The Elation Design Spot 250

by Mike Wood


Fig. 1: Unit as tested


Fig. 2: Lamp ballast and voltage tappings

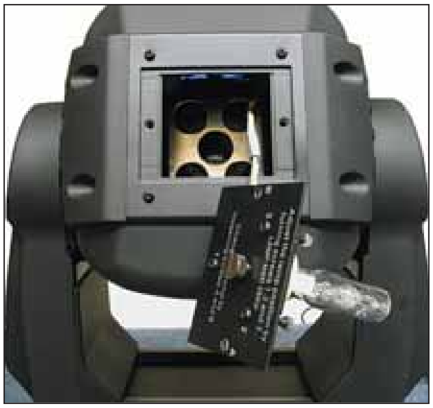
Fig. 3: lamp and lamp change

It's clear that, having added Eric Loader as director of sales, the American DJ Group sees its Elation Professional range of lighting products as having come of age. We've talked before about the increasingly blurred line between products designed for permanent installation in clubs and those for the touring market. With many once-proprietary components, such as high-temperature micro-stepping motors, now available as commodity items, there is an inevitable leveling of the playing field. This month we are looking at the Elation Design Spot 250—a product that seeks to blur that line even further.

Elation advertises the Design Spot 250 as a "hybrid," with elements of both a spot and a wash in one unit. There is no doubt, however, that it is primarily a spot fixture, so that is the main direction this review takes. The wash features are covered at appropriate points in the text.

As a reminder, this review will follow our established format—working forward in the fixture from lamp to output lens presenting the measured results in as objective a manner as possible. All results are based on averaging multiple readings when appropriate, but they are all from a single unit supplied by the manufacturer as representative of the product, so you may get slightly different results in your tests.

Lamp

The Design Spot 250, as its name suggests, is a 250W unit using the Philips MSD 250/2 lamp as standard. This 3,000-hour lamp is well established as an extremely reliable option in automated lighting fixtures. As an aside, the "/2" at the end of the name indicates it is the higher color temperature version, 8,500K, as opposed to the 6,700K of the standard MSD 250. Within limits, the higher the color temperature, the brighter a fixture appears—so just about everyone uses the /2 versions. The standard lamps are fully compatible, though, so you can always drop in an MSD 250 if you prefer a lower color temperature (Fig. 1: Unit as tested).

The Design Spot 250 uses a magnetic ballast and standard transformers driving linear low-voltage power supplies, so it is necessary to set the tappings for the local supply voltage. All the tests here were carried out at around 118V, 60Hz, with the fixture set to its 120V 60Hz settings (Fig. 2: Lamp ballast and voltage tappings).

Lamp installation is very straightforward: remove two screws from the lamp holder plate (take care—the screws aren't captive) and the whole lamp assembly pulls out from the rear of the fixture. There is also a good lamp-adjust system to optimize the arc position in the reflector (Fig. 3: Lamp and lamp change system).

The lamp is mounted axially in a cold-mirror-faceted elliptical reflector, followed by a hot mirror. This ensures that most heat is kept to the rear of the unit. The Design Spot 250 has temperature-controlled fans and, in all tests, I found no evidence of overheating, with the fixture remaining pleasantly cool.

As mentioned earlier, the lamp is supplied from a conventional magnetic ballast with power factor correction. At 118V 60Hz supply, I measured a current draw for the whole fixture of 4.2A with a power factor of 0.88.

Color wheel

First in the optical train after the lamp is the color wheel—many fixtures have the color system before the gobos like this, as it avoids any potential for distortion of the image if the dichroic filters aren't completely optically flat. The Design Spot 250 has a single color wheel fitted with eight non-changeable dichroic colors. The colors are trapezoidal and touch each other, so you are able to achieve some good half-color effects (Fig. 4).

Color Wheel

Color	Red	Blue	Green	Yellow	Magenta	Orange	UV	Pink
Transmission	2.2%	36%	17%	55%	15%	13%	7%	43%

We already mentioned the very high color temperature of the MSD 250/2 at 8,500K, so the relatively low output in red is not surprising. The choice of colors is reasonable for a fixed color system and you could always use one of the gobo wheels for any custom colors you need.

Color change speed was good, with the software for both this and the gobo wheels supporting "quick path" movement, so that the wheel rotates in the appropriate direction to minimize the distance it has to turn.

Color Wheel

Color change speed – adjacent	0.3 sec
Color change speed – worst case	0.8 sec
Maximum wheel spin speed	0.54 sec/rev = 112 rpm
Minimum wheel spin speed	105 sec/rev = .57 rpm

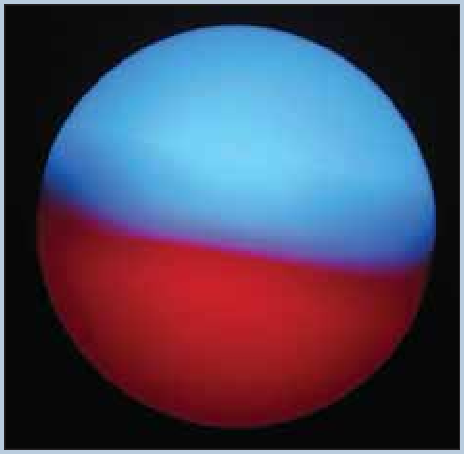

Fig. 4: Half colors

Gobos

As can be seen in Figure 5, the gobo wheels are next in line. The Design Spot 250 has rotating and fixed gobo wheels, both of which have seven gobos plus an open position. What's become increasingly common on moving light fixtures these days is the use of "snap-in" cartridges for changing gobos and, pleasingly, the Design Spot has this feature.

All gobos are contained in small trapezoid shaped holders (Fig. 6: Gobo in holder) which slide in under a retaining spring and then click into locating holes. This makes them easy to change even with the fixture rigged.

Focus quality for both wheels was acceptable, given the small size of the gobos, and was pretty standard for an ellipsoidal system (Fig. 7: Focus quality). There was very little chromatic aberration, but some difference in focus between the center and edge of the beam was visible (spherical aberration).

One nice feature of an ellipsoidal optical system is the relatively short back focal range and thus the ability to morph between two gobos as you pull focus. The Design Spot 250 performs well here and Figure 8 shows a sequence of photographs taken as focus is shifted from one wheel to the other.

Fig. 5: Head

Static Gobo Wheel

Gobo change time, adjacent apertures	0.5 sec
Gobo change time, max (Gobo 1 to 4)	0.8 sec

Rotating Gobo Wheel

Gobo change time, adjacent apertures	0.6 sec
Gobo change time, max (Gobo 1 to 4)	1.0 sec
Maximum gobo rotate speed	0.45 sec/rev = 133 rpm
Minimum gobo rotate speed	144 sec/rev = 0.4 rpm
Maximum wheel spin speed (clockwise only)	4.75 sec/rev = 12.6 rpm
Minimum wheel spin speed (clockwise only)	19 sec/rev = 3.1 rpm

Fig. 6: Gobo in holder

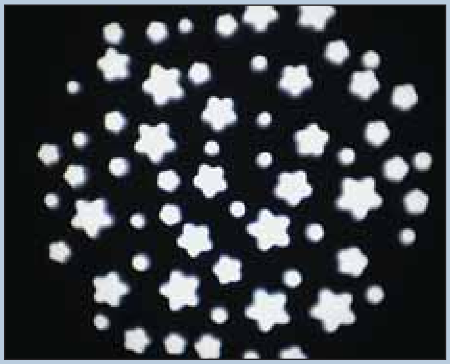

Fig. 7: Focus quality

Indexing and wheel positioning accuracy on the rotating gobo wheels was good, with measured hysteresis error at around 0.1°. That's less than 0.5" at a 20' throw. Gobo rotation was generally good but was a little jerky in places at slow speeds.

One slight quibble for me was the decision with the DMX512 protocol to restrict the indexing on the rotating gobo wheel to only 127 steps. This means each step is nearly 3°, which is too coarse for accurate alignment of projected logos. The hardware is clearly capable of better than this and I would appreciate an alternative DMX512 protocol that allowed finer positioning of the gobo indexing. I'd gladly give up the 20 speeds of gobos shake offered in the current protocol.

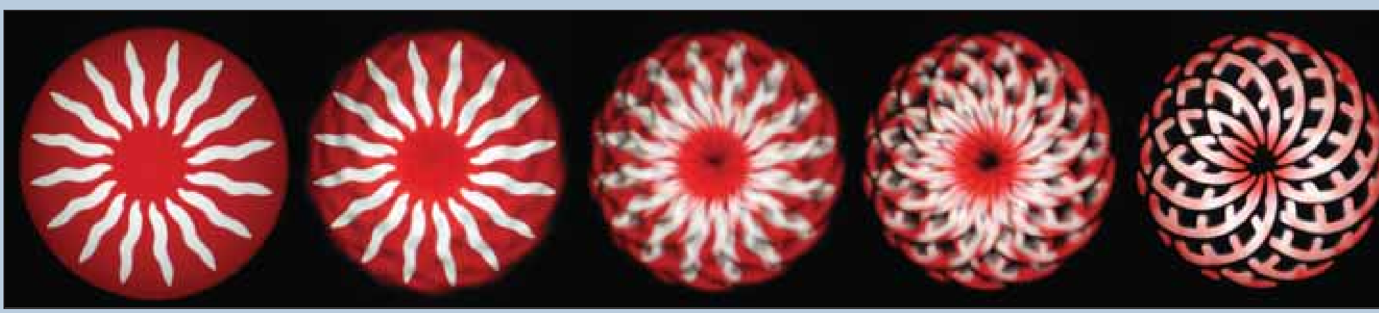

Fig. 8: Morph sequence

Fig. 9: Aux lens

Fig. 10: Field flatness

Iris

Next in line is a standard multi-leaf iris, which is capable of reducing the beam size to 25% (4.6°) of the full size when closed. It takes the iris 1.1 seconds to move from a fully open to fully closed position.

Lenses and output

As shipped, the Design Spot 250 uses a two-element lens system; however, the head contains an optional third auxiliary lens which can be manually inserted after the iris to provide a slightly wider beam (Fig. 9: Aux lens). Element one is a glued achromat, which moves providing focus control; next comes the optional auxiliary single biconvex lens. The final element is the static front lens. Field flatness with lamp optimization adjusted was normal for an ellipsoidal system (Fig. 10).

Focus time from end to end was 1.6 seconds. The output field angle as shipped, without the auxiliary lens fitted, was measured at 18.3° with total field lumens of 2,997 lumens. With the auxiliary lens fitted, the field angle increased to 21.0° and the total lumens went up significantly to 3,778 lumens. So, if 21° works for you, I recommend fitting the auxiliary lens and getting the improved light output. (Fig. 11: Output without aux lens. Fig. 12: Output with aux lens.)

Dimmer and strobe

Next in the optical train, in the middle of the lens system, is the dimmer and strobe mechanism which uses a fairly standard pair of flags to provide both dimming and strobing functions. Figure 13 shows the measured output dim curve compared with hypothetical linear and square laws.

Dimming was acceptably smooth. Beam artifacts become visible at low dim values, you probably want to get through these fairly quickly.

The strobe system has a speed range of 1.1Hz-6.25Hz, with many different pulse and random strobe modes available through the DMX512 channel.

Frost/wash

Twin frost flags with an open/close time of 0.3 seconds are provided. This is fairly standard so far; however, the effect produced is far from standard. These are the flags that provide the Design Spot's "wash" mode. The effect on a gobo is unusual—rather than softening the gobo image, the frost flags reduce the contrast ratio while leaving the edge sharpness pretty much unchanged. This can be clearly seen in Figure 14.

With an open field and full frost, the fixture's output and distribution does indeed resemble that of a wash light with a wide 44° field angle (Fig. 15: Wash field); however, the loss in light output produced by these flags is very significant. In the frosted "wash" mode, total lumens was reduced by 77% down to only 680 (Fig. 16: Output with full frost). That's very low for a 250W wash light. I'm sure the wash option is an effect that would be useful from time to time but it doesn't replace a dedicated wash unit.

Prism

The final element before the output lens is the three-facet prism. Image separation and focus is good (Fig. 17).

Prism

Prism in/out time	1 sec
Maximum prism spin speed	0.35 sec/rev = 171 rpm
Minimum prism spin speed	16.2 sec/rev = 3.7 rpm

Pan and tilt

The fixture has a very large pan and tilt range of 630° x 265° (The 630° can be optionally reduced through a menu setting to 540°) and moved well. A pan move of the entire 630° took 4.5 seconds, while a more typical move of 180° took 2.2 seconds. For tilt, the full 265° took 2.3 seconds, while 180° took 1.7 seconds. All tests were carried out in 16-bit resolution mode, although the software allows the option of running the pan and tilt in eight-bit resolution as well.

Repeatability on pan was a respectable 0.10°, while tilt had an excellent 0.05°. This pan repeatability equates to about 0.4" at a 20' throw. Movement was accurate but slightly "notchy" at lower speeds.

Both pan and tilt axes are fitted with encoder wheels and so provide automatic position reset if the fixture is knocked out of position. (Note: The unit I tested had a minor software bug in the position reset code and didn't reset to exactly the correct position, Elation tells me this has now been fixed.)

Noise

As mentioned above, the Design Spot 250 uses thermostatically controlled fans. Noise tests were carried out after the fixture had been

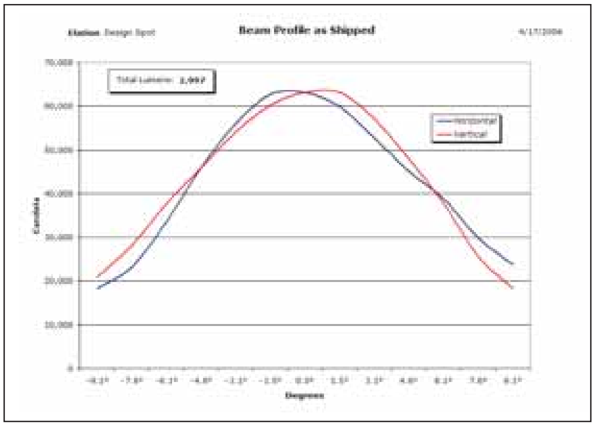

Fig. 11: Output without aux lens

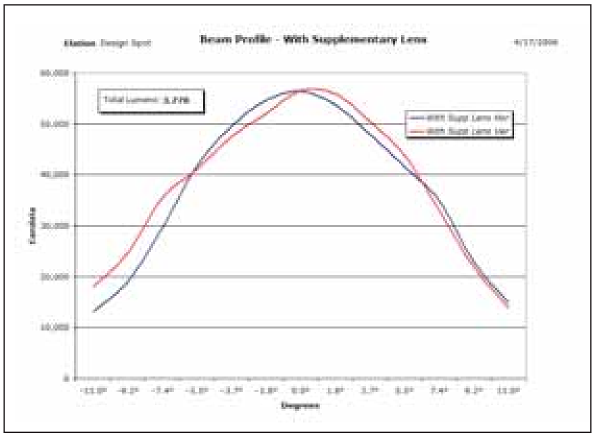

Fig. 12: Output with aux lens

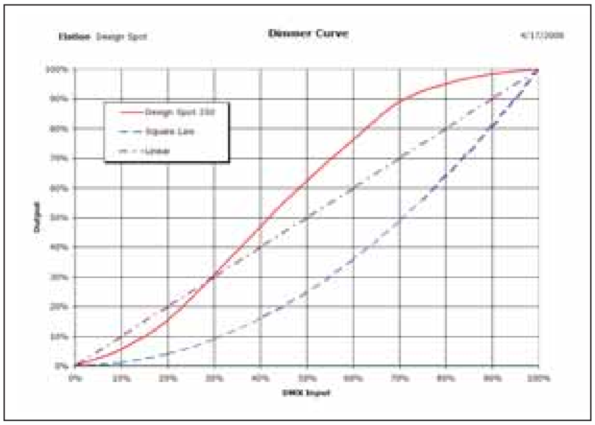

Fig. 13: Dimmer curve

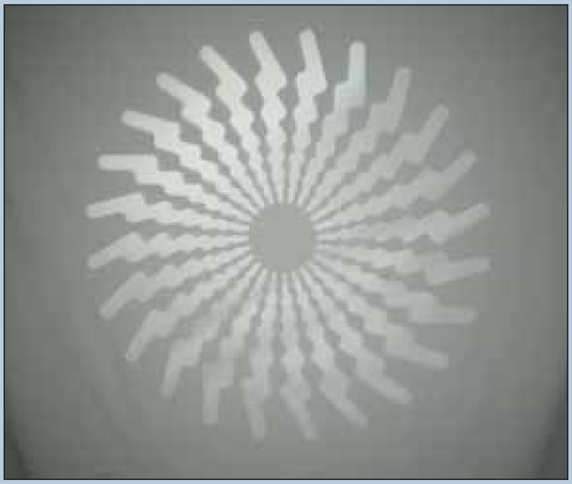

Fig. 14: Frosted gobo

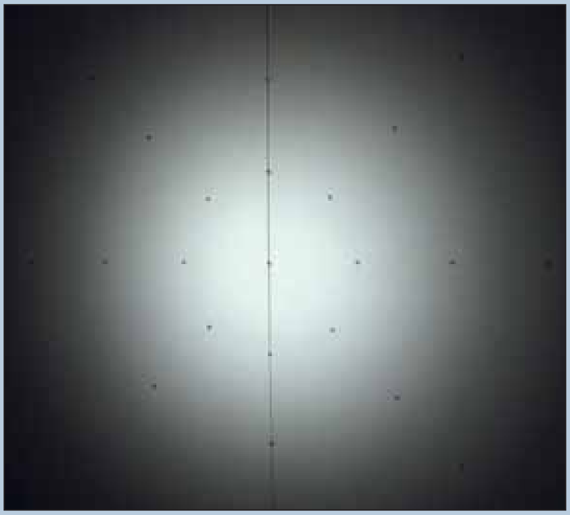

Fig. 15: Wash field

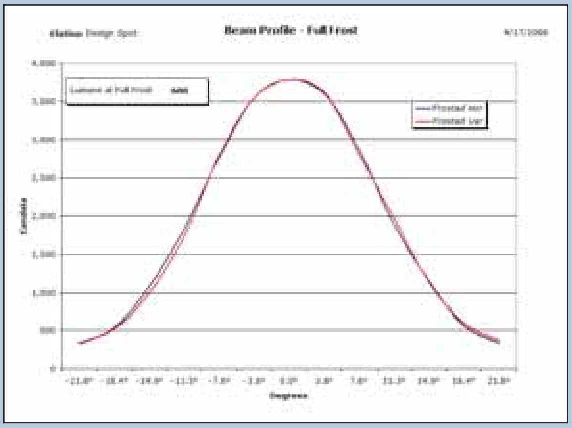

Fig. 16: Output with full frost

running for about two hours in an ambient temperature of 75° F. As the fans provided most of the noise, the sound levels were fairly constant throughout the tests.

Sound Levels

Ambient	<35 dBA at 1m
Stationary	50 dBA at 1m
Homing/Initialization	54 dBA at 1m
Pan	53 dBA at 1m
Tilt	53 dBA at 1m
Color	50 dBA at 1m
Frost	51 dBA at 1m
Prism	53 dBA at 1m
Gobo rotate	55 dBA at 1m
Focus	52 dBA at 1m
Strobe	51 dBA at 1m

These figures are fairly typical for a fixture of this type and there were no annoying movement whines. Gobo rotate was the noisiest effect and could be controlled by keeping the speed down if it was a problem.

Electrical parameters

Power consumption at 118V, 60Hz

	Max Current, RMS	Power Factor
Normal running	4.2A	0.88

The lamp can either be set to strike with fixture power or can be controlled directly through the DMX control channel. In addition, the menuing system allows you to set an individual delay time on lamp strike. This means you can stagger the lamp strikes as a rig powers up, which can help prevent tripping breakers from the surge current.

Homing/initialization time

With a cold start—applying power with the lamp in “auto-strike” mode, the result was 30 seconds. Given a warm start, in which the fixture is already powered up and the “reset” command sent, the result was 38 seconds.

Electronics and control

The menuing system (Fig. 18: Display) gives the user a comprehensive range of options, as you would expect from a modern fixture. The Design Spot 250 only offers non-standard three-pin XLR connectors for DMX-512 but, other than that, I had no problems with the DMX-512 implementation.

Construction is tidy and uses distributed motor control boards. Figure 19 shows a typical board, this one mounted in the yoke arm.

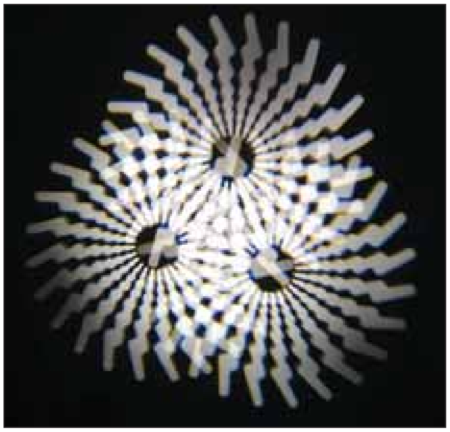

Fig. 17: Prism

Fig. 18: Display

Maintenance and replacement of these boards and other components should be straightforward (Fig. 19). The use of magnetic technology for lamp ballast and the power supplies also means the unit is likely to be reliable. This is very important in the installation market, where reliability counts for more than weight or automatic voltage selection.

Elation Professional is prolific in its production of new fixtures and has a solid reputation in its sector of the market. Does the Design Spot 250 have what it takes to make that move from installations to touring? As usual I leave you to draw your own conclusions.

Mike Wood provides technical and intellectual property consulting services to the entertainment technology industry. He can be contacted at mike@mikewoodconsulting.com

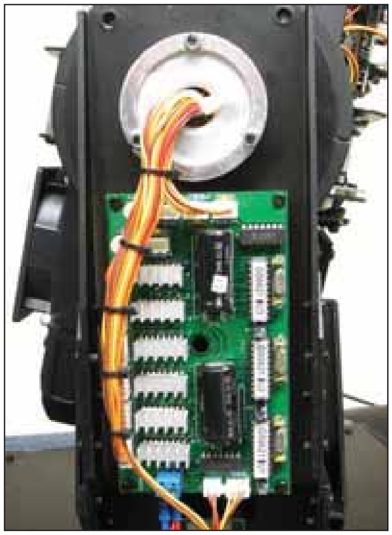

Fig. 19: Yoke arm