

THE LED DISPLAY BUYER'S MANUAL

SELECTING THE RIGHT **DIGITAL DISPLAY**



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The LED Display Buyer's Manual

Selecting the Right Digital Display

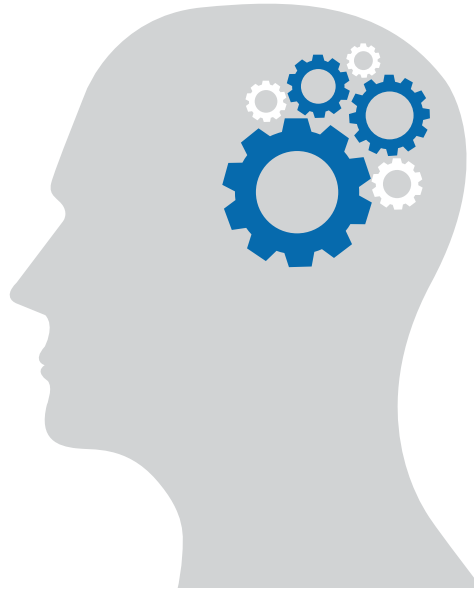
An LED display can be one of the smartest investments you make in your business. Learn how to make an informed choice.

How often have you gone into an establishment because of its appealing environment? How many times have you passed by a business that didn't have one? Digital displays are often your first introduction to the public and the means by which you identify yourself to existing and potential customers. In other words, they leave an impression.

Not only do LED displays create memorable experiences for prospects and customers, they do so for a good value. According to the research firm McKinsey & Co., "LED prices have eroded more aggressively, pulling forward the payback time of LED." In 2016, payback time will be one to two years, the firm noted.

LED signage also gives your business the advantage of owning the medium by which you communicate with customers, rather than relying on paid media to create customer experiences.

Organizations across industries are gaining value from their LED investments, with the \$2 billion LED display market growing 15% annually, according to Futuresource Consulting. This guide will help your business understand its display technology options, make an informed choice and reap the benefits that LED displays have to offer. ▶



The Decision-Making Process: An Overview

Before your organization makes the investment in an LED display, it's important to know what your options are in order to make an informed decision, and what factors you should consider. These include:

- Whether LED is the right technology for your business
- The total cost of ownership, including installation, maintenance and content creation
- The warranty terms of the signage
- The expected ROI or ROO of your investment

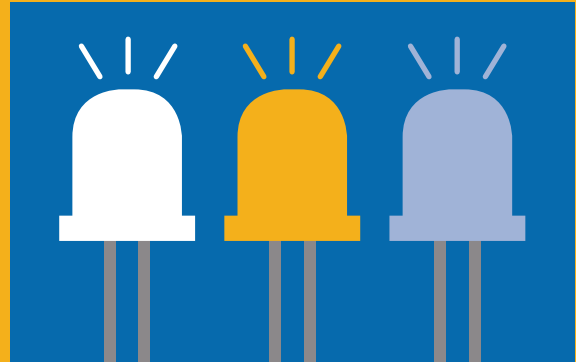
Every digital display purchase and installation will begin with product research that grows progressively more detailed as you establish your needs and identify potential vendors.

You may require anywhere from one month to two years from research to installation, depending on your organization's needs and your level of familiarity with display technologies. Every digital display purchase and installation will begin with product

research that grows progressively more detailed as you establish your needs and identify potential vendors. But for complex projects — such as those requiring new construction or renovations as part of the installation — expect the following steps:

- **Design:** During this initial phase, the display vendor and architect propose a design, and work with you to refine and finalize plans for mechanical, electrical, and other systemic changes.
- **Construction document preparation:** The architect or designer drafts documents that will be used to apply for any necessary permits and allow your vendor to solicit bids for contractors, if required.
- **Contract administration:** During this final stage, construction will take place to execute the vision created by your organization, the architect, and the display vendor.

Making the right investment in a digital display will help your business literally shine, so be sure to perform a careful analysis of all the factors that go into making a smart decision, and don't rush the process.



What is an LED?

A light emitting diode, or LED, is essentially a small light bulb, but unlike incandescent light bulbs, it does not contain a filament, thus making it more efficient. An LED also has a longer life span, lasting approximately 50,000 to 100,000 hours for a higher-quality LED — or about 5.5 to 11 years.

Is LED Right for You?

Before you begin evaluating signage solutions, you must take time to outline your business' goals for purchasing signage, and the needs and restrictions the solution must accommodate. Answer the following:

- What is the purpose of the installation?
- What size and shape do you need?
- What are your top three must-haves?

Once you have a basic understanding of your objectives, you can begin evaluating your options.

Setting Your Criteria

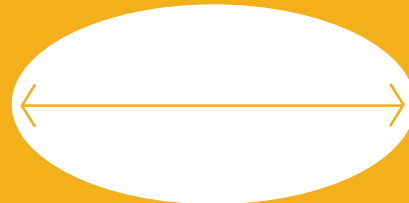
Your business has many choices for digital signage. There are large-format displays and smaller displays, such as digital menu boards, as well as a number of technologies from which to choose. How should you decide?

Selecting the most appropriate technology will depend on your organization's specific needs and restrictions for the criteria below.

- Size, shape, and weight restrictions within the display space
- Ambient light present in the display space
- Expected viewing distance
- Energy usage and efficiency
- Heat generation
- Noise
- Quality of the display, including color, resolution, and brightness
- Ease of content production

Understanding Heat Generation

If heat restrictions apply to the space in which the installation will reside, you need to think about the amount of British thermal units, or BTUs, a display will generate. A BTU is a measure of heat content, and equals the amount of heat needed to raise the temperature of one pound of water by one degree Fahrenheit.



A nit: The unit of measure for brightness. A nit measures luminance, or the luminous intensity of a surface in a given direction per unit of projected area.

Evaluating Your Technology Options

Now that you understand the criteria on which to evaluate your choices, analyze the advantages and disadvantages of the primary display technologies.

Video Projection

This is generally the least expensive option, and comes in two forms: rear projection, in which the image is projected onto the back side of the screen, and front projection, in which the image is projected onto the front, as in the case of a movie theater. Regardless of type, both require **light-controlled rooms with very low levels of ambient light.**

One of the primary restrictions of video projection is the need for **uninterrupted throwing distance.** This will vary depending on the size of the space and the width of the



projection surface, but determine whether it is realistic that you can keep the necessary space clear.

You also need to factor in the cost of replacing bulbs, which can run into the thousands of dollars, and the labor needed to recalibrate and realign multiple projectors.

How Ambient Light Affects Your Display

The more ambient light in a display space, the brighter the display needs to be in order for viewers to really see it. If you are considering an outdoor display, be aware that in order for viewers to see it properly during daylight hours, it needs to have a minimum rating of 5,000 nits.

If your business requires an indoor display, the recommended brightness

of your display will vary based on the space. Consider how much light is present during your highest-traffic hours.



Tile Displays

These self-contained non-LCD units, also called mosaic displays, can be joined together to create much larger displays. Tile displays can be visually appealing, but **visible seams and gaps between units and a lack of uniformity between modules**, especially in aging displays, **can be problematic**.

Tile displays are **often the heaviest technology**; for example, a display of approximately 230" weighs more than 2,000 pounds, without factoring in mounting equipment and accessories.

This is due, in part, to their thickness: 10 inches or more, which may not be suitable for many spaces. As expected, such a substantial display



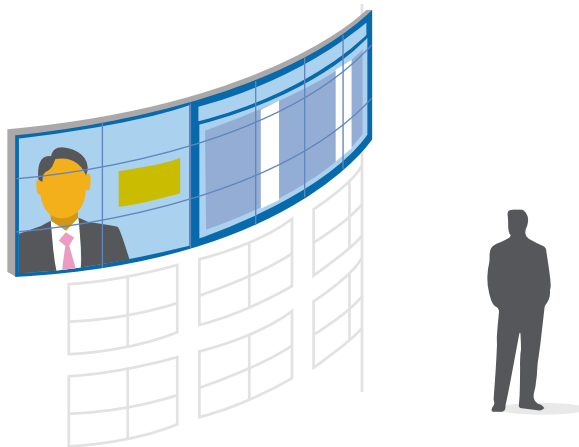
generates high levels of heat — about 28,000 BTUs per hour for the 230" display in our previous example — and **consumes up to four times the power** of other types of displays, at more than 8,000 watts.

Tile displays average 600 nits for a 230" display, and have a lifespan of about 65,000 hours.

LCD Displays and Video Walls

LED-backlit LCD (liquid crystal displays) are among the more common types of digital displays, but LCDs generally need to conform to the native 16:9 format. While an LCD display can be high-resolution, there is an associated cost: Even "zero bezel" LCD displays still contain bezel gaps between displays. They can be difficult to calibrate, and maintaining calibration between the displays is challenging.

LCD displays are relatively **light and thin** — more than 1,000 pounds for a 230" video wall array, plus the weight of the substructure or mounting components, and 2" to 4" thick.



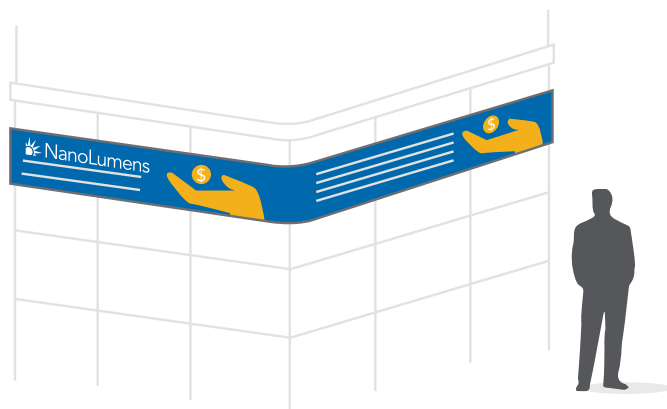
They are relatively efficient, too, using about 2,800 watts of power, but they generate about 12,800 BTUs per hour, and their **brightness is low** at 400 nits.

The lifespan of a 230" LCD video wall array runs at 50,000 to 60,000 hours.

Advanced LED Displays

LED displays can be visually stunning, and many become landmarks within their communities. Certain LEDs are **flexible enough to be customized to a space**, and even shaped into forms.

LED displays are **light and thin**. For example, technologies such as NanoLumens' displays weigh about 1,000 pounds for a 230" display and are 4 inches in depth. Despite a **striking brightness of 3,000 nits**, these **emit a fraction of the heat** of other display types (less than 2,000 BTUs per hour) and **consume less energy** as well (2,100 watts).



One of the greatest advantages of an LED display is its lifespan — **approximately 100,000 hours** for NanoLumens' installations, which is longer than any other type of display.

LED installations are suitable for both indoor and outdoor use where the expected viewing distances are at least 5 to 10 feet.

	Video Projection	Tile Displays	LCD Displays	Advanced LED Displays
Weight	Varies	>2,000 pounds	>1,000 pounds	1,000 pounds
Thickness	N/A	10+ inches	2-4 inches	4 inches
Brightness	Varies (low)	600 nits	400 nits	3,000 nits+
Heat	Varies	28,000 BTUs/hr	12,800 BTUs/hr	2,000 BTUs/hr
Energy Use	Varies	8,000 watts	2,800 watts	2,100 watts
Lifespan	Varies	65,000 hours	50,000-60,000 hours	Up to 100,000 hours

* Figures provided are for a 230-inch display

The versatility, performance, and maintenance advantages of LED displays put them far out in front of other technologies. LED displays

are often not just the most suitable choice for an organization's needs, but also the most cost-effective option.

Determining the Total Cost of Ownership

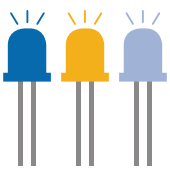
Purchasing an LED display is a meaningful investment that can mark an important step toward growth for your business. Without a doubt, one of the most important considerations, in addition to suitability and performance, is cost. But cost considerations go beyond the initial hardware investment in the screens themselves; it is essential to calculate a solution's total cost of ownership by assessing the following:

1 Component costs



This includes mounting hardware, media players (if necessary), cabling, and video wall controllers.

2 Number of LEDs in the display



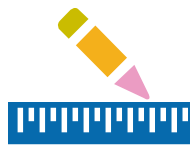
The more LEDs, the higher the cost will be. When trying to determine the number of LEDs, you need to know how many are in each pixel, which are groups or clusters of individual LEDs.

3 Labor costs for installation



These will vary based on the number of components required, the level of complexity of the installation, and the time needed to execute your vision.

4 Space adaptations



If the display space must be adapted to accommodate the installation, be sure to consider which measures must be taken. They may include fixtures needed to adjust ambient light, such as shades; wiring/connectivity costs; reinforcement of walls; and any business downtime while these adaptations are made.

5 Content-creation software



Understand whether the content-creation software that comes with your display charges for licenses, subscription fees, or training. If you plan to outsource your content creation, factor in the additional costs.

6 Maintenance



Every installation will incur maintenance costs, but these will vary based on the quality of the product. Displays with a longer lifespan and a low mean time between failures will require LED replacement less often.

Even if your display generates low levels of heat, it may still require cooling to make it suitable for the space in which it will reside, so consider the cost of this equipment.

If your display will be outdoors, prolonged exposure to wind, sun, dust, and rain mean it will require periodic cleaning. Also, you will need to take measures to ensure a stable power supply and good grounding protection to offset harsh natural conditions, especially thunder and lightning storms.

Before choosing a display, determine what resources your company can dedicate to maintenance. This is critical, because replacing equipment consumes valuable time and financial resources, so a low-maintenance system puts your business at an advantage and increases the return on your investment.

Did you know that NanoLumens is front serviceable? This saves on repair time by providing immediate accessibility to any issue.

7 Calibration



If your installation is composed of multiple LED displays, there is a risk of inconsistent brightness and color intensity. To ensure uniformity, your vendor should perform calibration, a process in which common values in brightness and intensity are identified and applied to the LEDs to make them brighter or dimmer as necessary.

Your LED vendor should use a proven method and set of software tools to perform calibration during installation, as well as after maintenance is performed on the displays.

Learn more about the importance of calibration for color consistency by downloading our guide, ["LED Displays and Color Calibration."](#)

8 Energy usage



Environmental considerations are part of the culture of many companies today. If your business — and your customers — value environmental responsibility, it's important to look for a highly energy-efficient display.

The cost considerations alone make energy efficiency a must. For example, based on a 16 x 9 foot display used for 24 hours per

day at 10 cents per kilowatt, an LED display running at 2,100 watts will cost \$1,938 per year, while a display running at 2,800 watts will cost \$2,568 per year. The difference will add up.

When evaluating your options for an LED display, it is vital that you properly determine

the total cost of ownership for each product under consideration. In doing so, be sure to include each of the eight types of costs outlined above to avoid unexpected expenses down the line.

Tips for Compelling Content

Your LED signage investment will not yield many benefits without superior content. Start the content development process by answering these five questions:

- 1. Who is your audience?** Messaging must be properly targeted to your audience, so bear in mind their age, gender, and other demographic data, as well as whether viewers consist of new or existing customers.
- 2. What is the purpose of the installation?** Determine whether you're looking to create an atmosphere, display branding, share offers or meet other goals, and develop content accordingly.
- 3. How frequently will the content be viewed?** The more often it will be viewed, the more it should vary so that viewers will stay engaged.
- 4. For how long will viewers experience your content?** If your audience will remain captive for longer periods, the content should change often. For viewers who will experience your display in passing, use eye-catching content that will capture their attention.



- 5. Who will create your content?** You can create it in-house, but you also have many options for using outside vendors — ranging from automatic content from licensed content companies to rendered content from agencies or individual contractors.

Under every circumstance, remember these tips for compelling content:

- Graphics capture viewer attention and engage them quickly. Replace text with graphics whenever possible and appropriate, and use bright, high-contrast colors.
- Animation, too, is effective at grabbing viewer attention, but be aware that producing it will raise content costs.
- When including text in your displays, use large font sizes to optimize readability.

Although there are a number of considerations that factor into your total cost of ownership, your business can take steps to limit these costs and boost the return you see from your LED signage investment.

Consider outsourcing content creation.

Businesses cannot afford to cut corners on creating high-quality content that pulls in qualified prospects and maximizes the impact of your investment. While it is certainly possible to create content in-house, doing so can absorb your internal resources that are better applied to your core business. Outsourcing content creation, therefore, can be the most cost-effective approach.

Look for a solution with software that facilitates content development, if you do decide to create content in-house. The software should not only be intuitive and easy to learn and use, but it should also guide you clearly through the creation process and provide assistance with templates and other customizable elements. This saves your team the time and effort of having to develop content-creation expertise.

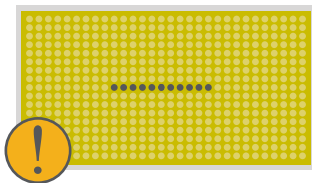
Remember to make use of the content you already have. Chances are you have more resources than you realize, so analyze your existing content — advertisements and other collateral — for elements that can be repurposed for use on your LED display.

Warranty

The terms of a supplier's warranty can make the difference between a smart investment and a potential drain on your resources. Without a comprehensive and fair warranty, your organization can incur a higher cost of ownership than anticipated for your display.

Warranty terms for LED displays will vary based on these factors:

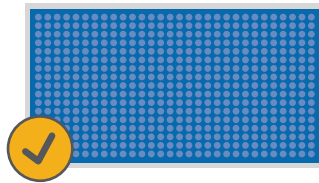
- Other manufacturers
- NanoLumens



If 100,000 pixels in display,
500 pixels must be out

If 500,000 pixels in display,
2,500 pixels must be out

If 1,000,000 pixels in display,
5,000 pixels must be out

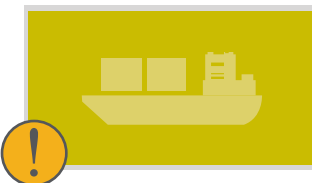


NanoLumens does not
have this policy and will
replace a single pixel as
soon as it goes out.

Number of failures: How many LEDs must fail before the manufacturer will execute the warranty? If this figure is given as a percentage, consider what it means in real numbers; for example, if a manufacturer requires a 0.5% failure rate for a display with 500,000 LEDs, this means 2,500 of them must be down before the warranty even goes into effect.



Length of coverage: How long does the warranty last? The standard coverage term for LED manufacturers is up to 3 years.



Effective date of coverage: Does the warranty begin after shipment, after installation, or only after the failure rate has been met?



Components: Does the warranty only cover certain parts of the display? For example, are control devices covered?



Estimating Return on Investment

Understanding the total cost of ownership plays an integral role in determining the estimated return on your investment — and deciding whether an LED display is right for your business. If your organization is using its digital display with an advertising or out-of-home model, you can calculate the ROI by first gathering the following information to determine your monthly revenue and profit:

- Average revenue per day
- Number of business days per month
- Average gross profit margin (%)

Now it's time to determine your expected increase in revenue as a result of installing an LED display. The U.S. Small Business Administration (SBA) estimates that

businesses using digital signage increase revenue by 15% to 150%. While that range is wide, it allows you to make low, medium, and high estimates of your business' projected revenue increase. Apply various percentages to your revenue and profit figures to get a spectrum of potential outcomes.

Finally, divide your projected revenue and profit increase by the estimated total cost of ownership to yield a good understanding of the type of ROI you can expect. To yield the most accurate calculation, remember to factor in the eight key components of total cost of ownership outlined previously.

Armed with this information, you're now ready to make an educated decision about whether or not to take the next step in investing in your business.

Conclusion

We live in a digital age. Having a digital display provides a business with a substantial competitive advantage at a fraction of the cost of other forms of customer communication. Digital displays with effective messaging get noticed by key demographics: 70% of 18- to 24-year-olds say they are aware of digital signage they've seen in the last 12 months, according to Nielsen, while 27% of

them took action based on the advertising there. And digital displays typically pay for themselves within four to 18 months.

Although the advantages are clear, it's important to give careful consideration to the range of factors reviewed in this guide. Doing so will ensure your business is satisfied with its investment.



About NanoLumens

Working with leading Fortune 500 clients on five continents, NanoLumens continues to pioneer visualization solutions. The company is creating a market where clients can have leading-edge technology, and access to choices that include managed, brilliant content, current information streams and even interactive customer experiences tailored to a specific industry. This innovation is driven by increasing customer demand. NanoLumens provides an immersive experience that shatters any previous modes of customer engagement. All NanoLumens solutions are designed and made in the United States of America and come backed by the industry's only **Six-Year, Zero Failure Warranty.** www.nanolumens.com