

Constant Technologies, Inc.

The Rules of Operations Center Video Wall Design

Introduction

An operations center is the nerve center of an organization that facilitates critical decisions based on a continuous flow of data. A video wall is the focal point of your mission critical operations center, and great care and precision must be taken in its design and installation to ensure peak performance. At Constant Technologies, we think of every last detail of video wall integration to ensure that your display wall withstands the rigors of nonstop use.

Video Wall Size, Placement, and Sight Line Analysis

One of the first steps in designing a video wall installation is determining size and placement. Deciding how a video wall will best fit your space is a detailed process. The decision of 24/7 video wall size and placement is based on the farthest distant viewer, the nearest distant viewer, an ergonomic sight line analysis and what the client plans to display on the video wall.

Said Danny Sasseville, Vice President of Project Engineering at Constant, “We use ergonomic studies to calculate the distance from the farthest distant viewer and the nearest distant viewer to define the height of the screen before the viewers’ necks are in a potentially harmful position. On top of that, we do a sight line analysis to calculate how far somebody’s head has to turn back to see the top of the screen.”

A sight line analysis is a detailed process wherein the Constant Technologies team conducts an ergonomic examination of operator placement and viewing capabilities to reduce strain on the

eyes and neck. An important component of the analysis is knowing how many people will populate the space and will need to view the video wall. There is significant variation in ergonomic ideals for a space with two operators compared to a space with 50 operators. In a room with multiple rows of operations center consoles, we strive to find a happy medium so that the operators at the back aren’t too far away, and the operators at the front aren’t too close to the video wall.

“As a general rule, the bottom of a video wall display typically starts at about 4 feet off the ground, which is about average seated eye-level and just above the top of a display at a console,” said Senior Design Engineer Neil Medeiros. With sight line analysis, Constant’s engineers make sure that operators will have no more than 25 degrees maximum eye rotation so that they don’t have to bend their heads back to look at a video wall installation. Added Sasseville, “We also take into account what would be in the field of vision to the right and left for someone sitting at a desk. We try to maximize what they can see with just eye rotation before they have to turn their heads.”

It’s not an exact science, however, according to Medeiros. The size of monitors and console desks affects video wall placement. “If you have very large display monitors in front of you that you need to see over, the display wall has to be higher.” The construction of the room is also a determining factor; ceiling height is often a fixed element that can add complications to the ideal design of a video wall. If a display should ideally start at 5 feet off the floor in a particular room but the ceiling height would not accommodate it, it may need to be shifted down. “And since



everyone is different heights,” added Medeiros, “this is really just a general starting point.”

When there are multiple rows of operations center furniture, especially if there are adjustable height consoles installed in the space, the sight line analysis becomes more complicated. “The challenge is that not everybody is at a fixed point,” said Medeiros. Constant often counteracts this by adding a slight tilt to the floor so that operators in the back can see over the heads of the operators in front of them. However, this solution comes with its own added challenges — if the tilt is too far, the operators at the back may have trouble seeing over their local displays. All of this detailed optimization is what Medeiros calls “a balancing act;” without the expertise of the experienced mission critical AV integrators at Constant, the multiple levels of necessary analysis could be overlooked.

As another element for consideration during the operations center design stage, the application for the video wall’s use also helps define the way that Constant Technologies approaches its design and construction. Medeiros said, “Sometimes we will install rooms that are more ‘showpiece’ rooms for tours. People in the room aren’t really watching the wall; it’s more for a viewing gallery. In that case the sight line analysis isn’t as important.” Added Sasseville, “Network operations centers and similar projects have comparable applications every time. But in a project scenario with a showpiece video wall in the lobby displaying large-scale content, or a room primarily used for tours, the considerations for sizing and placement of the video wall are different.”

When it comes to installing a mission critical video wall, bigger isn’t always better.

“Sometimes clients will ask us to install the biggest video display wall possible,” said Sasseville, “but once we show them the sight line analysis, many of them change their minds.” With a project as significant as a command center installation, you need an audiovisual integrator with the necessary expertise, precision, and attention to detail to ensure that every decision is the optimal choice for your space and its purpose. With over three decades of experience and projects all over the globe, Constant Technologies can help with your video wall installation every step of the way. Our thorough process of consultation and analysis ensures that your mission critical operations center runs at the peak of performance, aesthetics and ergonomic comfort.

Display Technology

In addition to size and placement, another major component of video wall design is determining what display technology to use. Because a video wall in a mission critical environment is a significant installation, it is important to weigh the pros and cons of each of the major display technologies available in the professional 24/7 display market. As mission critical AV integrators, Constant Technologies helps determine the best technology and installation for your video wall.

LCD vs LED

Video walls built for 24/7 use are created using LCD or LED display technology. LCD video walls have been popular for years and are the main display type used in the mission critical market due to their relative affordability and high-



resolution displays. LED video walls are energy efficient and can be used as tiles to create a relatively seamless video wall display.

One of the significant differences between LCD and LED displays is the pixel pitch, which is defined as the distance between each pixel. Said Danny Sasseville, Vice President of Project Engineering at Constant, "The bigger the pixel pitch is, the farther away you have to be to see it clearly." LED video walls have fewer pixels than LCD video walls, so the pixel pitch is greater for LED. Sasseville confirmed that typically, LCD displays are installed more frequently than LED displays due to their lower cost and higher resolution when viewed from close distances. However, moving forward we will begin to see LED video walls more frequently in command centers as both the pixel pitch and price continue to decrease.

Though LEDs have greater pixel pitch and are frequently more expensive, there are some advantages to choosing LED over LCD. LCD displays, though they have greater clarity from a close distance, have bezels which can be seen between the panels of a video wall. "The LCD video walls we install do have very thin bezels, as thin as 5 or 3 mm," said Sasseville. "But with LED displays you don't have that visible edge."

Added Senior Design Engineer Neil Medeiros, "Even with a thin bezel, you still see the lines on an LCD display wall; with LED, there are no visible seams in the wall." The margins in LED displays are smaller, and more facets can be used for a more precise, tight curve when creating curved video walls.

4K and What It Means for your Installation

4K video walls are frequently discussed in the industry, but are also easily misunderstood. "4K is simply the number of pixels in a display – about 4,000 – when measured horizontally," said Sasseville. "It's a technical definition." Nearly every installation of a video wall is technically 4K, since enough screens are combined to create the pixel amount required by the definition. An advantage of 4K is that with a video wall processor, one 4K image can be displayed across the entirety of the video wall. 4K displays are a popular choice because the resolution and picture quality are unmatched, with four times the resolution of full HD.

In addition to 4K video walls, there are also a number of 4K standalone displays, which are standard, single displays in true 4K with a mullion around the edge. These are frequently used for monitors placed at operations center consoles or as displays in an adjoining conference room or huddle space.

With 4K display technology, it is important to ensure that all hardware and cabling infrastructure is built to process 4K signals. It is also key to consider what will be displayed on the 4K video wall. "The tough part with 4K," said Sasseville, "is that there's not really any source content specifically made for it yet. Most of the content is upscaled, which means a video scaler is used to double the pixel amount. It's a lot of processing." However, according to Sasseville, 4K is quickly going to replace HD as the new standard for monitors and video. In fact, while 4K is still emerging as a technology, the industry has already started to look ahead; infrastructure is already being put in place for the eventuality of 8K video walls.



Curved Video Wall Installations

Another display wall consideration is whether to install a flat or curved showpiece video wall. Depending on the architectural design of the space and the client's preferences, a curved video wall might be the best display option for an operations center. While curved digital displays are manufactured, they are not made for the professional AV industry. Most pre-curved displays are more suited to digital signage applications and are not 24/7 rated displays. Additionally, it is not practical to use a curved digital display for a video wall, as the curve of the wall would have to be built out to the exact angle of the display's curve. Instead, the designers and installers at Constant create a curved video wall by using LED or LCD displays as tiles, arranged to form a curve at the angle that best fits the existing space. Due to essentially non-existent edges, LED display tiles make for a seamless curved effect at 24/7 rated quality.

Planning the Content of a Video Wall

The type of content that will be displayed on a video wall impacts the considerations taken into its design and installation for everything from placement to video wall type. An important element to consider during the video wall planning process is what type of sources will be displayed.

Danny Sasseville, Vice President of Project Engineering at Constant Technologies, said that there are three main methods of tying sources to the video wall: local source capture, native processor windows and streaming content, all of which are displayed on the showpiece video wall through use of a processor. A display wall

processor, said Sasseville, is "basically a big computer with a large amount of inputs and outputs. It takes all of the various inputs, maps them and organizes them on the screen in the way you would like them displayed." Whether that means one source displayed over the entire video wall or multiple sources mapped out over the wall, the processor manages multiple methods of source input and the visual information can be dynamically controlled by the end user through the integrated control interface.

Content Sources

Local Source Capture

Local source capture is the term for content that is replicated via a direct connection to the processor—for example, a computer with an HDMI cable connected directly to the processor. The screen that would be displayed on the computer monitor is "captured" from that local source and displayed on the video wall. This is a common method of sourcing for video walls, according to Sasseville. "Most of the workstations in the command centers we install will capture video from the computers at their desks, route it into a switch, and it will go to the processor to be displayed on the video wall."

Native Processor Windows

While the processor is a vital piece of machinery, it is also, said Sasseville, a functional computer. "You can run it natively as you would a computer, with software installed or an internet browser opened directly through the processor." According to Sasseville, in many large-scale operations center installations, a majority of what is displayed on the video wall



will be native processor windows. "In these big projects, often they will have 100 web browser windows open," he said. A processor can trim the browser to show only the relevant content, and it can produce other effects such as adding colored borders or a name or title.

Streaming Content

The third display option, streaming content, is simple: the processor has capability to stream a source, such as a video streaming service or video conferencing, via a codec. The processor decodes, consumes, and displays a stream that may be connected over Ethernet, LAN, or a WAN connection. Since operations center video walls are sometimes used for video conferencing between different locations of a multinational company, streaming is not an uncommon sourcing method in operations center installations that use a follow-the-sun model. Although the technical considerations of how to display content may not initially seem relevant to the design of a video wall, every detail of operations center design and video wall integration is an important and impactful piece of the whole.

Source Mapping as Design

Said Sasseville, "part of our design process is mapping out all the sources, how they will be routed through the processor and how the client wants each source displayed either on the video wall or at the command center workstation monitors." This source mapping process, or "input flow," contributes to design decisions such as cable management within workstations and under flooring.

Conclusion

The video wall is not just a standalone part of the installation and design, but an interconnected piece of the operation that affects and is affected by all the other individual pieces. The team members at Constant Technologies are experts at mission critical video wall integration and operations center design. We will help you decide which technology is the best fit for your space and which placement will most benefit your operators.

About Constant

Constant Technologies, Inc. provides customized AV integration and command center furniture worldwide. With over 30 years of experience, Constant's team has the knowledge and clearance to work with sensitive environments in both the public and private sectors and has implemented turnkey solutions all over the world. Constant designs, installs and services projects of all scopes and sizes to create solutions with the highest levels of security, aesthetics and functionality. Some of Constant's installations include: EOCs, Network Operations Centers, Fusion Centers, Security Operations Centers, and other command and control environments.

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