

Debunking the "More is Better" Mindset

5-LED versus 3-LED Systems: Pros and Cons

It's a common perception that "more is better". Buy one get one free. Two patties versus one. One hundred television channels versus three.

In the case of LED pixel design, however, this isn't necessarily so. Many other factors for consideration apply to the unique needs of LED sign manufacturers and users, including energy efficiency, maximum visibility, clarity, and even weight.

Although Adaptive Micro Systems has carefully perfected its time-tested, efficient 3-LED array over the years, competing manufacturers have recently caught the customer's eye with a larger 5-LED system that purports to be superior in brightness, color, and overall "flash."

So, when deciding on an LED system, how can a potential customer be convinced that more might not necessarily be better? Let's take a look at the technology behind the story, and see how the case behind the designs holds up to closer scrutiny.

3- and 5-LED Systems: A side-by-side view

Figure 1 shows four pixels of the standard 5-LED-per-pixel design produced by a competitor. The basic 5-LED array is made up of two red LEDs and two green LEDs, and one blue LED. Only one blue is required because to generate any color, less blue light is required than green and red light, while red light has the highest demand.

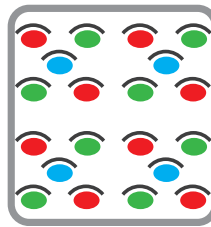


Figure 1
A typical 5-LED design; visual impact is diffused in direct sunlight due to increased reflectivity of all the shiny LED surfaces.

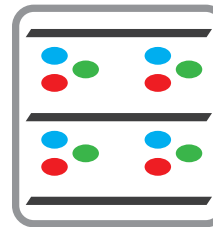


Figure 2
Adaptive's 3-LED design generates more visual "pop" in direct sunlight due to larger, flat black background.

When compared with the Adaptive array depicted in Figure 2, the individual pixels in Adaptive's 3-LED system are actually smaller, with more open space in between.

This difference in number and spacing of pixels leads to some specific differences between the two designs.

Consider the facts

- **Impact on Color and Image**

The close proximity of the pixels in the 3-LED design leads to better color mixing at closer ranges. This is also evident in off-angle viewing. Subsequently, poor color mixing in the widely spaced 5-LED/pixel design distorts colors even at small angles.

If you look at the 5-LED design more closely, you will see that an upper left to lower right edge that needs red will be well defined. However, if this same edge requiring red flows from the upper right to the lower left, the edge

will be jagged or wide. The same shortcoming is true with the green in the opposite direction. Neither will look right. In addition, the mirror image of an image will look quite different from the original image. This limitation will also exist with any colors requiring red or green or combinations of red and green, which could in turn result in limitations as to types and colors of images used by the consumer.

- **The Brightness Factor**

While the addition of two more LEDs to the pixel might seem to make the sign brighter, other LED display manufacturers counter the problem of

3-LED vs. 5-LED: A Clear Difference

3-LED PIXEL DESIGN

PROS

- Better color mixing
- Better edge definition
- Better off-angle viewing
- Lower power
- Lower weight
- Easier to service
- Lower material costs

CONS

- Lower maximum light output possible.

5-LED PIXEL DESIGN

PROS

- Higher maximum light output possible.

CONS

- Higher power consumption
- Higher operating costs
- Lower edge resolution
- Color skewing at off angles
- More heat generated
- Higher material costs
- Heavier weight
- Harder to service

reflected sunlight by using glossy black paint and small sunshades (also referred to as louvers). Instead of trying to be less reflective, they attempt to overpower reflected sunlight by driving their LEDs with more power, subsequently reducing the life of their lamps (and adding to the operating cost). Moreover, this increased brightness is only effective when the sign is viewed head-on; angled views are not affected.

Adaptive's approach, as detailed in our white paper entitled "Debunking 'Brightness' Myths," focuses on delivering better contrast rather than brightness—even in direct sun. Through superior technology and a better overall design, including the use of non-reflective flat black coatings on background surfaces, Adaptive is able to maximize the brightness of its 3-LED array in direct sunlight by minimizing reflected sunlight, thus delivering results that mean the most to our customers: better color mixing, lower operating costs, a superior viewing angle, and other long-term results.

• Energy Efficiency

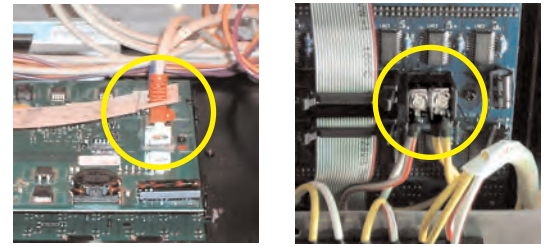
In this time of greater attention to energy consumption and efficiency, the fact that a 5-LED system requires an additional 60% more LEDs (and proportionally more power) is a compelling economic drawback. To add to the operating cost, these signs also require the use of heat exchangers, air-conditioning units, and fan systems to adequately regulate the internal and external temperature balance. When the utility bill alone is taken into consideration, an equivalent—and more efficient—Adaptive product begins to truly outshine the competition.

• Weighty Considerations

With the addition of 60% more total LEDs and accompanying cooling systems, the weight difference between a 3-LED sign and a 5-LED sign is not minor. A typical 5-LED sign weighs about twice as much as an Adaptive sign. Factor in a higher freight bill, a more extensive mounting structure, and other increases in installation costs, and the client will immediately realize yet another financial advantage to the Adaptive Micro Systems sign.

• Care and Maintenance

Even the best billboards will require maintenance from time to time, and serviceability is just as important a consideration as any other factor in choosing the best billboard for the job. However, some boards available today seem to have been designed in a way that makes servicing almost impossible.



Differences in the Details

The advantage of Adaptive's 3-LED system also comes into play behind the display, as their quick-connects (circled on left) make accessing their boards a "snap". Servicing the competitor's board (right) requires time-consuming removal of screw-in panels.

For example: in order to repair a module on one brand of 5-LED/pixel board, twenty-four of the surrounding modules must be removed in order to access it (and where do you put all these modules during service?) Once you've squeezed into the small access area behind the modules, you'll find that its extensive interior wiring system is screwed into place (an outdated technique still used extensively in China, where the units are produced, as opposed to the more modern quick-connects used in Adaptive's boards). The result? Longer service times—and higher maintenance bills!

The Last Word

No matter how big or small a company is, making the right choice in an LED sign is a big move, both in financial resources and public image. A big, bright sign that makes a client's company look great is the end result, but, as is the case with any major piece of technology, the costs involved in running, maintaining, and justifying such a purchase are even more of a critical factor.

Keep in mind that the output of any LED sign driven beyond its maximum specifications will decay over time (the tell-tale "pink" of an over-powered board comes to mind.) At Adaptive, we specifically design our *Excite™* billboard products to stand the test of time, and show a quality image for years to come.

This paper has been created to better serve our customers by educating them in the ins and outs of competing technologies—to let them know that a good LED sign is more than just massive output of NITs. Here at Adaptive, we firmly believe that our product line simply provides the best overall value, delivering better contrast, sharper and more accurate true-to-color images, and the lowest cost of ownership in the business.