Which video wall technology is preferred for 24/7 control rooms in 2019?

By Rudolf Ernst, Undergraduate Industrial Engineering student at Stellenbosch University

The 1990's saw the employment of large-scale video walls in 24/7 command and control rooms becoming the norm when DLP (digital light processing) cubes were developed by Texas Instruments. DLP as depicted in fig. 1 remained unchallenged by other technologies until LCD (liquid crystal displays) screens increased in size and their bezels became thinner. In 2010, 42-55" LCD's with ultra-narrow bezels entered the video wall market and started competing with DLP: see fig. 2.

Recently a third technology came to the front in the form of LED (light emitting diodes) walls. LED walls should not be confused with DLP cubes that use LEDs as light source or LCD displays with LED backlights. LED walls are currently making strides in becoming a 24/7 indoors video wall solution and have been used in several control rooms already like the spectacular video wall in a traffic and control centre in Shenzhen in figure 3.

Figure 1 - DLP display wall

Figure 2 - LCD display wall

Figure 2 - LED display wall

These technologies are discussed with the aim to suggest the most appropriate solution for future 24/7 control room applications.

Installation

Although the height and width of a video wall will approximately be the same for any of the technologies, DLP cubes have a 'deeper' footprint than LED or LCD, thus requiring more floor space.

Screen gaps/bezels

LED display technology as well as DLP allow for virtually no visible screen gaps and deliver a seamless image, compared to LCD displays which have bezel thicknesses between 0.8mm and 5.7mm.

Lifetime

High quality LED walls from for example Mitsubishi Electric (MBE) has a service life of >100 000 hours until it reach half-brightness. That equates to over 11 years in 24/7 operation and trumps the service life of LCD screens. The latest DLP cubes from MBE have an expected lifetime of 130 000 hours.

Image retention

One of the biggest drawbacks of LCD screens is burn-in or image retention, which restricts it to 22/7 use instead of 24/7 use. LED walls and DLP cubes are warranted against image retention for 24/7 use.

Flexibility

The flexibility in installation of LED walls allows for curvature or even corner designs which set it above both LCD and DLP video wall systems. This allows for a curved shape video wall facing the room, as a result requiring less eye and head movement.

Redundancy

This is comparable amongst the technologies. The light sources (LED clusters) and input signals to DLP's are redundant, but not the power supplies. LED's make use of redundant power supplies and dual input signals, while a few manufacturers of LCD's provide the option of separate, redundant power supplies that power the LCD panels

Maintenance

Options for front and rear access for maintenance personnel allows quick maintenance of both LED units and DLP cubes. Maintenance access for LCD screens are restricted to the front only. This is an important consideration for instances where you cannot afford anyone obscuring other parts of the video wall while performing maintenance.

Brightness and power consumption

For a long time, the power consumption along with over excessive brightness of LED walls are what kept it out of 24/7 control rooms. Newer LED technologies are addressing these issues e.g. an active power peak saving function. This reduces the brightness of the image which aims to solve the age-old concern of LED walls being too bright for control room use. This function also limits the maximum power consumption through automatically optimizing the image by detecting its brightness. Despite these measures, LED walls still consume too much energy in a country such as South Africa when looking at competitor technologies.

Resolution

Most control room owners require full HD resolution for their displays. DLP cubes come in sizes ranging from 50-80", each cube's resolution varying from XGA to full HD. LCD screens, typically 55", also support full HD. However, for an LED wall to obtain full HD, 18 x 28" units arranged in an array

of 6 x 3 is required. This means that the screen size to obtain full HD, is a huge 2.88 m x 1.6 m for units with a 1.5 mm pixel pitch.

Cost of ownership

The cost of an LED wall is roughly 3.5 times more than an LCD wall, while a DLP wall costs about 3 times that of an LCD wall. An LCD wall - on price only - is thus the cheapest option when only looking at initial capital outlay. But energy consumption and expected lifetime need to be factored in to get the total cost of ownership. An LED unit's lifetime is roughly twice that of an LCD. A DLP cube's lifetime is roughly 2.6 times that of an LCD. For any specific application, the *combination* of initial cost, how long it will last until it needs to be replaced, replacement cost, amount and cost of maintenance interventions and the cost of electrical energy consumed over the video wall's lifetime must be considered.

Conclusion

EEU Taltronics' Dr. Hennie Barnard was asked about his technology choice. He replied "Whilst appreciating the continued advances made with these technologies, preventable eye fatigue due to excessive brightness, the amount and size of LED units required to obtain full HD resolution and solutions that are super-economical w.r.t. its power consumption remains critically important. Until these are addressed satisfactory, DLP is still the way to go."

Figure 3 A recent installation of a DLP video wall by EEU Taltronics

Although it is clear to see the advances LED walls have made by arguably surpassing LCD screens in video walls, there isn't clear evidence that LED walls conquer the economic, reliable DLP cubes as yet.

Contact: Rudolf Ernst, rudolfernst1998@gmail.com or Dr.Hennie Barnard, hennie@eeutel.co.za