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by Ken J Johnson
Preproduction model shown

PUBLISHER'S MUSINGS



Model Railroad Hobbyist | December 2020

JOE FUGATE DISCUSSES LAYOUT
LIGHTING WITH LED STRIPS ...



VIEW READER
COMMENTS

WHEN I STARTED DISMANTLING MY OLD SISKIYOU LINE 1 (SL1) layout a couple years ago, I felt quite excited at my newfound freedom on my next layout, Siskiyou Line 2 (SL2).

Layout construction options now exist here circa 2020 that didn't exist when I started SL1 in 1991 and I could now explore the latest and greatest tech. One of these new tech innovations that's come about is LED strip lighting.

Shopping for LED strips

The first question with LED strip lights: how much light do I need to get a well lit layout space?

LED strip vendors measure light output in lumens, so some conversion to incandescent lights can be helpful. For example, if a 5 meter (16.4ft) LED strip listing says it's 300 lumens per meter, what does that really mean?

Looking at table [1], I can see 300 lumens per meter equals roughly 30 watts of incandescent light per meter. In other words, that sounds rather dim – but is it really?

Let me throw in another consideration as well – the distance of the light from the layout surface. If you remember your high school science class, light drops off with the square of the

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1. Table of lumens to much more familiar incandescent light bulb watt equivalents.

Comparing light to energy					
Lumens	220+	400+	700+	900+	1300+
Incandescent	25w	40w	60w	75w	100w

distance. Actually there's another term for this intensity of light on a surface – it's called a lux.

As a minimal illumination level on your layout surface, start at ~500 lux. If you want more details to be visible, aim more for ~1000 lux. More on how to compute lux in a bit.

For my layout, I like to use a shadowbox type of construction, with the viewing window being about 13 -15 inches or so.

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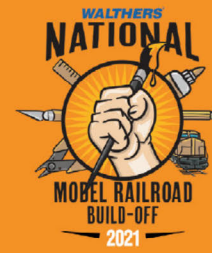
Let your mind wander to unexplored creative horizons.

(oh, and there's that thing about winning oodles of cash.)



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▲ Brandon Lepley of Lewisburg, PA created this stunning entry for the 2020 NMRBO contest.



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Planning your entry starts now with a visit to your local hobby shop in person or online to stock up on the tools and supplies that'll turn your ideas into a modeling masterpiece!

Watch for complete contest details and kit packs coming soon.

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[INDEX](#)

[TABLE OF CONTENTS](#)

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[INDEX](#)

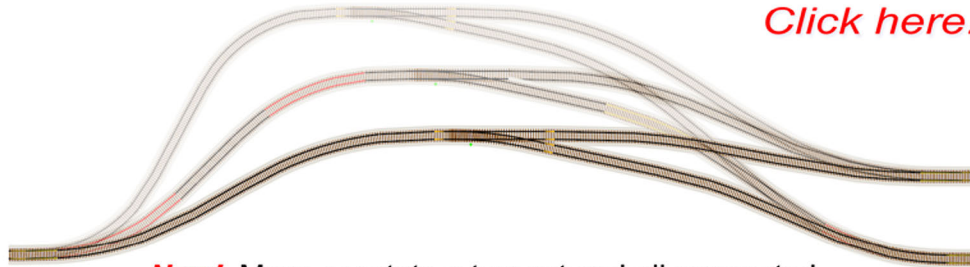
[TABLE OF CONTENTS](#)

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PUBLISHER'S MUSINGS | 3

That may sound small, but if I have the layout height at 50" minimum, then the bottom of the valance comes to 65". Higher deck heights can see the bottom of the valance move to 70" or more in short order.



2. My SL2 TOMA modules on display, with an estimated 1000 lux of light.

If I take that 300 lumens and compute the lux at 14" using the lumens to lux calculator here [dmslighting.com/tools/illuminationconverter.html], I get about 1000 lux, nice and



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[INDEX](#)

[TABLE OF CONTENTS](#)

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[INDEX](#)

[TABLE OF CONTENTS](#)

PUBLISHER'S MUSINGS | 4

bright, actually! To see what this looks like in real life, here are my TOMA modules [2] at the last National Train Show – looks plenty bright to me! So that 300 lumen LED strip works fine.

Notice if I put this LED strip instead behind a valance that's hanging from an eight-foot ceiling, the strip now sits at least 40" above the layout surface for a layout that's at 50" from the floor.

Using the lumens to lux calculator again, I get a bit less than 100 lux, which is way too dim!

It's important to not only know the lumens of output from the LED strip, but to also know how far the light will need to travel to get to the layout surface. Using lumen/lux math, you can pretty much nail the look you're after.

Avoid waterproof strips

You can get LED strips that have a waterproofing plastic coating so they can be used safely outdoors.

However, various modelers have reported the waterproof coating will yellow over time as the heat from the LEDs cause it to change color. Yes, the LEDs don't put out a lot of heat, but with the coating being right on top of the LEDs, what heat there is builds up and yellows the coating.

That yellowing will change the light color of the LED strip, which isn't good news. Long story short: avoid LED strips that have a waterproof coating.

LED strips have what's called an IP (ingress protection) rating. You want an IP of 20 or less to avoid the waterproof coating. An IP of 65 or more has the waterproof coating, so avoid those.

What's a good LED color?

LED strips also come in different color temperatures such as warm white, cool white, and so on. A more precise description of light color uses Kelvin temperature ratings.

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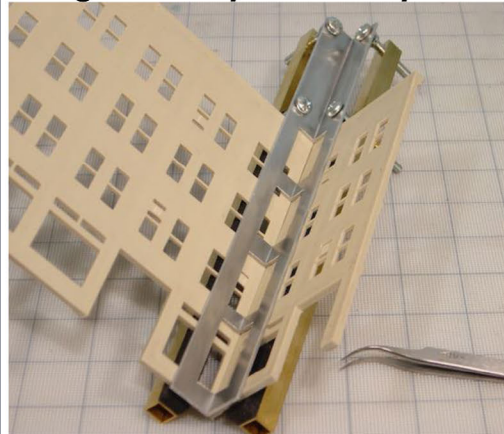
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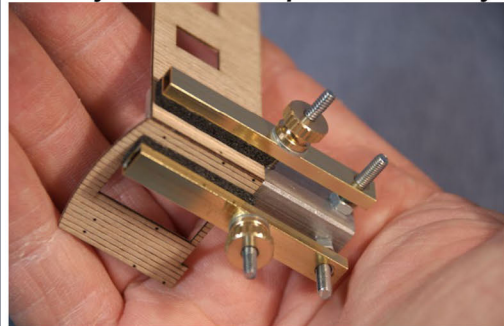
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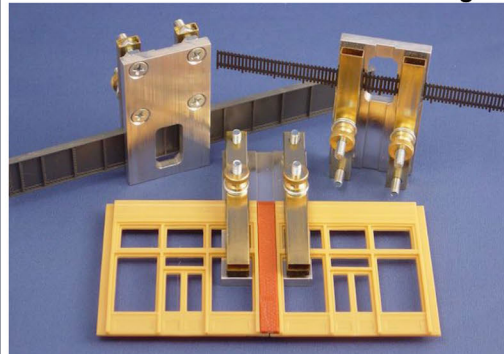
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PUBLISHER'S MUSINGS | 5

A standard incandescent light bulb has a color temperature of about 2700K. See chart [3] for a comparison of the different lighting colors.

Halogen lights come in at about 3200K.

Warm white fluorescent tube bulbs run about 3500K, and cool white fluorescents come in at around 4200K.

Light at around 4000K is considered "neutral white" or "daylight."

Moving up to "crystal white" fluorescent bulbs, their color approaches 5000K. I call it "hospital light" because an area lit with light of this color makes me feel like I'm in a hospital. For me, it's an uninviting light color to use for a layout space.

If you're not sure, 4000K is a good safe light color to aim for.

I personally prefer a warmer white color, say about 3000K. This color feels like a warm summer day to me – which I find gives a quite pleasant look to the layout.

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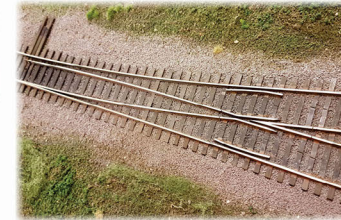
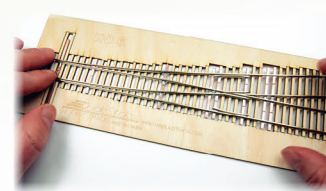


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3. Light color diagram showing the different Kelvin (K) temperatures of light.

I just feel happy inside when I look at 3000K layout lighting. It's a tad more blue than 2700K incandescents, which look too orange to me. I know Tony Koester said he liked the more bluish daylight color on his previous Appalachian layout because it brought out the greens and increased the sense of being up in the high mountains.

While I'm discussing light color, one notion I've seen thrown around has been using RGB LED strips since you can program those to be any color you want. You can literally have a red sunset look, to a blue moonlight look, all the way to a white light look or anything in between.

In fact, RGB LED strips don't produce a very smooth white light, it's always got a tinge of color to it, especially in photographs. You can run a second strip of RGB LEDs along the valance with a consistent white LED strip. Then use dimmers to control the mix of white light with other colors such as red or blue to get special looks.



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[INDEX](#)

[TABLE OF CONTENTS](#)

I've just scratched the surface

I've just scratched the surface here regarding all the considerations needed to get great layout lighting using LED strips. The strips don't cost too much, especially if you shop online, so get a strip or two and try them out for yourself.

I'm also planning to do a much more in-depth video on Train-Masters TV about LED strip lighting. I will delve into all the different considerations such as double row LED strips, LED color rendering index (CRI), and how to pick a good power supply for your LED strip lights.

I encourage anyone who is using LED strip lights to post their experiences in the reader comments for this article. The collective wisdom you all have can be extremely helpful to the rest of us trying to decide on the best way to go with our layout lighting.

See you online!



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[INDEX](#)

[TABLE OF CONTENTS](#)