# Ayrton MagicPanel FX

By Mike Wood


Figure 1: Fixture as tested.

Ayrton seems to have found its spot in entertainment lighting, and it hasn't been slow to capitalize on it. Although the company manufactures more conventional moving lights, it's the "Creative Solution" products that seem to have caught the attention of many LDs. Essentially a range of LED-based products that provide various forms of automated pixel arrays, units such as the MagicPanel and MagicDot have been showing up in numbers on many shows, often not as lighting per se but as a combination of lighting effect and low-res screen. We've looked at a couple of them in this column before and, this time, I'm examining the MagicPanel FX, one of the newest offerings in the line.

As always when I test these kinds of effects fixtures, it's important not to judge the unit purely on the more conventional parameters, such as lumens. The more subjective results, such as aerial beam appearance, are just as important; however, I'll follow my usual track from light source to output and try and accurately report what I saw.

Ayrton distributes its products in the US through Morpheus Lights, which provided me a unit from its demo stock for this review. Everything I report is based on the tests on this single, typical, unit. All tests were run on a nominal 115V 60Hz supply (tests run at 118V); however, the unit is rated to run on voltages from 110V — 240V 50/60Hz (Figure 1).

## Light sources and optics

The Ayrton MagicPanel FX is based around a 5 x 5 array of 25 four-color RGBWLED emitters. I measured each of the 25 packages as consuming about 25W or slightly more, with all four LEDs running at full power. Each LED package, with four dies, is mounted directly to a large main circuit board in the rear of the unit. In turn, each emitter group has a TIR collimating rod mounted directly to the top of the LED. It's a little hard to see all this without complete disassembly, but you can see the TIR rods and the circuit board behind in Figure 2.

Figure 2: LED array.

The TIR rods serve to both collimate the light from the four dies, and to mix the colors so that a single mixed colored beam emits from the top surface of the rod. The close-up view in Figure 3 shows four of the TIR rods, each within a protective white colored plastic tube. Also visible in Figure 3 is one of the lead screws, and a slider that provides movement for the entire LED assembly forwards and backwards, relative to the body of the luminaire. This movement gives the MagicPanel FX the ability to change the beam angle of the LEDs in unison. Figure 3 also gives you a glimpse of a second layer of circuit boards mounted

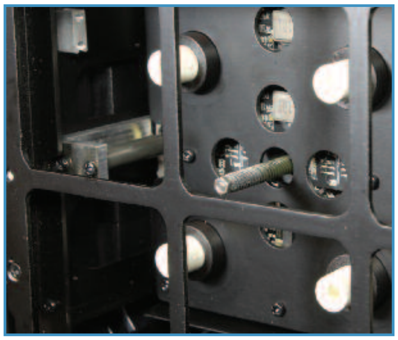

Figure 3: LED zoom.

Figure 4: Lens array.

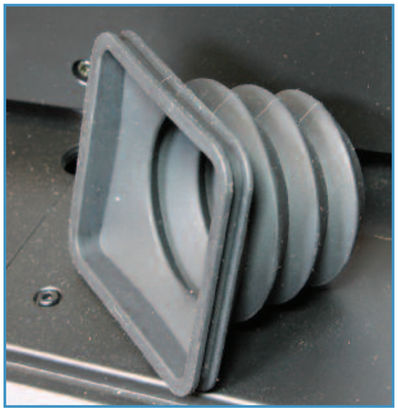

Figure 5: LED boot.

above the LED board. This board, I assume, contains drive electronics for the stepper motors, as well as additional circuitry for the LED system. With the MagicPanel FX giving the user fully individual control for all 100 LEDs, there must be a lot of LED drivers in there somewhere!

The light from each of those moving LEDs and TIR rods is directed into its own fixed lens on the front of the unit. These are large, thick molded lenses. Each is a standard circular lens cut back to a square shape so that they stack up neatly in the 5 x 5 array (Figure 4). To isolate each LED and lens from its neighbors, every assembly sits in a flexible rubber boot, which expands and shrinks to accommodate the zoom movement. Figure 5 shows one of the boots and Figure 6 shows the entire LED system with all boots fitted before the lens array is attached.

Figure 6: LEDs with boots.

That's the light path, but what about the heat? It goes in the opposite direction, out of the rear of the unit. Heat pipes lead from the LED board to a large aluminum heat sink with bunches of long, thin circular pins extending backwards. This assembly is, in turn, cooled by two large-diameter fans within the rear assembly. Figure 7 shows the arrangement. Heat is also distributed into the external frame of the unit, to give as much area as possible for cooling. Figure 8 shows a thermal camera image of the MagicPanel FX after it had been running for about 30 minutes at full power. It shows good, even, heat dissipation.

Figure 7: Rear panel.

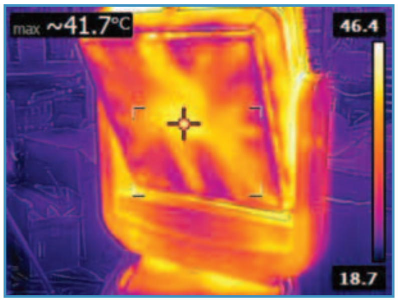


Figure 8: Thermal.

I know from questions I get asked that folks can get slightly confused about the beam shape from a luminaire like this. The lenses are square and the array is square—does that mean the beam is too? Well, the answer is, sometimes… In the case of the MagicPanel FX, we also have a square LED within each emitter, and this, in conjunction with the lens system, does produce a squarish pattern at narrow beam angles. Those 25 squares add up to something which is, again, squarish in shape. Once you start to increase the zoom angle, that square disappears and the beams overlap and merge into a single almost circular beam. The further the throw distance, and the greater the zoom angle, the more circular the combined beam appears.

## Output

The multiple emitters and squarish beam makes measuring light output tricky. To get a better answer, I only turned on one pixel at the center of the grid and measured that. We can then get the total lumens when the whole unit is powered up by multiplying by 25. Figure 9 shows the beam profile and output for that single emitter at minimum zoom. in

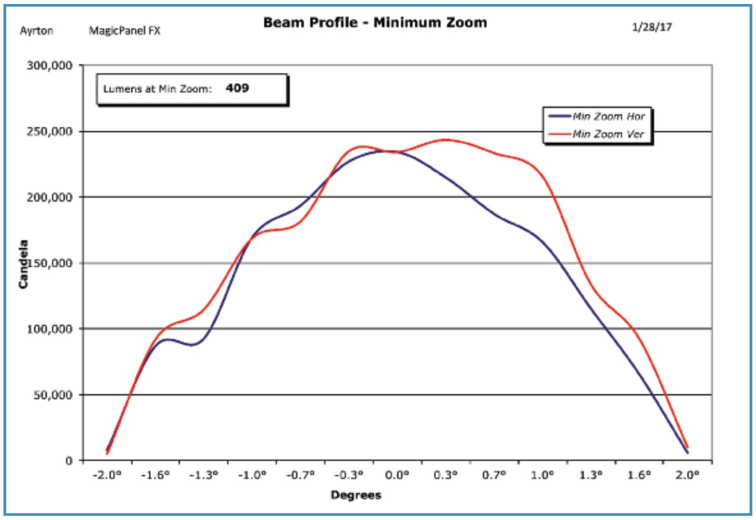


Figure 9: Minimum zoom.

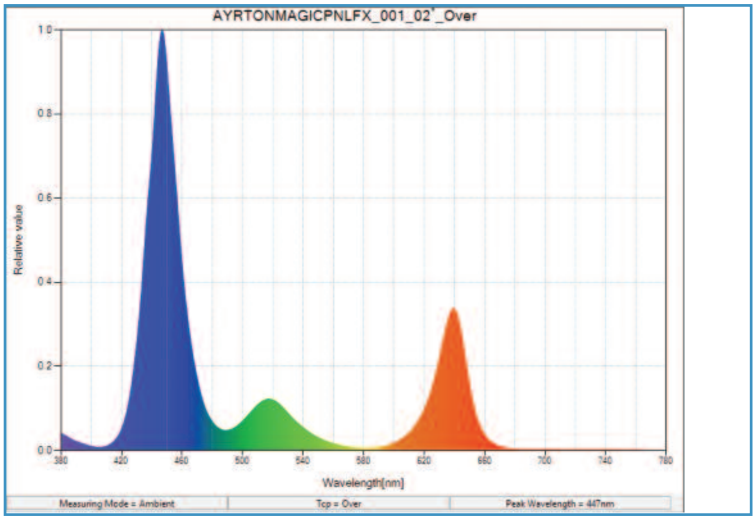


Figure 11: Spectra.

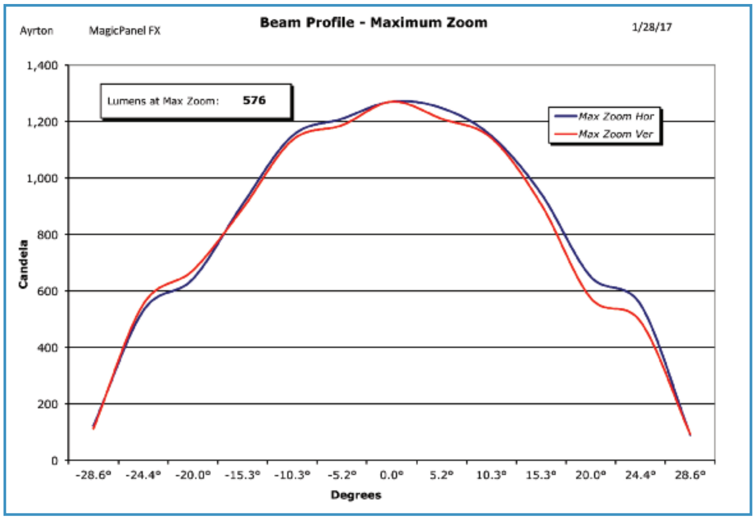


Figure 10: Maximum zoom.

this configuration, I measured approximately 409 lumens with a field angle of 3.9° for that single pixel. That equates to 10,230 field lumens for the entire fixture. Figure 10 shows the same information for maximum zoom; here I measured 576 lumens with a field angle of 57.2°. That's 14,400 field lumens for all 25 pixels. That's a pretty large zoom range and it takes the unit about 1.8 seconds to move from one end to the other.

I also measured output from the individual colors whose spectra are shown in Figure 11. With just the white emitters on, the color temperature was 11,900K.

**COLORS**

| Color | Red | Green | Blue | White |
|---|---|---|---|---|
| Transmission | 22% | 33% | 11% | 47% |

It's clear from this, as the percentages add up to 113%, that Ayrton is applying some power budgeting to the system. In other words, emitters are allowed to be brighter when run on their own than when all run together, as long as the total power consumed is less than some limit. This is a good technique to improve output in saturated colors from LED luminaires. Color mixing in the TIR rods was excellent, with the output appearing as a single homogeneous color with no colored shadows.

As I've mentioned before, the lumen output of a luminaire like this, which is specifically designed for effects use, is only one part of the picture. With all the narrow beam lights we are seeing from many manufacturers at the moment, when we want to view a light beam in the air, then the beam definition, color, direction (towards or away from you), and profile have as much to do with how clear the beam is as the raw brightness. The beams from the MagicPanel FX are well separated visually when run at narrow angles with some haze in the air.

## LED control

With 100 channels of LEDs to control, dimming is understandably limited to eight-bit control. With this in mind, the dimming provided by the MagicPanel FX is very good. Clearly, the unit is performing interpolative smoothing to improve those eight bits. Steps are unsurprisingly visible at low dim levels. I measured the PWM rate at 1,200Hz. The unit followed a square law dimming curve very closely (Figure 12).

Looking at thermal droop, I ran the fixture with all emitters at full and tracked any changes in output as the unit warmed up. Output dropped to a level of 89% in the first 15 minutes of operation, and then stabilized at that level. (All my measurements are done after this initial sag when the unit has reached thermal equilibrium.)

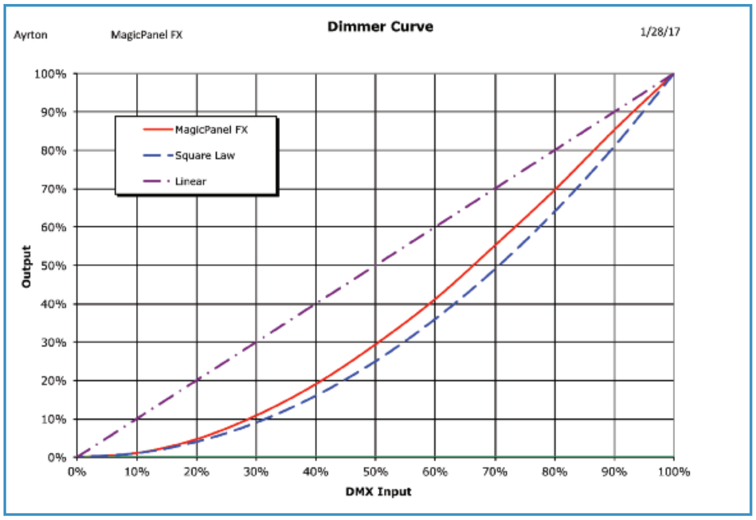


Figure 12 - Dimmer curve

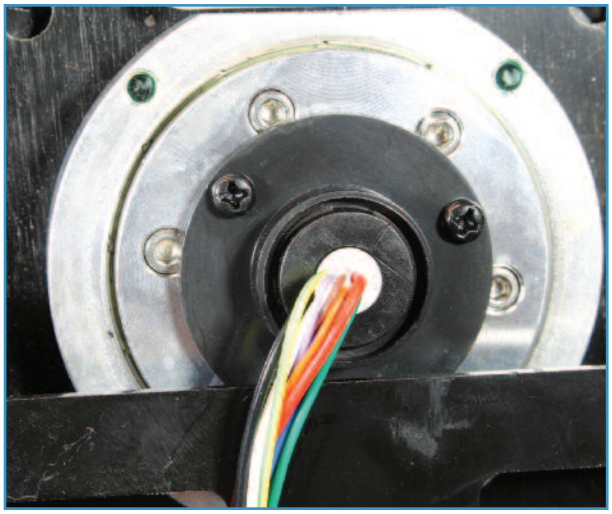

Figure 13: Slip rings.

I measured the Ayrton MagicPanel FX as offering a strobe rate from 3.3Hz up to a maximum speed of 24Hz.

## Color and pixel control

As mentioned, you can access every pixel of the MagicPanel FX independently. Each one can be a different color and intensity. Ayrton also provides macros and modes, including pre-programmed pixel patterns and color patterns, to allow quicker programming of simpler looks. In all my tests, I ran the unit in the full 118-channel mode. As with any product of this type, programming can take a while if you want to get the best out of the unit. In many of the uses I've seen, pixel-mapped products like the MagicPanel FX are installed at the back or side of a stage in a grid or line, facing towards the audience so as to make the best use of the pixel mapping.

## Pan and tilt

As with the previous MagicPanel that I tested, the FX model offers continuous rotation on both the pan and tilt axes. This is handled from a control perspective in a way very similar to rotating gobo wheels. You choose either conventional control, when you are limited to the normal 540º of pan and optionally 270º or 540º of tilt (like indexed mode on a gobo), or you run in rotate mode.

When operating in the conventional 540° pan mode, I measured pan speed over the full travel at four seconds and two seconds for 180°. In tilt, the figures were 3.8 seconds for the full 270° and 1.2 seconds for 180°. Movement showed some undershoot; I measured hysteresis of 0.45° on both pan and tilt, which is equivalent to 1.9" at a throw of 20' (79mm at 10m).

When in rotation mode, I measured the range of spin speeds for pan as 0.6rpm up to 40rpm (1.5 sec/rev) and for tilt as 0.7rpm to 43rpm.

To enable the full rotation, all cabling has to go through slip rings at the pan and tilt bearings. With both axes possessing full rotation, cabling has to go through slip rings. Figure 13 shows the tilt slip rings; I'm sure pan is the same. shows the tilt slip ring assembly.

## Noise

Not surprisingly, spinning the head on both pan and tilt at full speed at the same time was the noisiest I could make the MagicPanel FX.

**SOUND LEVELS**

| | |
|---|---|
| Ambient | <35 dBA at 1m |
| Stationary | 50.3 dBA at 1m |
| Homing/Initialization | 51.7 dBA at 1m |
| Pan | 50.8 dBA at 1m |
| Tilt | 52.6 dBA at 1m |
| Head Spin | 54.5 dBA at 1m |
| Zoom | 51.2 dBA at 1m |

## Homing/initialization time

The Ayrton MagicPanel FX took 37 seconds to complete a full initialization from power up or a DMX reset command. The reset is badly behaved; the LEDs are faded up before the unit has come to a final halt in its programmed position.

## Power, electronics, and control

My tests were carried out with a 118V 60Hz supply, and the MagicPanel FX consumed 5.8A when running with all LED channels at full but with motors stationary. This equates to 683W, 685VA with a power factor of 0.99. Quiescent load (all LEDs off and stationary) was 0.96A, 105W, 114VA power factor of 0.92.

There are a lot of circuit boards in this unit; as well as the main LED driver and control boards in the front, there is a further control board and power supply board in the back of the head. Both are visible in Figure 7. In addition, there is

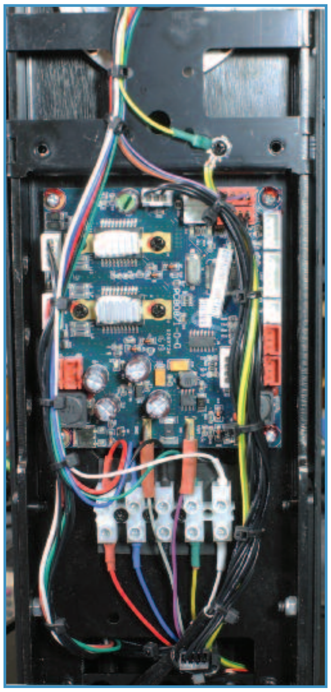

Figure 14: Yoke arm 1.

Figure 15: Yoke arm 2.


Figure 17: Display.

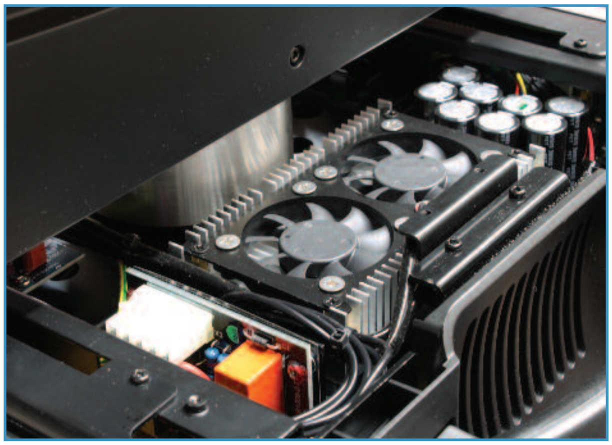

Figure 18: Top box.


Figure 16: Connections.

a motor control board for pan and tilt motors in one yoke arm (Figure 14). The other yoke arm contains the tilt system (Figure 15).

The top box contains the main power supplies and display and communication electronics. The MagicPanel FX offers a comprehensive range of options in how to talk to it. As well as regular five-pin XLRs for DMX-512 and RDM, there are in and out etherCON RJ45 connectors for Art-Net and sACN, and built-in wireless DMX using a system from LumenRadio. Power in and out is through powerCON TRUE 1 connectors (Figure 16).

Local control is through the familiar Ayrton color LCD touch screen and touch controls. This offers the expected setup, stand-alone operation, and maintenance functions (Figures 17 – 18).

## Conclusions

Although there are many similarities, the MagicPanel FX is clearly an upgrade from the MagicPanel 602, which I tested back in 2014. Higher output and the addition of the wide zoom range are clear differences. Is the Ayrton MagicPanel FX the light for you? I hope I've given you enough information to make your mind up about taking it for a test drive.

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