Ayrton MagicPanel 602

By: Mike Wood

This month, we have something a little different. The product under review is a little difficult to categorize; it's not strictly a wash light, although you could use it as one, nor is it a hard-edged beam unit, although you could use it as one, nor is it an LED pixel display luminaire, although you could use it as one. It is the MagicPanel 602 from Ayrton in France. We've looked at Ayrton products before in this spot with some of its more conventional offerings, but the MagicPanel seems to have found a new niche in the lighting arsenal of many designers.

As I mentioned, it's a tough product to categorize. It's also a tough product to measure and review. However, I'll do my best and follow the usual route from light source to output and try to accurately report what I saw. Hopefully, this objective approach will give you some assistance if you want to see if the Ayrton MagicPanel 602 is a product you would like to try out; however, as this is primarily an effects unit that is less likely than most products to be used for functional lighting, it's your subjective opinion that really counts!

Fig. 1: Fixture as tested.

Ayrton distributes its product in the US through Morpheus Lights, and the company 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 119V); however, the unit is rated to run on voltages from 110 – 240V, 50/60Hz (Figure 1).

Light sources and optics

The Ayrton MagicPanel 602 uses an array of 36 four-color (red, green, blue, and white) LED emitters arranged as a six-by-six pixel array. No output is specified for these emitters, but they seem to be consuming approximately 10W in each pixel. Each four-color LED is a single chip mounted directly to a single large circuit board that is the size of the luminaire (Figure 2). If you take a closer look, you can see that the LED clusters are mounted at a 45° angle and then rotated (or "clocked") around from one pixel to the next. This ensures that all the reds, for example, point in different directions in equal quantities and you don't get one side of the luminaire predominantly the same color. In Figure 3, you can see four of the 36 pixels, each rotated 90° from its fellows. The circuit board is quite complex, as each of the 144 separate LEDs, 36 of each color, can be controlled individually, meaning that every LED must have its own associated driver and control circuitry. To fit everything in the space available, Ayrton has stacked a second layer of circuit boards containing processing and control on top of the main LED board with the LED lenses passing through. You can see this second board layer in Figure 3.

Fig. 2: LED main board.

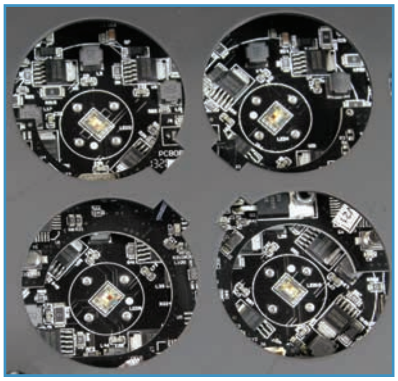

Fig. 3: Board layers.

Fig. 4: Rear of head.

Even with the efficiency of modern LEDs, this large array produces a significant amount of heat that has to be dealt with and removed. The main LED circuit board is mounted directly onto a finned heat sink running across the entire rear of the luminaire. There are then four thermostatically controlled fans blowing across that heat sink and extracting heated air. Figure 4 shows the four LED cooling fans surrounding the main LED power supply, and its own cooling fan, in the center of the unit.

Fig. 5: Lens.

Fig. 6: Lenses.

The LED dies are bare, with no primary optic or dome, just a flat cover over the dies. This die sits in a cavity at the bottom of a large molded acrylic TIR lens that collimates and mixes the light. The cavity ensures the best coupling from the light from the dies into the optic. Figure 5 shows a single optic when removed, while Figure 6 shows the lenses in place over the top of their associated LEDs. This optical system has a fixed focal length (i.e. no zoom) and is designed to give a narrow beam from each of the 36 pixels. You might wonder if the beam that comes out of a square array like this would also be square. Well, not really. It might start out as a square pattern of 36 individual beams, but each of those 36 beams is circular and diverging. Once you get a little distance away, into the far field, at about 10' or so, then those individual beams have merged and you get a single fairly round beam. The further the throw, the more circular the beam as the initial square arrangement gets swamped by the natural beam divergence pattern. It's extremely difficult to get anything other than a round beam with non-focusing optics. No matter how you start, it nearly always ends up circular. You need an optical system with a focus point and an edge to focus on, such as from a gobo, shutter blade, or barn door, or a coherent (non-diverging) light source such as a laser to get straight lines.

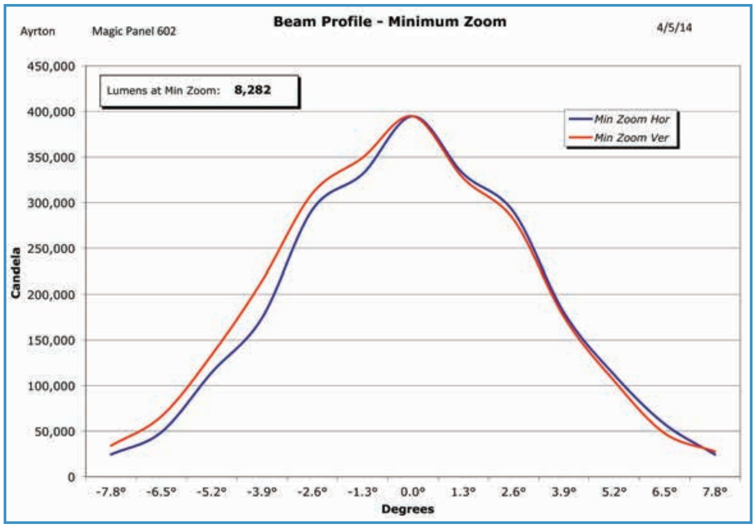

Fig. 7: Beam profile.

Output

I measured the output from the system with all emitters at full and then with the color set to the various color temperatures of white light that the MagicPanel 602 offers through one of the color-control channels. 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. Like 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 (toward or away from you), and profile have as much to do with how clear the beam is as the raw brightness. Figure 7 shows the beam profile and output with all emitters at full. In this configuration, I measured approximately 8,300lm with a field angle of 15.6° (beam angle approximately 8°). The output in the preprogrammed whites was as follows:

OUTPUT IN WHITE

Rated CCT	Actual CCT	Output, %
Full Output	N/A	100%
2,700K	3,200K	45%
3,200K	3,461K	50%
4,300K	4,856K	47%
5,600K	6,109K	74%
6,500K	6,607K	74%
8,000K	9,666K	72%

I also measured the output from the individual and mixed colors:

COLORS

Color	Red	Green	Blue	Cyan	Magenta	Yellow	White
Transmission	12%	41%	4%	46%	18%	50%	54%

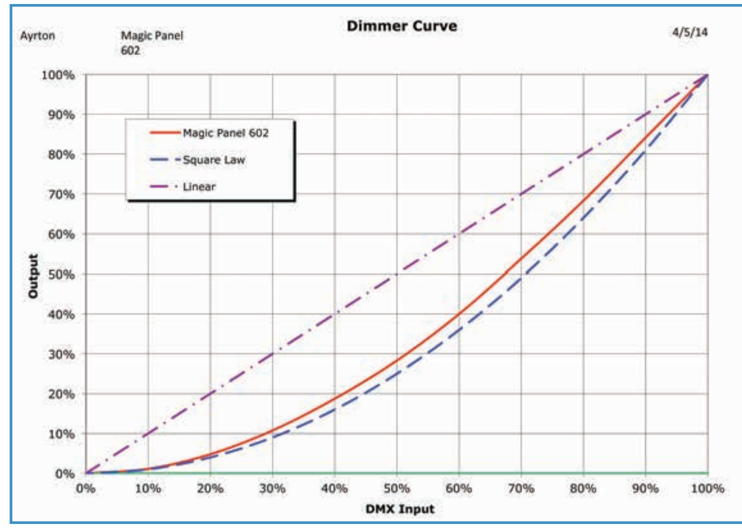

Fig. 8: Dimmer curve.

It's clear from this, as the percentages add up to more than 100%, that Ayrton is applying 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.

What matters with a light like this are the beams in the air, and the MagicPanel 602 performs well here. With a little haze in my test room, the beam definition was good and the effects available through individually adjusting the color and brightness of the 36 pixels, are complex and interesting.

LED control

Dimming was smooth and followed a good square law curve (Figure 8). With only eight-bit dimmer control available, the performance under 15% was inevitably less

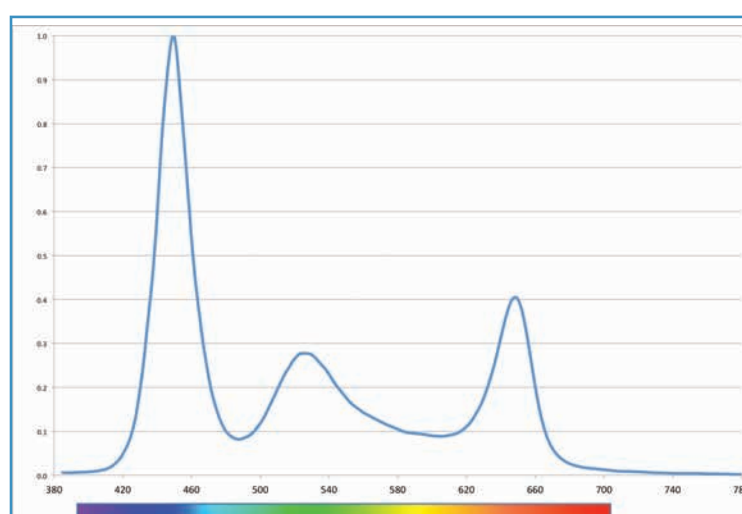

Fig. 9: Spectrum at full.

smooth, with every step visible below 10% dimming. I measured the PWM rate at 600Hz, which, although fine for the human eye, can be a little slow with the newest CMOS cameras. However, Ayrton staggers the phase of the PWM across emitters, which can help in some TV situations. This situation has gotten worse in the last year or so. While 400Hz was acceptable for CCD cameras, CMOS often requires 1kHz or more to avoid rolling shutter artifacts. It's a problem all LED luminaire manufacturers are struggling with right now. Ayrton tells me that it intends to increase its PWM rate to 1.2kHz in the MagicPanel 602.

Output sag was relatively standard for a non-calibrated LED unit; output dropped to a level of 83% in the first ten minutes of operation and then cycled slowly around the 80% – 85% levels. All my measurements were done after this initial sag when the unit reached thermal equilibrium.

I measured the Ayrton MagicPanel 602 as offering a strobe rate from 1.15Hz up to a maximum speed of 25Hz.

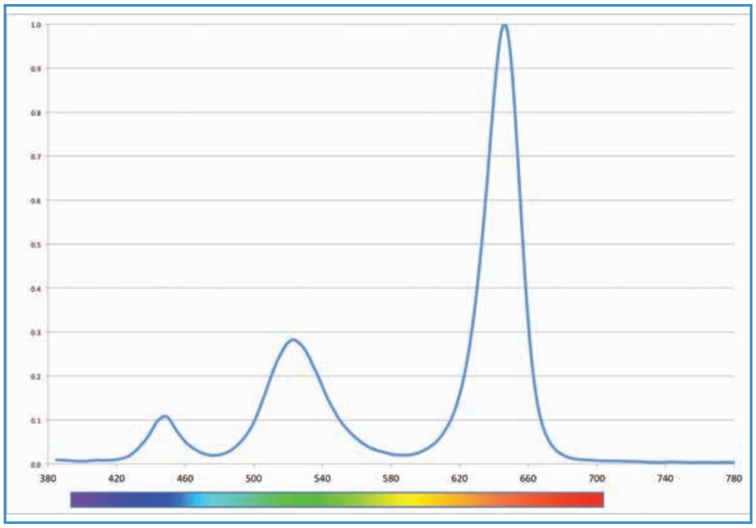

Fig. 10: Spectrum at 2,700K.

Color and pixel control

Figures 9 and 10 respectively show the spectrum of the light at full output and 2,700K. This was very typical for an RGBW unit, with blue (from the blue emitter and the blue pump in the white emitter) peaking around 450nm and red at 650nm.

Ayrton provides a myriad of ways to control the colors from all those emitters. As I mentioned earlier, you can choose to go into a pixel-mapped DMX512 mode using 160 DMX channels where you have individual control of all four emitter colors in each pixel. For these tests, however, I ran it in 20-channel-combined mode where you can manually control the color of all pixels together and also apply effects, patterns, and chases on top of that. The system allows the selection of both preprogrammed pixel patterns and pre-programmed color patterns, either or both of which can be static or dynamic. For example, you could have a static spiral pattern of pixels with a dynamic rainbow color chase running around the pattern or a pulsing square image with a static color. There are lots and lots of possibilities, and it took a while to get my head around how all the various control channels interacted and prioritized. Make sure you have rehearsal time to explore these if you use the unit. Some of the more complex effects look best when looking into the MagicPanel 602, while others produce interesting aerial and projected patterns. Still others probably look best when you have a lot of MagicPanel 602 units in an array or line.

Pan and tilt

It's interesting that Morpheus is handling Ayrton distribution in the US, as the MagicPanel 602 offers fully continuous rotation on both the pan and tilt axes, just like a Morpheus product did a few years ago. This rotation is handled through separate control channels from the normal pan-and-tilt control, so you can choose to treat it as a normal automated light with pan and tilt ranges of 540° and 268° respectively or switch to a controlled variable-speed spin on either axis.

When operating in the conventional 540° pan mode, I measured pan speed over the full travel at three seconds and 1.5 seconds for 180°. In tilt, the figures were 1.6 seconds for the full 268° and 1.2 seconds for 180°. Both axes were tight, with minimal hysteresis of only 0.04°, which is 0.2" at a throw of 20'. There was some slight oddity in movement producing some overshoot, which was quickly corrected, when reversing direction quickly, but Ayrton tells me that it is looking at this. Slow movements under 16-bit control were very smooth.

Fig. 11: Slip ring assembly.

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

With both axes possessing full rotation, cabling has to go through slip rings. These are sealed units, so I couldn't see what was inside, but each seems to contain ten conductors for both power and data. Figure 11 shows the tilt slip ring assembly, with pan being similar. I experienced no problems with either of these.

Noise

The fans are by far the noisiest items in the Ayrton MagicPanel 602. The only other moving parts are the pan-and-tilt systems, so the sound level chart is short this month.

SOUND LEVELS	
Ambient	<35dBA at 1m
Stationary	49.7dBA at 1m
Homing/initialization	48.0dBA at 1m
Pan	50.6dBA at 1m
Tilt	50.4dBA at 1m

Homing/initialization time

The Ayrton MagicPanel 602 took a measured 42 seconds to complete a full initialization from power up and 28 seconds from a DMX reset command. The reset is badly behaved in that 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 119V, 60Hz supply; the MagicPanel 602 consumed 5.02A when running with all LEDs at full. This equated to 596W, 599VA with a power factor of 0.99.

Fig. 12: Yoke arm 1.

Fig. 13: Yoke arm 2.

We've already discussed the two large circuit boards in the head, containing LED control and the associated driver electronics. There are only two stepper motors, and the electronics for them, along with the pan motor, is in one of the yoke arms as seen in Figure 12. The other yoke arm contains the tilt system and encoder (Figure 13). In Figure 13, you can also see the magnetic sensor on the large gear wheel at the top, which provides the homing position for tilt as well as the spring belt tensioning. With continuous rotation, you can't use hard homing stops of course.

The top box is pretty empty, with just a power supply and the electronics for the various network and control con-

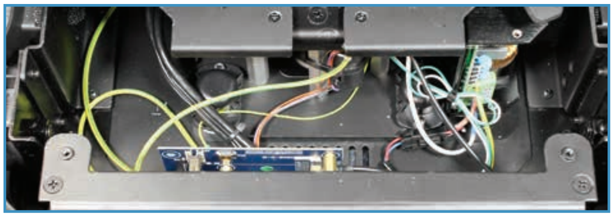

Fig. 14: Top box.

Fig. 16: Connectors.

Fig. 15: Display.

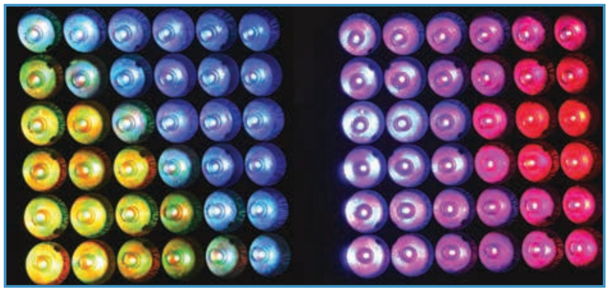

Fig. 17: Pixels.

nections. As well as DMX512, the MagicPanel 602 offers Art-Net and Kling-Net over Ethernet (with internal switch and Ethernet output), and integrated wireless DMX from LumenRadio (Figure 14). You can also use a unit as an Art-Net node and pass DMX512 on to other units downstream. I was unable to test it, but Ayrton tells me it will also support RDM in a later firmware version.

Figures 15 and 16 show the LCD display and menu system and the set of connectors. The Ayrton MagicPanel 602 uses the new Neutrik powerCON TRUE1 connector. You may already be aware of this, but the more familiar blue powerCON isn't rated for live connection/disconnection, so many people are moving over to the TRUE1 version, which Neutrik designed as a fully rated version. Unfortunately, they aren't interconnectable.

Construction is based around simple aluminum chassis members, with significant use of plastic injection-molded panels and assemblies. I had no difficulty in disassembling and reassembling the unit and would expect normal service to be straightforward. The slip ring system is the only unknown there.

Conclusions

As I said at the start, this is a tough product to categorize. The Ayrton MagicPanel 602 is very much a light to use for effects and in rows or arrays. It isn't really a single light that you would use for direct illumination. With that in mind, the choices that have been made in design and control—only eight bits for dimming but four separate color-control channels—begin to make sense. I'll end with a couple of photos of the kind of patterns you can get on the unit (Figure 17), although it's difficult to convey this with a static image, and by reminding you, as I always do, that although I've given you some facts and figures, it's your decision as to whether or not the MagicPanel 602 will work for you.

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