Ayrton EURUS-S

By: Mike Wood

Figure 1: Fixture as tested.

Over the last few years, Ayrton has made a successful transition from manufacturing niche pixel-mapping style products to producing a more conventional range of automated lights. A couple of years ago, I looked at the Ghibli, a white LED-based automated profile spot, which, at the time, was the company's first product with framing shutters. This month, I'm looking at a selection from its next generation of products, which clearly builds on the Ghibli legacy: the Eurus. It comes in two models—one with a high color rendering light engine, and one with a higher output but lower color rendering. It's the latter, called the EURUS-S, that Ayrton provided for this review. (I actually got to see and test this product before the US distributor, ACT Lighting, did. The very first unit into the US came to me first, direct from the factory, on its way to ACT. Many thanks to Ayrton for being so helpful.)

Everything in this review is based on tests using this single Eurus-S unit, all of them run on a nominal 115V 60Hz supply (tests run at 119V); however, the unit is rated to run on voltages from 110-240V 50/60Hz (Figure 1). The tests reported below move through the unit, from light source to output lens, measuring as much as I can.

Light source

The Eurus-S uses a white LED light engine from the ubiquitous Appotronics Atria range. These light engines are being continually improved so, even though the gobo image sizes in Eurus-S are the same as in the Ghibli, the output is higher, and Ayrton has managed to shrink the unit down a little. Figure 2 shows the light engine, which is attached to a heat plate using liquid-filled, phase-converting heat pipes, coupling heat to a large fan-cooled heat sink. Six thermostatically controlled fans pull air across this to keep the LEDs at their safe operating point. The Eurus-S offers a number of operating modes for these fans, to either maximize output or minimize noise; more on that later.

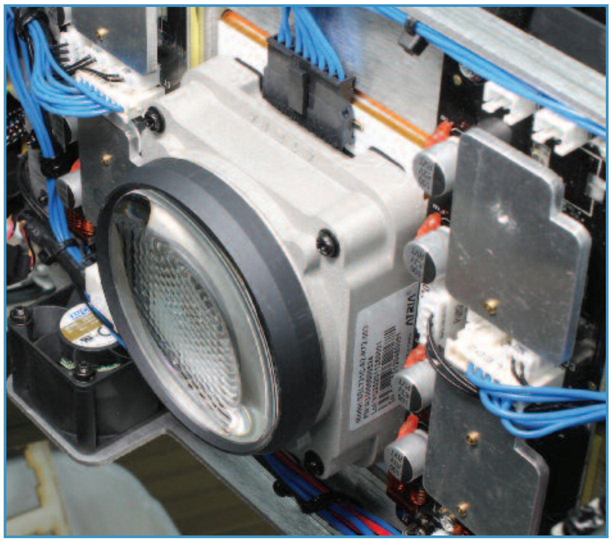

Figure 2: Light engine.

Color

Immediately after the light engine, mounted on the first of two removable modules, is the four-flag CMY + CTO color-mixing system. Each color (cyan, magenta, yellow, and CTO) has two flags coming in from opposite sides of the beam. Again, it's all very familiar but, Ayrton tells me, with refined design and improved mixing patterns from earlier units. I can confirm that the color mixing is indeed very smooth, and I saw no noticeable artifacts, just clean transitions with only a hint of color breakup when soft focusing on a gobo. (This is a generic issue with fly-eye light engines and how they interact with color-mixing gradients). Figure 3 shows the

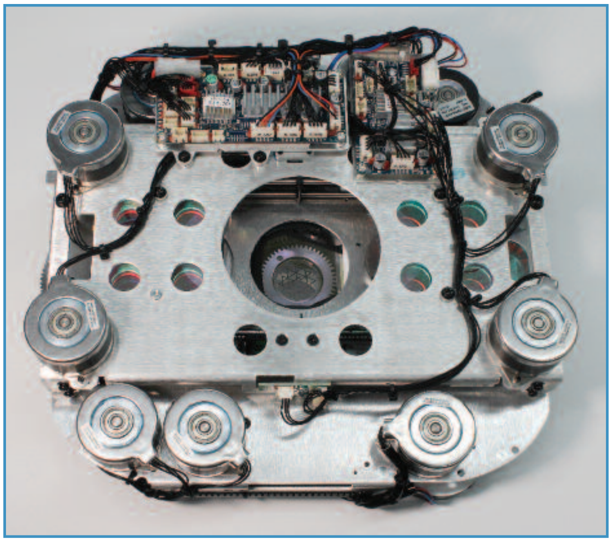

Figure 3: Color and gobo module rear.

color/gobo module with the four CYM CTO color motors visible in the four corners of the rectangular filter housing.

I measured light transmission through the color-mixing system as follows. These are slightly lower than those of the Ghibli, indicating somewhat more saturated colors.

COLOR MIXING

Color	Cyan	Magenta	Yellow	Red	Green	Blue	CTO
Transmission	13%	6%	56%	5.3%	3.2%	0.2%	38%

When inserted fully, the CTO flags reduced color temperature from a native 6,881K down to a CCT of 3,038K. As mentioned earlier, the Eurus-S is optimized for output rather than color rendering. The native open 6,881K beam had a TM-30 Rf of 73 and Rg of 93 (CRI Ra 72); with full CTO inserted at 3,038K, the TM-30 Rf was 72 and Rg was 93 (CRI Ra 68). Figure 4 shows the spectral distribution at these two extremes of color temperature.

Immediately after the color-mixing flags is a large double flag containing two filters: a half minus green and a quarter minus green. These can be inserted to improve color rendering as required, albeit with an inevitable corresponding loss in output. Figure 5 shows the results. Using the half minus green improved TM-30 Rf to 79, and Rg to 99 (CRI Ra 84). It took 0.6 second to insert either of these filters and 0.9 second to transition between them. (These color-rendering filters work by reducing the large green spike that comes from white LEDs, flattening the spectrum.)

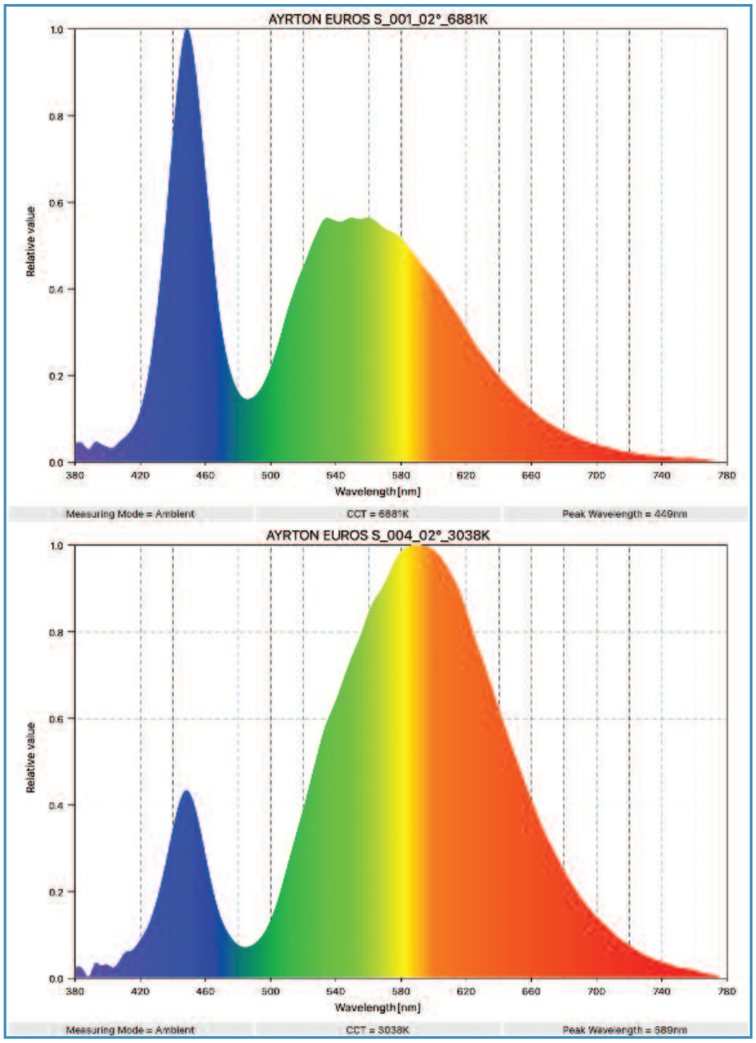

Figure 4: Spectral distribution.

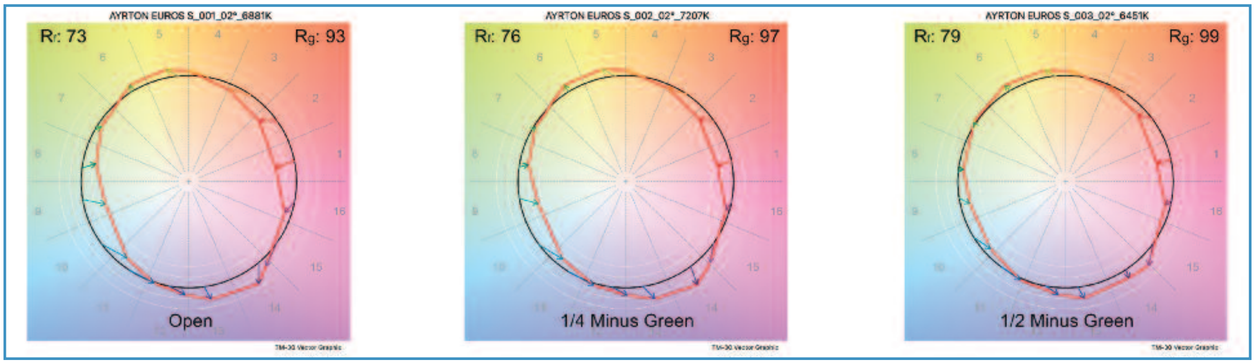

Figure 5: Color rendering.

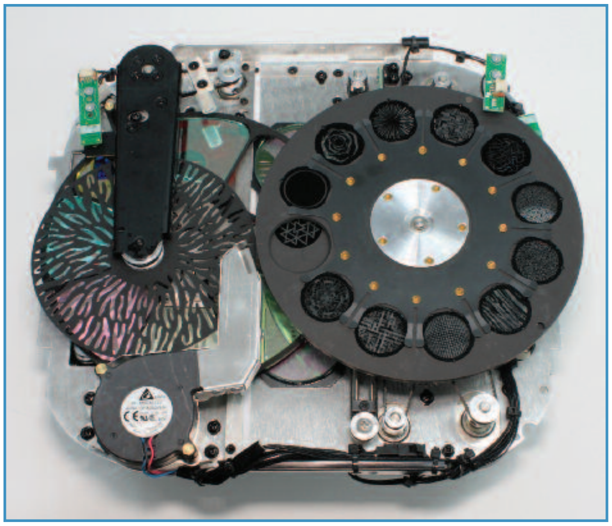

Figure 6: Gobo module.

Finally, as regards color systems the Eurus-S has a fixed color wheel. This has seven fixed dichroic colors, including a ¼ CTB filter, and an open hole.

FIXED COLOR WHEEL

Color	¼ CTB	Magenta	Congo Blue	Green	Orange	Blue	Red
Transmission	55%	2.2%	0.5%	15%	10%	4.43%	1.8%

The colors are trapezoidal with a narrow band separating them, so half colors are possible. Color change speed was good, with very smooth transitions and slow wheel rotations possible.

COLOR SYSTEMS

Color wheel speed – adjacent	0.15 sec
Color wheel speed – worst case	0.35 sec
Color wheel spin – maximum speed	0.46 sec/rev = 130 rpm
Color wheel spin – maximum speed	168 sec/rev = 0.36 rpm
Color mix speed – worst case	0.7 sec

Gobos

On the other side of this module, the Eurus-S has an animation wheel and two gobo wheels as shown in Figure 6, where you can see the animation wheel on the left, above the fixed color wheel, and the two concentric gobo wheels on the right with the fixed gobo wheel on top (last optically).

The first in the optical path is the animation wheel. This can be inserted or removed from the beam at a fixed angle in about 0.8 second and rotated at a wide range of speeds up to a maximum 12rpm.

Next in line is the rotating gobo wheel, which has seven rotating, indexing gobos plus an open hole (one more than the Ghibli) and the fixed wheel with 11 gobos plus open hole. This is four more gobos on the fixed wheel than in the Ghibli. All gobos are glass and replaceable.

ROTATING GOBO

Gobo change speed – adjacent	0.5 sec
Gobo change speed – worst case	0.8 sec
Maximum gobo spin speed	0.42 sec/rev = 144 rpm
Minimum gobo spin speed	864 sec/rev = 0.069 rpm
Maximum wheel spin speed	0.83 sec/rev = 73 rpm
Minimum wheel spin speed	408 sec/rev = 0.1 rpm
Fixed Gobo	
Gobo change speed – adjacent	0.35 sec
Gobo change speed – worst case	0.7 sec
Maximum wheel spin speed	0.69 sec/rev = 87 rpm
Minimum wheel spin speed	426 sec/rev = 0.1 rpm

Positioning and rotation of both wheels was quick and smooth, with a good range of rotation speeds. My only observation is that the fixed gobo rotation was a little steppy at very slow speeds. The rotating wheel showed very little bounce when changing.

Focus quality on all gobos was good. There is some spherical aberration, which manifests as edge-to-center difference at some zoom positions, but it's not objectionable. There is very little color fringing. Figure 7 shows an example of the gobo morph effect from the rotating wheel to the fixed. (Note: I've been asked why I include these gobo morph images. It's not just to show the aesthetics of the

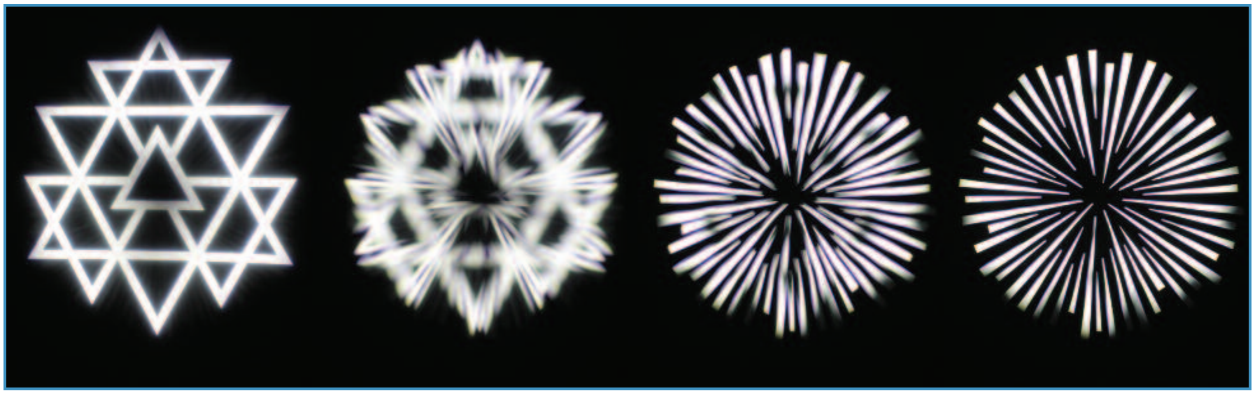

Figure 7: Gobo morph.

unit, although that's part of it. I've also found them to be a good way of spotting chromatic aberration and other lens issues. In the mid positions, when both gobos are out of focus, these issues are often emphasized. For example, take a look at the second image in the sequence in Figure 7. You can see some slight discoloration caused by interaction between the two gobos and the lens system. This is a very cruel test!?

Framing and iris

The second removable optical module contains the framing system and iris. Figures 8 and 9 show its two sides, with the motors and framing blades (driven through a three-bar linkage system) all clearly visible. As seems to be becoming increasingly common in framing systems, the Eurus-S offers blades that are able to travel across the whole beam—but, as a consequence, it has reduced control over the angle adjustment of each individual blade. I really don't have a strong opinion on which is more useful—I'm sure it depends on the specific show—but you should be aware of this trade-off. Do you want individual blade angle, or do you want beam coverage? In most available framing systems, you can't have both. In terms of geometry, the Eurus-S framing system is similar to that used in the Ghibli. Each blade can be tilted approximately 22.5º in each direction at the center of the beam (45º in total) and can travel fully across the beam. Figure 10 shows two images of the system in use. The left image is a square made from all four blades, hard-focused on the top blade to show the focus difference between blades; the right image shows the maximum angle for a single blade. Finally, the entire framing mechanism can also be rotated by +/-65º. I measured a maximum of 0.6 second to move a blade into position across the beam.

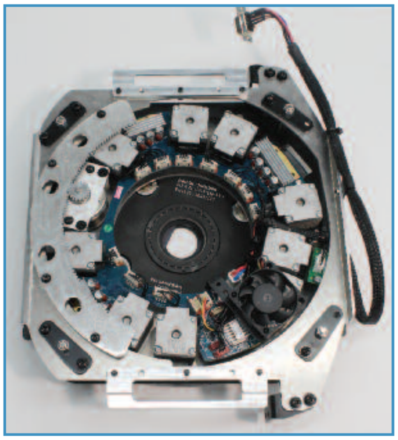

Figure 8: Framing side 1.

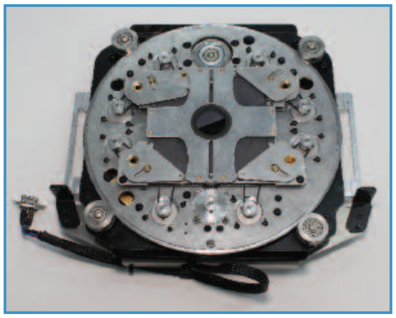

Figure 9: Framing side 2.

Right behind the framing blades and visible in Figure 8 is

Figure 10: Shutter focus and blade angle.

the iris. I measured the opening/closing time of this at 0.35 second. The fully closed iris reduces the aperture size to 15% of its full size, which gives equivalent field angles of 0.7° at minimum zoom and 6.6° at maximum zoom.

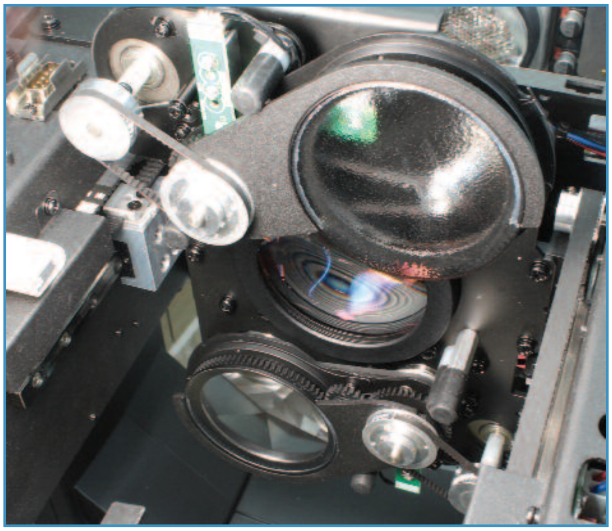

Figure 11: Prisms and frost.

Prism and frost systems

The Eurus-S has two prisms and two frost flags. These are attached to the rear of the first lens group and move back and forward as it moves changing focus and focal length. Figure 11 shows the arrangement. There are effectively three slot positions. Prism 1 has a slot of its own closest to the lens, then slot 2 is shared by prism 2 and frost 1; the final slot is for frost 2. This arrangement means that some juggling goes on and prism 2 and frost 1 are mutually exclusive. The two prisms, a five-facet circular and a four-facet linear, are completely independent from each other; either or both can be inserted at the same time and combined overlay effects are possible. The time to insert or remove these prisms is about 0.8 second but varies with whatever the zoom and focus are set to, as, in some positions, the lenses have to move apart first to give room for the prisms. Once inserted, they can be rotated at speeds up to 0.6 sec/rev (100 rpm).

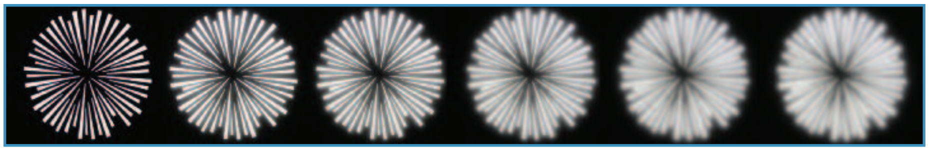

Figure 12: Frost 1 effect.

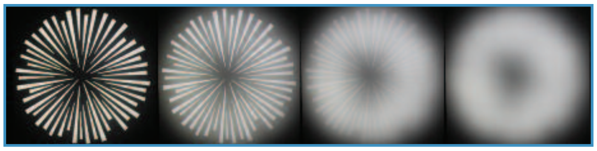

Figure 13: Frost 2 effect.

Both frost flags are variable and give differing types of effects. Figures 12 and 13 show the result of using them on the same gobo. Frost 1 is much more of a true frost and softens the focused edges of the pattern, while frost 2 is more of a contrast reducer which leaves the edges sharp.

Lenses and output

The output lens system is very familiar; the Eurus-S uses a three-lens group zoom, with the front group fixed as the output lens and the other two groups moving to provide zoom and focus control. The change Ayrton has made here is to increase the output lens size up to 170mm diameter. Zoom took 0.9 second to run from maximum to minimum while focus took 0.6 second from end to end.

I measured the output of the Eurus-S, after allowing the unit to reach thermal equilibrium, at 25,780 lumens at a 42.7° field angle at the wide-angle end of zoom, ramping down to 12,257 lumens at a narrow angle of 4.7°. The field flatness can be seen in the beam profiles in Figures 14 and 15. These measurements were taken after running the unit at full power for at least 30 minutes to account for any warm-up droop. I measured 18% droop on the unit from cold turn-on until thermal equilibrium was reached after 10 – 15 minutes.

Dimming was smooth and accurate with a standard PWM speed of 1.2kHz. Faster PWM rates, up to 25kHz, are available through the menu or DMX control channel. Figure 16 shows the standard square-law dimmer curve. I measured the maximum strobe speed of the LEDs at 24kHz.

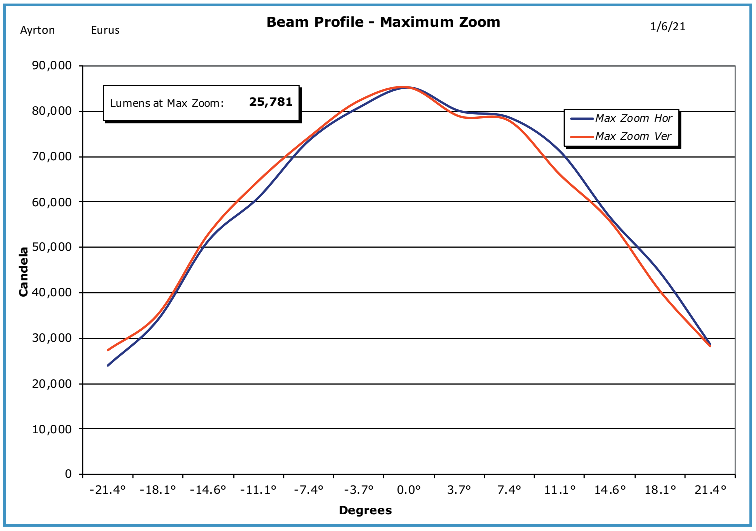

Figure 14: Output at maximum zoom.

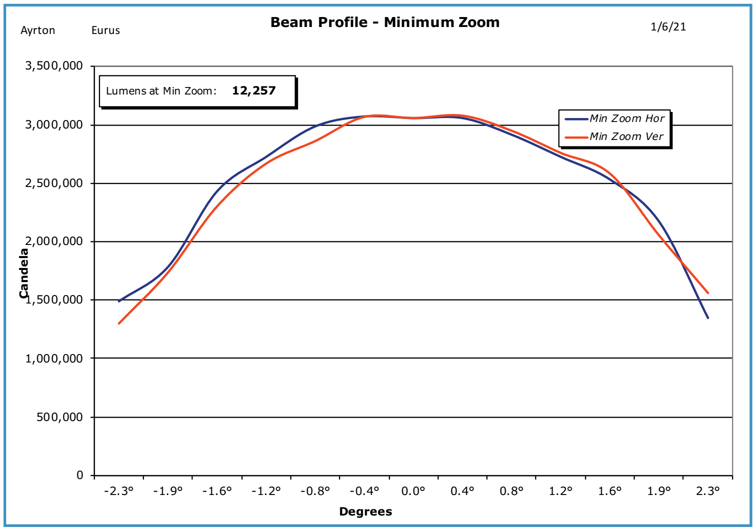

Figure 15: Output at minimum zoom.

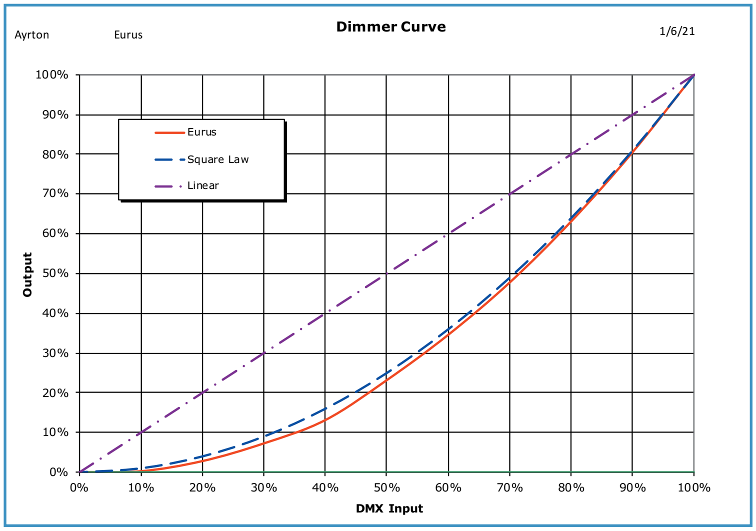

Figure 16: Dimmer curve.

Pan and tilt

The Eurus-S has 540° of pan and 270° of tilt movement. I measured pan speed over the full travel at 4.5 seconds and 2.6 seconds for 180°. In tilt, the figures were three seconds for the full 270° and 2.4 seconds for 180°. Movement on both axes was very smooth, with minimal hysteresis and just a little bounce on tilt. Pan exhibited 0.08° of hysteresis, which is 0.3" at a throw of 20'. Tilt was

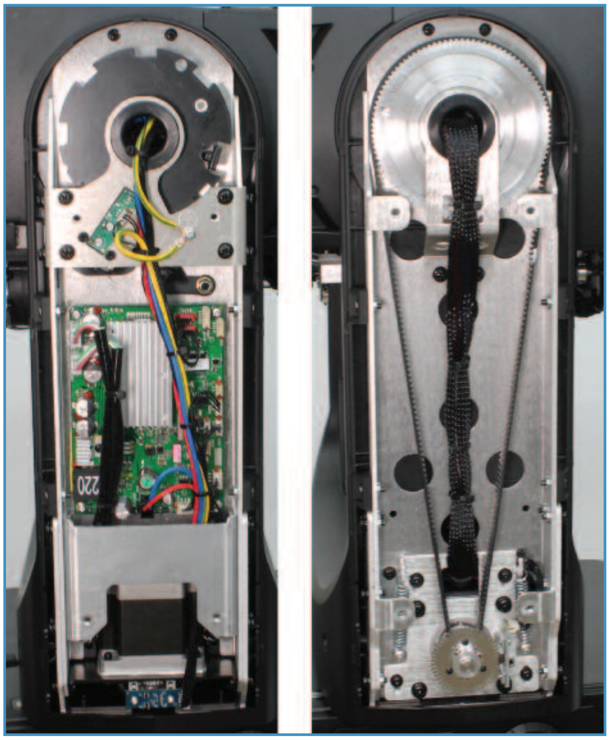

Figure 17: Yoke arms.

less, at 0.04°, 0.2" at 20'. Figure 17 shows the construction details of both yoke arms.

Noise

As is often the case, zoom and focus were the noisiest functions. It's hard to move those large lenses quietly. These measurements were taken with the fans in the default "auto" mode. In the "super silent" mode, with the fans turning very slowly, the fixture was about 5dBA quieter, while light output reduced to about 61%.

SOUND LEVELS

Ambient	<35 dBA at 1m
Stationary	47.0 dBA at 1m
Homing/Initialization	55.2 dBA at 1m
Pan	47.8 dBA at 1m
Tilt	47.9 dBA at 1m
Color	47.6 dBA at 1m
Zoom	56.5 dBA at 1m
Focus	55.7 dBA at 1m
Frost	47.2 dBA at 1m
Gobo	47.2 dBA at 1m
Gobo Rotate	47.8 dBA at 1m
Prism	47.8 dBA at 1m
Animation Wheel	47.2 dBA at 1m
Framing	50.2 dBA at 1m

Figure 18: Menu.

Figure 19: Connectors.

Homing/initialization time

I measured the time for a full initialization of the Eurus-S from power up to be 53 seconds and 41 seconds from a DMX reset command. The reset is well-behaved in that the LEDs are dimmed out before reset starts and fade up again after final positioning.

Power and construction

Running on a 115V 60Hz supply, the Eurus-S consumed 7.2A when running at full output and allowed to warm up. I measured this at 850W with a power factor of 0.99. Quiescent load, with the unit powered up but no LEDs on, was 1.0A, 122W, power factor 0.98.

Disassembly for maintenance or cleaning was very simple; the two main optical modules I discuss above are removed very easily, with just a single connector and a couple of screws for each. Access to the lenses for cleaning is also very straightforward.

Figure 18 shows the now-standard Ayrton color LCD and encoder wheel. Figure 19 shows the connector panel, with Neutrik powerCON TRUE1 power input, five-pin DMX512 input and output, and EtherCON RJ-45 in and out for Ethernet networking. I tested and confirmed RDM functionality using a DMXcat.

Conclusion

We've gone from input to output for the Eurus-S. This is an evolutionary product that builds on the legacy of Ghibli and other Ayrton products, with refinements in engineering, and improved output in a slightly smaller package. Is the Eurus-S for you? That's your decision.

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