WHITEPAPER

# Top considerations when choosing display wall technology

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Each display wall project varies in size, complexity and application, which in turn determines solution selection. Through this guide, we outline the main considerations to help you expedite the technology selection process.

## Technology categories

First, let's review the types of technology that are available for creating a display wall. Some of the more popular technologies are rear-projection cubes, LCD panels and LED tiles. Display walls may also be created by using either rear-screen projection without a cube or front-screen projection. To evaluate which technology category will best support your display requirements we will review the following considerations: design flexibility, physical footprint, ease of installation, image quality, ambient light tolerance, reliability, ease of maintenance and cost.

## Design flexibility

When it comes to creating eye-catching display walls, you can use rear-projection cubes, LED tiles or projection, and the latter may be used to create concave and convex shaped walls. In the case of LED tiles, custom sizes for the individual LED modules within a tile are possible for even greater architectural design freedom. Front-projection and rear-projection (with or without enclosed cubes) offer some flexibility since the images from projectors are available in a wider range of aspect ratios, typically 16:9, 16:10 or 4:3. In addition, a projector can produce an image of almost any size depending on the lens it uses and its distance from the screen. LCD panels, which almost universally use a 16:9 aspect ratio and are available in a relatively small number of standard sizes, offer the least flexibility. As a result, when using LCD panels, site architecture may need to accommodate the display dimensions.

▶ Christie® offers a broad range of digital display solutions to fit your application's requirements, including: projection, rear-projection cubes, LCD panels and LED tiles.

## Physical footprint

Display technologies for walls differ greatly in the space they require. Front-projection can take up the least space if a projector is ceiling-mounted; the projection screen itself, which can be very thin, is then the only object in the viewer's space. However, since the light from the projector requires an unobstructed path to the screen, this path needs to be accounted for in the display's design.

Flat panels and display walls using LED tiles are the next, least-obtrusive option based on thinness of screen profile. Rear-projection takes up the most space, particularly if it is not used within a cube, because considerable space is needed behind the screen for the projector(s). The depth required largely depends on the size of the screen and whether mirrors are used to fold the optical path. Such mirrors are almost always used in full-size cubes.

For display walls constructed from flat panels, rear-projection cubes or LED tiles, consideration should be given to any additional space behind the display wall that may be required to ensure adequate airflow. This can depend on the size of the array – larger display walls may require more space. Extra space may also be necessary if a display requires rear service access.

## Ease of installation

Although a display wall will typically be installed only once, careful consideration should still be given to the installation process to plan for additional structure or resources that may be necessary beyond the display wall itself. For example, does the display wall require more power than is available and is the total power consistent with the power-efficiency requirements of the building? Can the space's present HVAC system accommodate the display wall's extra heat load? Will the display be stackable and free-standing, or will it require a mounting structure?

Some displays, such as rear-projection cubes are stackable and thus capable of free-standing operation. Other displays, such as flat panels and projectors, require a special mount for each unit in the array. In some cases, such as LED tiles, the display units all attach to a common frame. The wall or ceiling may need structural reinforcement to support the extra load. If a free-standing display wall is created, the floor may require initial leveling.

Considering the display wall itself and the importance of alignment, additional questions to ask are: how many individual display units (tiles) are required and how easy is it to align them to each other?

## Image quality

Fortunately for display wall designers, most current display technologies can produce outstanding images. LED tiles and LED-illuminated rear-projection cubes stand out in particular, reproducing deeply-saturated colors with wide color gamuts made possible by LEDs. Two additional considerations are pixel density and screen gap.

Resolution is important, but pixel density (pixel pitch) should be the primary concern and matched to the viewing distance. LCD display wall panels and individual rear-projection display wall units both have pixel pitches typically between 0.5 and 0.6mm, hence both are optimal for installations where the viewer can get very close to the display wall. LED tiles are at the other end of the spectrum, with pixel pitches ranging from just over 1.0mm to 20.0mm. LEDs are better suited to venues in which the viewer is farther away from the display wall. Full-size rear-projection cubes occupy a middle ground, with pixel pitches typically ranging from 0.6mm to 1.2mm.

Most display walls are composed of multiple, identical displays tiled in an array. Hence, the size of the physical gap between the images of adjacent screens is an important parameter. Display walls composed of LCD flat panels typically have the largest gaps while LED tiles are virtually seamless from typical viewing distances.

▼ Christie MicroTiles® are a rear-projection cube solution that can be used to create video walls in any size and shape, including concave curved displays.


## Ambient light tolerance

Some display technologies are inherently better at handling ambient light than others. For example, LED solutions that employ a black background between pixels increase image contrast in the presence of ambient light. Most rear-projection screens also reject ambient light in a similar manner using black stripes or beads embedded in the screen. Flat panels, on the other hand, typically need better light control in the viewing environment. Front-projection screens are particularly sensitive in this regard. As a rule of thumb the higher the brightness of the display the more ambient light it can handle. Viewing angles also need to be considered for drop-off in quality and this is ideally evaluated in person.

## Reliability

The primary reliability concern for a display wall is its light source. Of the current light-source technologies, LED is among the most reliable, with typical specified lifetimes of at least 50,000 hours to half brightness. Beyond the performance of the display and the impacts of downtime, the inherent reliability of a display wall system can also greatly affect ongoing servicing which has cost implications related to labor and replacing parts.

Additionally, image retention of previously displayed data is a concern for display walls requiring 24/7 operation. Image retention can happen with LCD flat panels while DLP rear-projection cubes and LED tiles are largely immune when operated within specifications.

## Ease of maintenance

At a minimum, display walls require periodic color and brightness calibration to maintain image quality and consistency, particularly in tiled systems. Most LCD flat panel display walls require manual calibration while those using LED, and some rear-projection solutions offer automatic calibration without disturbing the image, and with full knowledge of the colors and brightness of other displays in the array. In addition to regular maintenance, consideration should also be given to how easy it is to replace components if there is a failure. For example, does the display require rear access or removal for service? Some do while others can be serviced from the front, without removal from the system. Another concern is whether displays in an array need to be removed in order to access any particular unit for service.

## Cost

The purchase price of display wall technology is one of the first budgetary considerations when planning an installation. It's equally as important to weigh out how much the display will cost to operate over its lifetime. These costs can include ongoing operational costs such as electrical power consumption of the system, the cost of cooling the display using the building's HVAC system and the cost of any consumables such as lamps, filters and fans. Technologies that use solid-state LEDs, whether in the form of LED tiles or as a light source in rear-projection cubes and LCD flat panels, do not typically have any consumables. However, many projection solutions use high-intensity discharge lamps that need to be replaced periodically.

To compare power consumption and heat generation from one display technology to another, simply multiply the total number of units (tiles) required for the display system by the typical power consumption specified for an individual display.

## Making a technology selection

Once you've worked through the considerations noted in this guide, you will have a strong foundation for your technology selection and installation plans. If you require further consultation, please contact us. We can connect you with our trusted network of technical experts who can address your detailed questions.


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