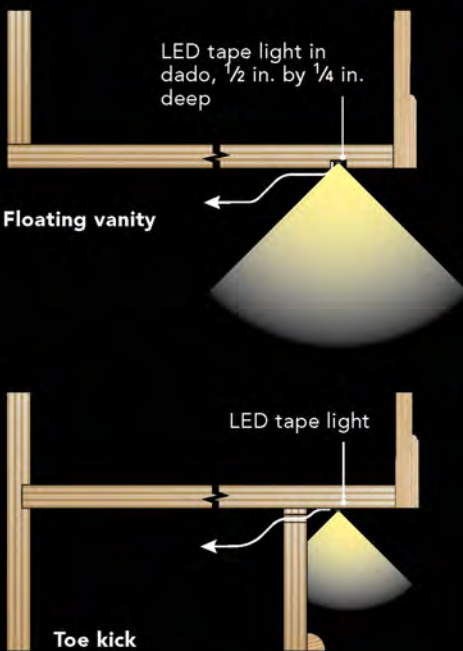
COLOR RENDERING INDEX (CRI)

Lower-quality LEDs have a CRI of less than 90, which makes colors appear less vibrant. The ideal CRI is 100, but light tape with a CRI of 90+ will ensure your furnishings, millwork, flooring, cabinetry, paint colors, and more appear naturally lit.



BRIGHTENING BATHROOMS

To get the details right for floating cabinets, dado or rout the bottom of the cabinet about 3 in. from the front face. The recess should be $\frac{1}{8}$ in. deep—any deeper can result in unsightly shadowlines. Use a similar recess in toe kicks, but place the tape as close as possible to the face of the bottom cabinets to project light farther into the room.



LED LIGHTING 5 common mistakes and expert solutions

1 SPOTLIGHTING DRYWALL

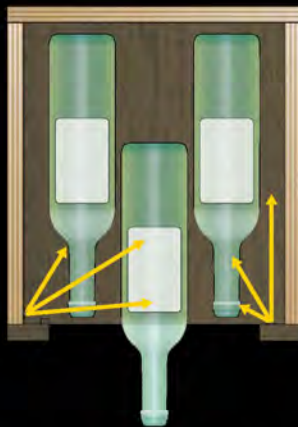
There was a time when I would pull crown molding down below the ceiling by a few inches and then use the space behind the molding to hide rope light, which is a product encased in flexible vinyl tubing, similar to Christmas lights. This approach, however, puts the emphasis above the molding and on the drywall ceiling, which is often the cheapest surface in a room. It was a valuable lesson. Now, I include a secondary lip of trim a few inches below the main crown-molding assembly, making for a tall crown. Linear LED strips are hidden in the lower lip to illuminate the crown molding itself before casting soft light onto the ceiling. The focus is then on the trimwork instead of the drywall.

2 FEATURING FIXTURES

A finely crafted dining room with a cheap pendant over the table is something I see too often; the eye is drawn to the pendant and not to the details of the space. A general rule of thumb: Feature your features, not your fixtures. In the wine cellar pictured on p. 67, for example, decorative fixtures would have called attention away from the wine bottles and woodwork, and that would have been a disservice to the project. In the end, we were able to execute the project with just one visible recessed light in the cellar—all other lighting is hidden from view.

THE ARTFUL SIDE

The true potential of linear LED strips is best revealed when illuminating crown molding and other features such as fireplace mantels and stair treads. The small size of the tape—some are just ¼ in. wide and ⅛ in. deep—means it can be easily integrated into millwork and built-ins. Adding light strips to multipiece crown is a great way to get indirect light that focuses on a home's craftsmanship and high-level architectural details instead of the drywall. Essentially, it creates a soffit or tray ceiling effect without the extra framing.



Clever in the cellar

For this project, a wine rack mockup helped in figuring out how to illuminate the bottles and labels. Prairie Woodworks studied the details, and potentially costly mistakes were avoided on the front end.



3 CREATING UNWANTED SHADOWS

If you put solid dishes on glass cabinet shelves (or make the shelves out of wood), then light is interrupted and stays at the top. Instead, put nice glassware on those shelves so that light can filter down from the top to the bottom shelf for full dramatic effect. To further reduce shadows, install LED tape vertically behind each face frame to light underneath every shelf.

4 CHOOSING UGLY LEDS

Many LED bulbs have poor color quality or simply are not bright enough. Countertops may look discolored, the beauty of wood may be diminished, and food can look unappetizing under LEDs with poor color rendering, which is measured by the color rendering index (CRI). Look for LEDs with a CRI of 90 or greater. A good way to avoid the wrong color temperature, which can leave whites looking dirty and wood looking gray, is to create mockups to test your ideas and bulbs.

5 SKIPPING DIMMERS

Too much light on a built-in can distract from the rest of the room—a problem that is easily solved with a dimmer or control system. If your clients plan to live in the home for many years, it also pays to add more light and dimmers so that light levels can be increased as occupants age. Good lighting will adapt to the changing needs of cloudy days, late nights, parties, spring cleanings, and relaxation time—but only if you install dimmers.