Chauvet COLORado Batten 72 Tour

By Mike Wood

Figure 1: Fixture as tested

The last time we looked at an LED luminaire from Chauvet was 18 months ago; that's a relatively short space of time for products based on conventional light sources, but it's an eternity for LEDs. In 18 months, the brightness of the source emitters will have increased significantly, and Chauvet will have had to look at software and control to keep up in a marketplace that's running on consumer-product timelines. This rapid pace of new product introduction and subsequent short product lifetimes is a new game for manufacturers; it's a far cry from the ten-years-plus you could expect from a mature incandescent lamp-based product. The COLORado Batten 72 Tour is a brand-new unit; Chauvet sent me a final production prototype immediately after LDI in Orlando. The company warned me that one or two software features weren't finished, and I'll mention any that are relevant to the review as we go along. However, Chauvet tells me that they should be included when the product ships in the first quarter of this year.

This review will follow my normal procedure of detailing the luminaire from source to output—not a very long journey with LED-based luminaires—measuring and reporting everything as I go in as objective a way as possible. As this unit is a linear flood, I'll employ a set of tests more appropriate for the intended use.

Figure 1 shows a view of the Colorado Batten 72 Tour, as supplied to me by Chauvet. It is a long, thin unit designed as a linear wash light for backings or downlight. Its small cross-sectional width of around 3" should help it squeeze into tight gaps, and I'm sure this is a selling point for Chauvet.

Light source and optics

As its name suggests, the Batten 72 includes 72 LEDs along its 39" length. These are 1W emitters and are split across five colors: red, green, blue, amber, and white (RGBAW). The 72 are further split into three groups, or blocks, as Chauvet calls them, which can be individually controlled. Each block thus comprises 24 LEDs—six red, six green, six blue, three amber, and three white. While 72W is not an enormous power output, in its intended use as a wall-washer it should be adequate; the addition of amber and white to the RGB mix should fill in the gaps in the wavelengths somewhat and make for a more continuous and more pleasing spectrum—but more of that later.

Figure 2: LEDs

There's nothing unusual about the optics; each LED has its own standard TIR optic, providing a symmetrical circular distribution with a measured field angle of 53°. Chauvet also offers narrower angle and asymmetric optics, although I was not able to test any of these. Figure 2 shows a close-up of a portion of a block and its associated TIR lenses. A white LED, second from the left in the top row, is clearly distinguishable by the yellow appearance of the phosphor used to create the broad-band white.

(Note: You have to be a little careful when looking at the distribution angles from a linear luminaire like this. The vertical angle can be measured directly; however, measurement of the horizontal angle can be skewed by the wide horizontal separation of the emitters, and, with a unit that's over 3' long, the beam on the wall will always be 3' wider than you might expect from the beam angles alone. The best way to measure them is to turn off, or mask, most emitters and measure a few in the center of the unit. With the Colorado Batten 72 Tour, I was able to just run the center block of 24 emitters and get an acceptable result.)

We can see the total spectral coverage, with all emitters running at full, in

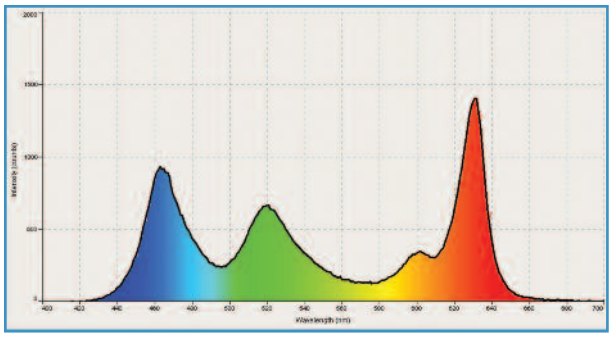

Figure 3: Spectrum—all at full

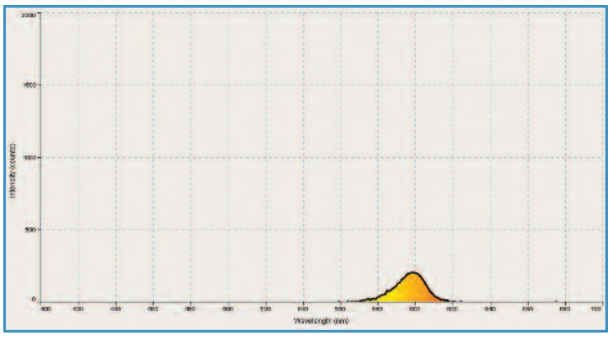

Figure 5: Spectrum—amber

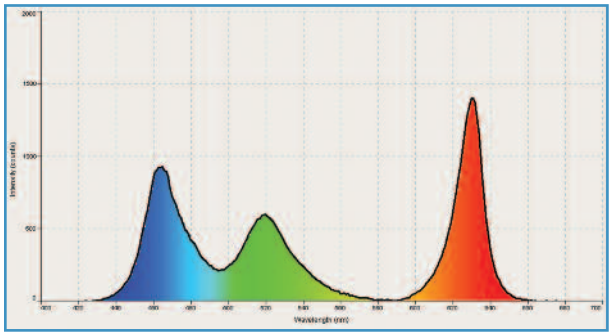

Figure 4: Spectrum—RGB

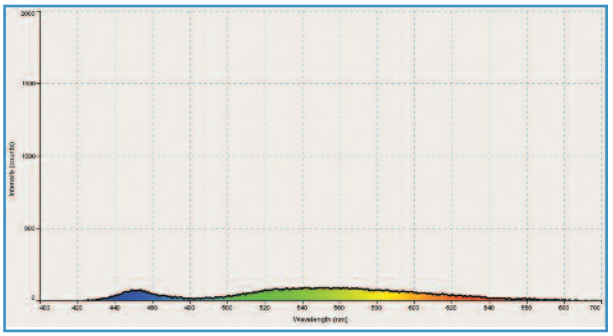

Figure 6: Spectrum—white

Figure 3. The amber fills in the large gap between red and green, and the white ensures that we have output in all wavelengths across the used portion of the visible spectrum. Figure 4 shows the output with just RGB—no amber and white—to show the difference and the discontinuities in the spectrum. Even though amber contributes relatively few lumens to the output (Figure 5), it significantly improves the color rendering and appearance of an LED luminaire, especially when mixing pastel colors that are near to white. You might think from the low levels of the white LED spectrum (Figure 6) that it also contributes little to the brightness, but that isn't the case. It's the area under the spectrum that represents the output—not its height—and, although it's at a low level, the white spectrum is very broad, stretching all the way from the deep blue of its pump LED at 450nm up to the mid-red 650nm extent of the broad yellow phosphor; the area under that broad curve contributes 22% of the fixture's output. Chauvet has chosen a standard set of wavelengths for the RGB LEDs, with the blue at 465nm, green at 520nm, and red at 630nm. The amber, at 600nm, is at the long wavelength end for ambers, and is starting to push into the red-orange region. That may not be the ideal wavelength for filling in the spectral gap when you need something with a little more yellow—but ambers are usually fairly inefficient, so making it a bit redder is good for output. The LEDs are well-cooled, and I didn't see any of the temperature-drift problems I'd seen with earlier units. At only 72W (85W consumption), and with that large heat sink, the unit never rose above feeling slightly warm to the touch.

Output

We've discussed before that, when reporting the output from linear floods, the total lumens figures aren't as immediately useful in comparison. In this case, I measured the Colorado Batten 72 tour at around 2,500

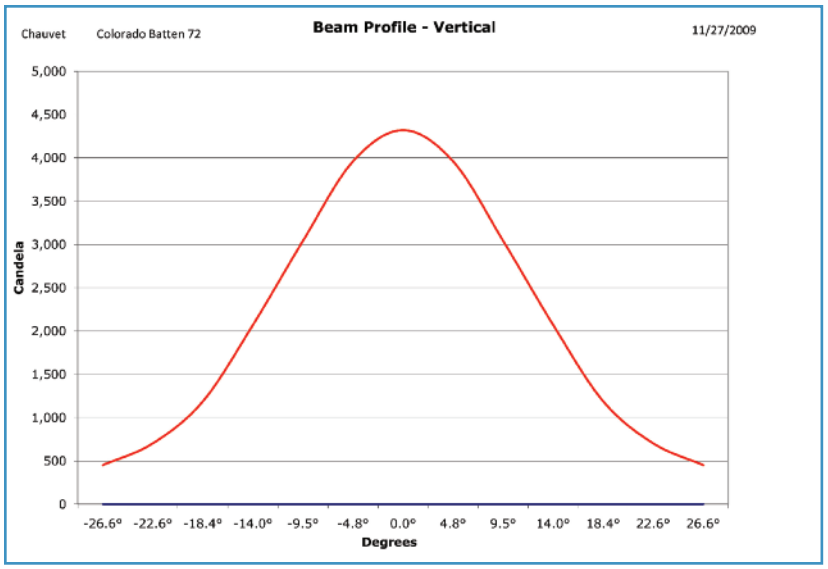

Figure 7: Output

lumens, but that doesn't tell you much. More interesting are the candela figures measured vertically across the beam (Figure 7). As you can see, the output is very smooth, and should blend well between adjacent units. Note that I measured this output in the center of the beam, when all three blocks were running at full output on all channels, producing a white of around 7,000K color temperature. Color homogenization was very good—there was slight color fringing at the horizontal ends of the output, but they would substantially disappear when a continuous run of Batten 72s is used. As with any unit, using separate emitters at short throws will produce colored shadows.

This month, I'm introducing a new piece of equipment with which I've been recently experimenting: the Fixture Beam Analyzer, from Special Labs (www.speciallabs.com). It uses a standard webcam to generate pseudo-colored output images and ISO contour charts from a luminaire's output. These images are generated in real time, making it easy to see the effect of adjusting the position or angle of a luminaire, or of the lamp within the reflector. I've always wanted to illustrate the smoothness of a luminaire's output in these reviews, but so far have not been able to do so in any consistent manner. A regular photograph doesn't show the nuances of a beam's profile very well—especially after it has gone the long route from a digital camera through image processing and finally onto a printed page. I've finally found a way of doing it, and I hope the end result is useful to you. In this case, I generated pseudo color and ISO images for the Colorado Batten 72 from both a single 24 LED block and all three blocks. Figures 8 and 9 show the output from a single block, while

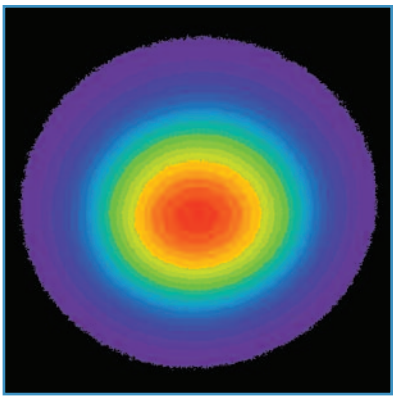

Figure 8: One block

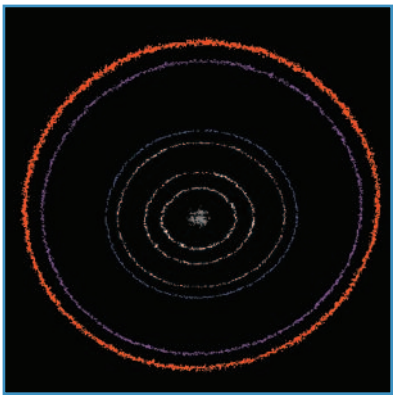

Figure 9 -One block ISO

Figures 10 and 11 show that from the complete unit containing three blocks. The images show very clearly the smooth output from the TIR lenses, with no discontinuities or jumps in the output. In the case of the two ISO images, the blue contour is the 50% line, or the beam angle; the purple contour is the 10% line, or field angle; and the orange contour is the 3%, or cut-off. As time goes on and the software improves, I hope to be able to use this tool to give me direct measurement of total lumens.

Dimming

Achieving good LED dimming is not a trivial problem, and clearly Chauvet has put in a lot of development work on this over the last year or so. The dimming on the Colorado Batten 72 is excellent, a huge improvement over the company's earlier offerings. The firmware offers a choice of a number of different dimmer speeds, both through the menu system and the DMX512 protocol. As you decrease the dimmer speed selection, the luminaire software adds in more and more smoothing to the output by, I assume, 16-bit interpolation from the eight-bit DMX-512 values. The end result in the slower dimmer modes is particularly pleasing; it's reminiscent of incandescent dimming, with no steppiness in the output at all, even at low levels below 10%. You can also choose a faster mode if you want snappy instantaneous changes. Personally, I found Dim Speed 2 to be a good compromise between smoothness and dimming. I'm delighted to see this improvement, as it really expands the possible uses of the product.

One slight downside of the improved dimming smoothness is the PWM frequency. There is always a trade-off between the two, as 16-bit dimming requires much higher clock rates, which usually come at the expense of the PWM rate. The Colorado Batten 72 Tour runs at a 300Hz PWM rate, which, I feel, is a little slow and could cause problems with video if narrow shutter angles are being used. Chauvet says it has had good success with using a frequency that is a multiple of the 60Hz field that, but the company is also working to increase this for at least some of the dimming speeds before the product is released.

(*Note: In most current systems, the PWM frequency times the number of PWM levels gives you the processor clock rate. For example, if your processor clock were 10MHz and you use eight-bit dimming (256 levels), then your PWM rate can be 10MHz / 256 = 39kHz. Raise that up to 16-bit dimming, though, with 65,536 levels, and that same 10MHz clock rate can now only support 152Hz! This is a simplistic approach—and there are ways to overcome these issues—but it shows the magnitude of the problem when we want both high PWM rates and high dimming resolution.)*

The dimmer curve itself is as shown in Figure 12, and falls between the

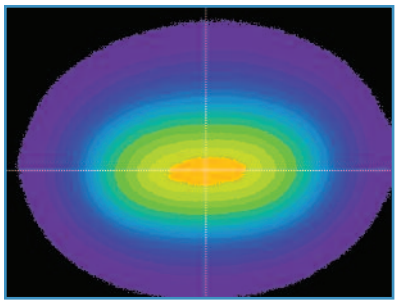

Figure 10: All blocks

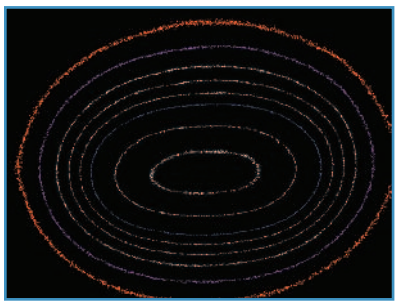

Figure 11: All blocks ISO

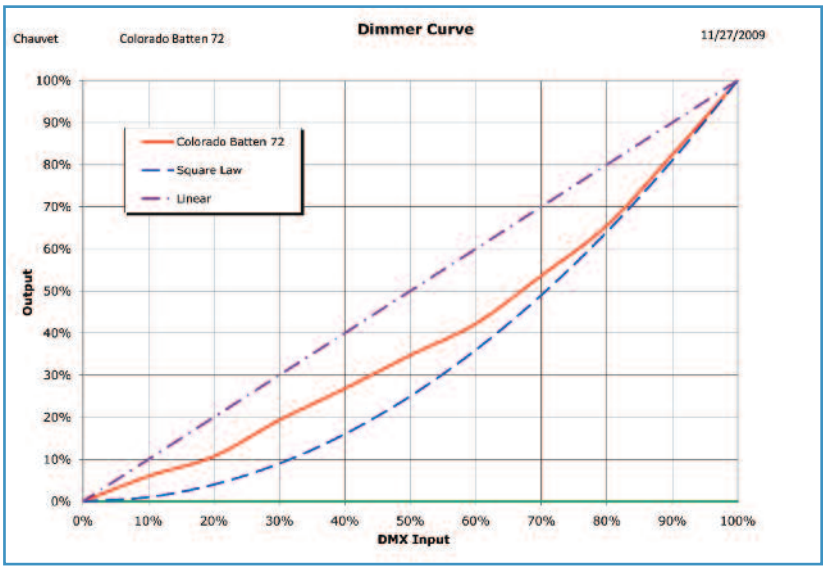

Figure 12: Dimmer curve

Figure 13: Power and safety

Figure 14: Data

Figure 15: Menu

square-law and linear dimming curves. It's perfectly acceptable and feels fine on a fader.

Color system

The RGBAW mixing system gives the Colorado Batten 72 Tour an excellent gamut of available colors, with good performance in the difficult-to-reach pastels. Those white and amber LEDs also look good on skin tones, although that isn't really the intended use of this product.

Color mixing, percentage of full RGBAW output					
Color	Red	Green	Blue	Amber	White
Output	19%	40%	9%	10%	22%

Noise

The Batten 72 has a single visible external fan mounted on the rear panel adjacent to the power input connectors, presumably cooling the power supply. This fan can be run in various modes from "off" to "high." In the default "auto" mode, where fan speed is controlled by temperature, I measured 40dBA at 1m compared to the ambient floor noise in my test room of < 35dBA. This was with an ambient temperature of 75°F, after the fixture had run at full power for 30 minutes.

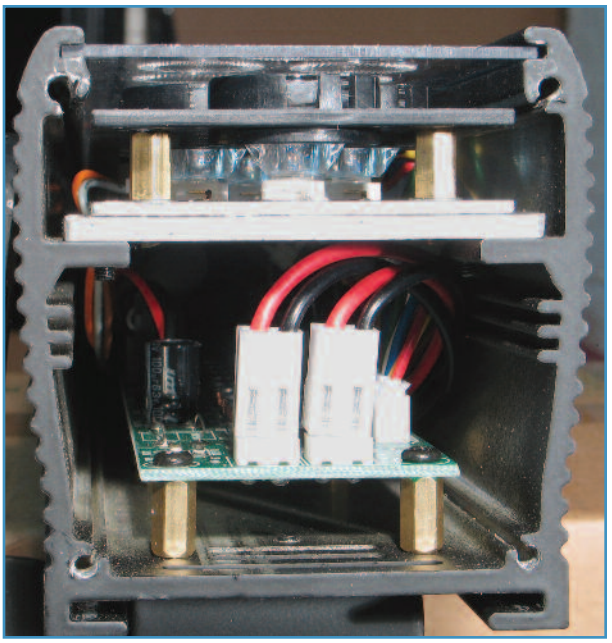

Figure 16: Circuit boards

Electronics and control

Each of the three blocks has its own associated LED and driver boards. The LEDs are mounted on aluminum-backed circuit boards bolted directly to the backbone extrusion that forms the housing for the unit. Behind each LED board is its associated driver which, in turn, is bolted to the rear of that same extrusion. The power supplies are universal voltage auto ranging, and will operate from 100V-240V 50/60Hz. On test at 119V, 60Hz, and full output, the unit consumed 1.15A, 85W, 139VA at a power factor of 0.61. Power input is provided through a PowerCon connector; an output PowerCon is also provided, so that power can be daisy-chained along a string of units (Figure 13).

The Colorado Batten 72 Tour provides both five-pin and three-pin XLR connectors for DMX512 input and output (Figure 14) as well as a comprehensive menu system using a multi-character alphanumeric LCD display (Figure 15). This menu system facilitates configuration of operational parameters, such as the dimming speed and fan settings, as well as allowing stand-alone operation and calibration of the product.

The unit offers a wide range of DMX512 protocols, varying from simple three-channel RGB and HSV modes all the way up to a 15-channel mode, which gives individual full control of each block separately. There is also the "tour" mode, which gives the user access to a wide range of macros and pre-programmed colors.

Construction

As mentioned earlier, a prime feature of the Colorado Batten 72 Tour is its very thin profile. It is achieved by building everything in and around a single U-shaped aluminum extrusion, which runs the length of the unit and provides

structural support, acts as a heat sink for the LEDs and drivers, and gives the unit its slim-line aesthetic appearance. This construction can be clearly seen in Figure 16 once you remove one of the end caps. This slimness comes at the penalty of easy service access, and it requires removing quite a few screws to dig into the innards of the luminaire. Once you've made your way inside, the construction is fairly modular, and service, if necessary, should be relatively straightforward.

Conclusions

The Chauvet Colorado Batten 72 is an attractive and slim unit. At 72W, it won't win awards for output, but, with RGBAW emitters coupled with excellent dimming and smooth LED control, it offers a good package with some finesse in its features. Perhaps this fixture meets a need in your design or application? If so, I suggest trying it out in your venue, and looking at it with your own eyes to see if it does the job for you. As I've said before, the measurement of light output and color with LEDs is not yet consistent and reliable enough to be absolutely certain that what I see and measure is what you will see and measure for yourself. Take a look and make up your own mind.

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