

Video Display Formats

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As we go about our daily lives we come in contact with several display formats that we are used to seeing. Television, computer monitors, movie screens, and digital signage to name a few. These displays use different formats that have different ratios of height to width in order to accomplish certain goals. When planning a new video display system for a church worship space, one of the decisions that must be made is the selection of the display format. Obviously there are many other decisions to make as well, but for now we are going to focus on the format and some of the related issues that will be impacted by the choice you make.

Movie Screens

Prior to 1950, the standard aspect ratio for the film industry was 4 to 3. This ratio defines the relationship between the width of the display and the height of the display – in this case it is 4:3 (or 1.33 to 1 for those of us who don't do well with fractions). In the early fifties, wider formats were introduced and developed for the film industry.

Cinemascope was the first format introduced (2.66:1 and eventually 2.55:1) which later gave way to Panavision (with an aspect ratio of 2.35:1).

Since the original Cinemascope format, there have been a myriad of film formats and aspect ratios in use. Some of these include Cinerama, VistaVision, Todd-AO, Technirama, Ultra Panavision 70 and Super 35. With as many different aspect ratios as the day is long, some of these formats are even as wide as 3 to 1.

Movie screens today are typically manufactured to a format that is larger than the images that will be shown on it. The screen format is modified to match the format of the film being shown through the use of drapes that 'mask' off the unused portion of the screen. This eliminates the need to have visible black bars on the screen image either to the sides of the image or above and below the image.

Television

Since the original film aspect ratio was 4:3 (or 1.33:1), this is the standard that was originally adopted by the television industry. As the aspect ratio of movies has increased, and with the chance to establish new television standards related to the move toward digital broadcasting, the 16:9 format was created. The concept was that this height/width ratio is closer to the format used by movie producers and less cropping of the picture (letterboxing) would be needed to display a feature film in its original format on your TV. However, 16:9 is 1.78:1 which is still not quite the same ratio as most movie formats. As a result, the black bars of letterboxing are still visible with some film format material. It's just they're just smaller in size. Newer television displays, such as plasma and LCD TVs, are mostly being produced with screens that are in the 16:9 format. This format is intended to become the standard that eventually replaces the 4:3 format.

Until just recently, all televisions were manufactured with the 4:3 aspect ratio. As home viewing

Signage

Increasingly, video displays are being used for signage applications. This can be anything from information stations and advertising space to the menu at a local fast food establishment. The various formats found in use today for signage is nearly unlimited. You may see anything from a 16:9 plasma display turned sideways so that it is taller than it is wide to curved LED screens that 'wrap' the picture around a cylinder. Most signage content is custom created for whatever aspect ratio is desired which provides a limitless number of options.

Church Applications

Deciding on a display format for a church facility, several factors need to be taken into account. Probably the most important is consideration of the primary use of

the display, or the content that is going to be displayed. If the display is going to be used primarily for computer generated graphics (i.e. song lyrics, sermon outlines and the like), nearly any format can be made to work. However, it will be



much easier to set up the system if the display format matches the output resolution of the graphics system. Most of the standard computer display resolutions (VGA, XGA, etc) are formatted 4:3. Some of the newer computer graphics cards include output resolutions that accommodate 16:9 or 16:10, such as wide XGA, and if you are using a true character generator system most of them can be switched to output either 4:3 or 16:9.

Image magnification (IMAG) is often shown on screens that are 4:3 in format. This is due to the fact that many churches already have a substantial investment in camera systems that are set up to output this format. In addition, IMAG is really intended to be a close-up of particular areas of the platform and does not necessarily benefit from the added field-of-view available in a 16:9 image. Most new cameras and switching equipment, particularly those operating with a digital signal, are able to operate at either 4:3 or 16:9.

If the display is primarily designed for presentation use, such as showing movies and/or custom content that is produced in-house, then the cinematic feel of the 16:9 format becomes a big asset. The extra width can give a sense of envelopment to the viewers, drawing them into the image being shown. Often times a large

center screen with this format is very useful for this type of function.

Some churches have begun exploring the use of video as a stage backdrop. In this application the larger the display format the better. To some extent the format will be dictated by the dimensions of the area the backdrop needs to cover, but commonly a backdrop display will have a format of 3:1 or greater. This type of wide aspect ratio screen technology requires custom created content and the display system typically utilizes extensive processing with multiple edge-blended projectors or LED screen technology. These types of displays are still in their infancy and will definitely grow in popularity and functionality over the next several years.

One of the primary factors to consider for a video backdrop display is the space available for the screen. If the image needs to be 6' high to be viewable at the back of the room and you only have 9' of width available in which to mount a display, then a 4:3 screen is what will fit (6'x8'). Conversely, if you want a backdrop for a stage that is 60 feet wide, but the back wall is only 20 feet high then you will need a display format of 3:1 to cover the area entirely.

Display Systems

While 16:9 is definitely the direction the video industry is headed, it is not there yet. This makes for some interesting quandaries when planning a video display system. For one thing, most of the projectors (LCD or DLP) currently on the market have a native output format that is 4:3. While many of these projectors can output a 16:9 image, they do so by cropping the top and bottom of the picture (letterboxing). In doing so you lose some of the resolution and light output of the projector.

Alternative technologies, such as LED walls, are still prohibitively expensive for most churches while flat panel displays such as plasma and LCD screens are not yet available in large enough sizes to use as primary display systems for a worship venue.

While scalars are available that will cross-convert any image format to any other image format, all of these conversion processes involve some sort of image distortion or degradation. In setting up a display system that relies on format conversion, care must be taken to ensure that the amount of image manipulation is not objectionable.

Generally speaking, the larger the size of the display the more noticeable the manipulation. Distortion that is not too bad on a 27" TV might be very disturbing when viewed on a screen that is 15' high x 20' wide.

One of the ways to limit the degradation of the image is to ensure that format conversion happens at only one point in the signal path. For most churches, this point is a switcher/scaler. For example, if you play a movie that was shot at 2.35:1 and the projector you are using has a native resolution of XGA (1024x768, which is a 4:3 format) you send that signal through a switcher/scaler that is set to output an XGA signal so that the projector does not have to perform any additional manipulation of the image in order to put it on the screen.

Different scalars use different methods of manipulating and image in order to perform format conversion. Some of these include different types of image zoom, image cropping, image stretching. Also, some of the wide aspect ratio format movies are reformatted by using a technique called "pan and scan" where the primary content of the image is centered into the new format frame and may require panning across a static image as it was captured in the original wider format to show the main action. Each of these processes can create some noticeable problems when looking at an image that has been reformatted.

High Definition

You may have noticed that we haven't mentioned high definition video yet. High definition is really its own topic, but in terms of image format it is a 16:9 image. Hence one of the questions we are most frequently asked: What format should the screens be in our new worship facility? Our usual answer is that 16:9 is likely to become the standard format and it makes sense to at least prepare for it, even if the church already owns a large amount of 4:3 formatted video equipment.

One of the easiest ways to prepare is to install a 16:9 screen and only project on part of it, possibly masking off the unused portion with drapery. Another option includes providing an architectural opening for a screen that will fit the 16:9 aspect ratio, but filling in the sides with construction materials that can be easily removed in the future when the screen width is increased.

Image Formats for New Construction

The general consensus within the industry is to move toward 16:9 format presentation screens. While this hasn't happened in every new venue, it is the format that appears to provide the greatest compatibility in the future. For those facilities where it is feasible, virtually all projects that we are involved in will use this format. Regardless of what format you use, remember that the success of any display system comes down to the quality of the images you put on it.



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