PixelRange's PixelLine Micro W

By: Mike Wood

Fig.1: Unit as tested.

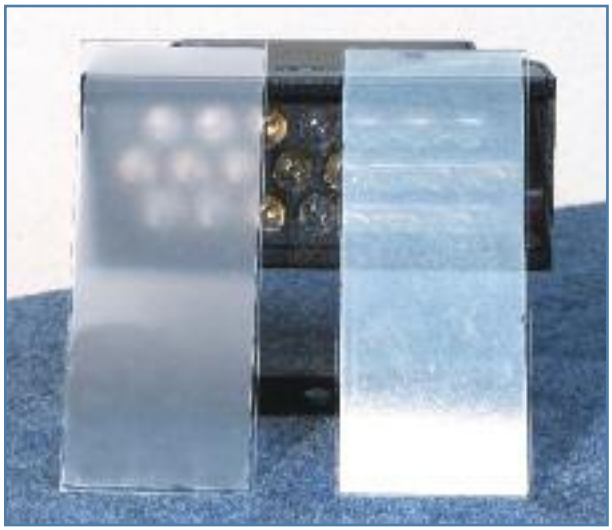

Fig 02 - Diffusers

Fig 03 - Top panel and filter retainer

For this month's review we, perhaps belatedly, turn to a manufacturer who has actually been making LED-based luminaires for quite a while, and was one of the pioneers of LED-based entertainment lighting units. The company is James Thomas Engineering and the PixelRange line of LED products. Although JTE started life as a fixture manufacturer—as the original developer of spun aluminum PAR cans—it arguably became better known for its trussing systems. The company returned to its luminaire roots in 2002 with the introduction of the PixelRange LED products which, like most of its products, are aimed at the rental and staging end of the business. As JTE operates PixelRange as a separate division, I'll refer to the company as "PixelRange" for this review.

Specifically, this review covers the PixelLine Micro W, which PixelRange describes as a "micro batten" product. (As I was testing this product immediately after Thanksgiving, and was suffering from a surfeit of turkey, I was delighted to be testing the smallest and lightest product I've reviewed so far; at 8" x 6.5" x 3.5" and under 5lbs., even I had no difficulty in lifting it on to my test bench.) (Figure 1.)

This review follows the usual structure, where I measure everything I can think of and present objective results so that you, the user, have the data and can decide if the unit is appropriate to your needs.

As with other, similar, units on the market, the PixelLine Micro W is designed so that it can be stacked and used in a modular manner, to create a continuous batten or array. I measured a single unit, but you can easily multiply up to see what the output would be from an array of units. In fact, another PixelRange product, the PixelMax Wash, is essentially six of the Micro W battens in a single enclosure.

Light source

As usual, let's start out with the sources—the PixelLine Micro W uses 22 of the familiar Lumileds Luxeon K2 emitters rated at 50,000 hours (these emitters are nominally 1W-3W devices, depending on color) arranged as a four-color RGBA array; six red, five green, five blue, and six amber. The PixelLine Micro W is fitted with an autosensing universal power supply input that takes any voltage from 90V to 264V AC. For these tests, the unit was run from a nominal 115V 60Hz supply.

Optics

Each of the 22 LED emitters is fitted as standard with a TIR (total internal reflection) lens, which focuses the native wide-angle Lambertian output of the K2 emitter down to a more useful 23° field angle (12° beam angle). You can see these lenses in Figure 1. The different colors of emitters are distributed across the unit so as to homogenize the output beam as much as possible to end up with even colors. More about that later.

The PixelLine Micro W also allows the fitting of optional diffusers in front of the LEDs, which use a thin sheet of diffractive diffusing film mounted onto an acrylic support. Figure 2 shows a couple of these diffusers. Fitting them to the unit was straightforward: There are two quarter-turn fasteners on the top of the unit, and loosening them allows the top plate to be removed. The filters then drop into what is essentially a gel frame slot top and the top plate replaced. (Figure 3)

The PixelLine Micro W came with a wide range of different diffusers, with both vertical and horizontal asymmetric spreaders that behave like a silk frost as well as a range of symmetrical diffusers providing different beam angles. Figure 4 shows the bare beam, with no diffusion fitted,while Figures 5 to 7 show some of the options.

In every case, there was some variation of color from one side of the beam to the other, caused by the physical separation of the emitters on the unit. (You can see this effect in Figures 5 and 6, where a linear diffusion is used.) As expected, the more diffusion used, the less this effect was apparent. This isn't a unique issue to the PixelLine Micro W, and is a familiar concern for any unit using separate emitters for each color.

Output

With all the usual caveats about measuring the output of blue LEDs that I've harangued you with in previous reviews, I measured the PixelLine Micro W as giving 640 lumens at a field angle of 23° with all channels at full (Figure 4). This, as is common with many LED fixtures, was a "pinkish" white quite a long way from the Planckian locus (sometimes called the black body line). As always, green and amber were the weak links, so, by setting those two channels to full and adjusting red and blue down, I was able to mix a 3,500K white that was much closer to the Planckian locus

Fig 04 - Beam with no diffuser

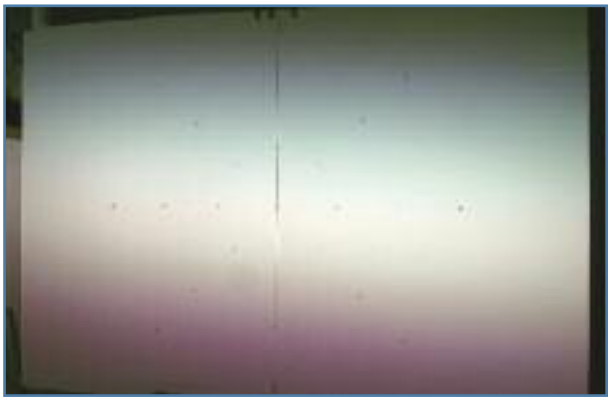

Fig 05 - Beam with horizontal diffuser

Fig 06 - Beam with vertical diffuser

Fig 07 - Beam with wide angle diffuser

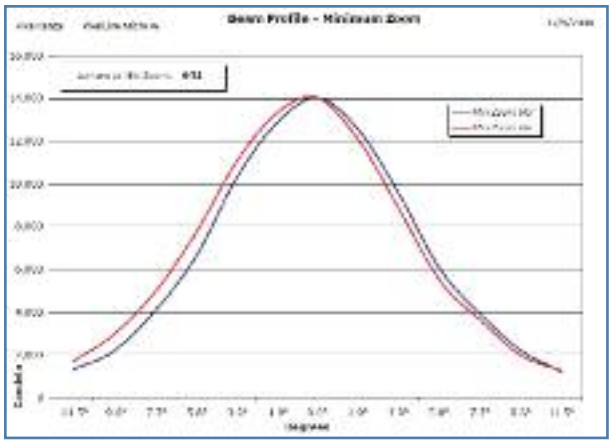

Fig 08 - Output at full

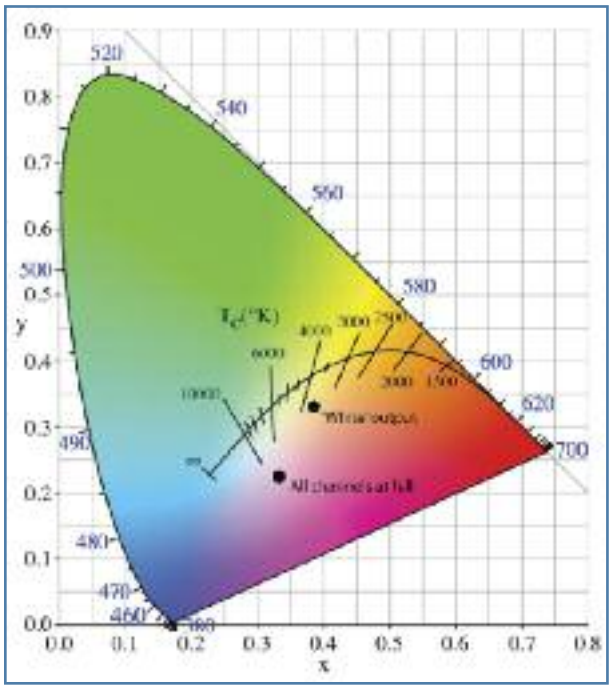

Fig 09 - White points on CIE chart

and had an output about 24% lower than the full output.

Figure 9 shows the familiar CIE color chart with the two color points plotted. The output, with all channels at full, is well below the Planckian locus and into the pink area. By

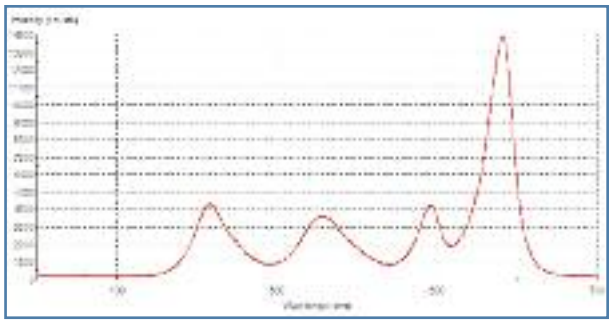

Fig 10 - Spectrum with all LEDs at full

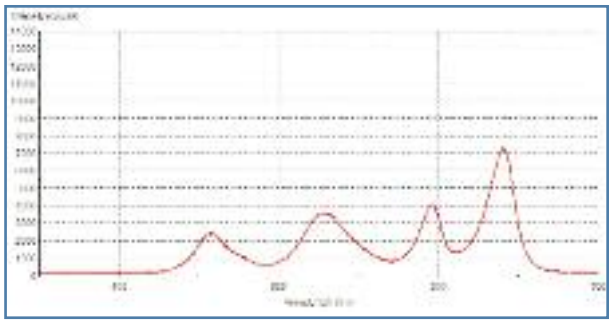

Fig 11 - Full white spectrum

reducing red and blue, we are able to move that point up towards the warm whites. You can see clearly that a bit more green and amber would help get it up onto the line. This is a very common situation with RGB(A)-based LED luminaires: Green and amber LEDs have less output than is needed for an equal mixed white, so a fixture optimized for a true white would have many more green emitters and fewer red and blue ones. The problem then is that often the main use for an LED unit like this is to make strong saturated colors, not whites, and we want to be able to make intense reds and blues as well. The result is, as PixelRange has done, that we use a compromise mix that gives us a reasonable white while still giving us lots of punch in the reds and blues. There's nothing wrong with that; engineering is all about compromises, and good engineering is being able to choose the right ones.

Figures 10 and 11 finish the tale and show the spectra of the PixelLine Micro W at both full output and the full white point. You can see the four distinct peaks, one for each

color of LED: blue at about 460 nm, green at 530 nm, amber at just under 600 nm, and red at 640 nm. As regards the smoothness of the output distribution, the output curves in Figure 8 show a good, smooth, highly symmetrical light distribution which should blend well.

Dimming

Definitely a strength of the PixelLine Micro W, the dimming and control of the LEDs is excellent. The fixture offers three different control and dimming set-ups selectable through the menuing system: Fine, TV, and Tungsten. "Fine" is a legacy mode using no smoothing and a relatively slow-speed PWM at 244Hz; it's old-school and suffers from the familiar steppiness and flicker. The other two modes are a completely different story. "TV" mode offers a very high PWM frequency of 7.8kHz and should have no problems with flicker on TV cameras, standard or HD. However, my favorite was the "Tungsten" mode; this has a very smooth feel and does an excellent job of emulating the response curve and thermal inertia of a tungsten source. It uses an internal fade engine with a time constant, so that it fades smoothly between levels rather than snapping and, I assume, interpolates between the eight-bit DMX512 values to provide a step-free fade at a much higher internal resolution. I couldn't see steps until the output was well below 10%.

The dimming curve in Tungsten mode was also commendable, with a good match to a square law curve as you can see in Figure 12.

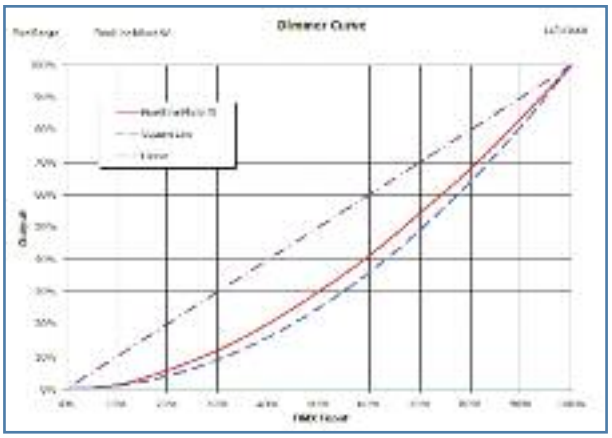

Fig 12 - Dimmer curve

Color Mixing

Color	Cyan	Magenta	Yellow	Red	Green	Blue	Amber
Output	61%	60%	55%	27%	28%	33%	13%

Color system

The real strength of any LED fixture at the moment is its ability to produce colors, particularly strong and saturated tones. As you might know if you've read other reviews I've written on LED fixtures, I'm not a great fan of three-color RGB mixing; however, in my view, the addition of amber to the RGB triad significantly enhances the ability to mix pastel colors and warmer skin tones and tints, and also improves the color rendering around the white point. All of this is true with the PixelLine Micro W, and the chart below shows the output in the major colors.

As expected, the unit showed excellent output in the deep reds and blues and the addition of the amber LED allowed mixing some good, powerful orange and amber tones. The further you get away from white and the more saturated the color, the more LED units come into their own.

The PixelLine Micro W offers a multitude of DMX512 control options to get to these colors, using anything from four to 11 channels of DMX512. You can operate it completely manually (as I did) with individual control of the four LED colors with either eight- or 16-bit resolution. Alternatively, there are a number of effects and chase modes, which allow semi-automated control for quick set-up of standard sequences.

Noise

The only noise maker in the PixelLine Micro W is the internal fan on the back of the LED heatsink which can be seen in Figure 13.). I measured this as giving 38dBA at 1m.

Electrical parameters

The PixelLine Micro W uses an internal, fully power-factor-corrected auto-ranging (90 – 264 50/60Hz) power supply.

Although overall power consumption is only 64W, the

Fig 13 - Power supply and fan

Power consumption as tested at 115V

	Current, Power	Power Factor
Electronics only, no LEDs	0.02A, 2W	n/a
All LEDs illuminated	0.85A, 64W	0.62 (102 VA)

power factor at 0.62 seems a bit low to me and could be an issue if you have a large number of the units in a system. Initialization time from power up was two seconds while the software booted. The unit uses Neutrik PowerCon connectors for mains power, and has both in and out connectors, so you can daisy-chain power, as well as DMX512 data, along a line of luminaires.

Electronics and control

Fig 14 - Main control board

The fixture control and drivers are mounted on an easily accessible single circuit board inside the unit, as shown in Figure 14. As discussed earlier in the color section, the control options are fairly comprehensive, with many options for DMX512 control as well as standalone and master/slave operation. The unit is so small that you can think of many spots you could hide it in a stand-

Fig 15 - Menu and display

alone situation. All control is through a standard four-digit/four-button menuing system with all the usual maintenance and set-up functions, in addition to the control options mentioned above (Figure 15).

The single fan does a good job of keeping things cool. In my tests, I ran the PixelLine Micro W for about 12 hours continuously and had no problems with light output dropping with heat—a problem endemic to many LED units.

Construction

Mechanical construction is simple, clean, and tidy, with the usual options for rigging the unit on either a bar or floor. A neat point is the right-angled yoke, which doubles as a floor stand as shown in Figure 1. Figure 16 gives you a better look at the rear of the unit and shows all the connectors on either side of the menu system.

I would expect maintaining the unit to be straightforward. Removing six screws and the top panel gives access to the main circuit board and power supply and also allows unplugging the LED board and heatsink so it can be removed.

Fig 16 - Rear panel

My favorite feature is the one I started this review with: the small size of the unit. LEDs hold out great promise for compact units. However, even though the LEDs themselves are small, the size of the necessary heatsinks, drivers, and power supplies often gets you back to a standard size unit again. PixelRange have done a good job of keeping everything in proportion here.

Conclusions

So there you have it, the PixelLine Micro W from PixelRange, a manufacturer who's well-experienced in LED products. It's a compact unit that provides another option to users of modular wash lights and battens—but is it the one for you? I hope I've provided useful information to help you make that decision.

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