

Geometry

Digital Signage applications continue to increase in number globally—video presentations continue to be a mainstay of the business meeting and conferences world wide. Video projectors are the tool of choice for presentations and are occasionally used for digital signage.

Projectors allow for displays much larger than plasma or LCD and at an affordable cost. Flat panel displays can run \$10,000 for a quality 61” device, and currently are limited to that size or smaller (although sizes upwards of 100” are imminent). LED walls offer huge sizes (displays at stadiums, outdoor signage on buildings, etc...) but at a hefty price—\$2000 per square foot for coarse resolution at 22mm distance between LEDs up to \$5000 per square foot for 3mm LED placement (higher resolution). To achieve a 10’ or greater diagonal display, the choices are either LED at \$64,000 to \$160,000 with limited close-viewing resolution or projection in a price range of \$2,500 to \$10,000 depending upon the quality of the projector and screen material.

Simple Geometry

While economy is the attractive feature of projectors in large format applications, the projector itself is the major con—especially in digital signage. The physical characteristics of projection mandate that the projector be placed as close to perpendicular to the screen as possible and at a “throw distance” that fills the screen. In some presentation applications the hindrance of placing a table in the middle of the room shooting straight onto a screen is not significant...but in an open venue, this is rarely viable and in staging applications, the desired placement of a projector would be hidden from view.

The projector needs to be placed out of the general traffic flow for simple viewing angle reasons but also for safety reasons. Rear projection can help, but if the screen that needs to be filled is large enough, a significant amount of room behind the projector must be allocated to give the projector throw distance.

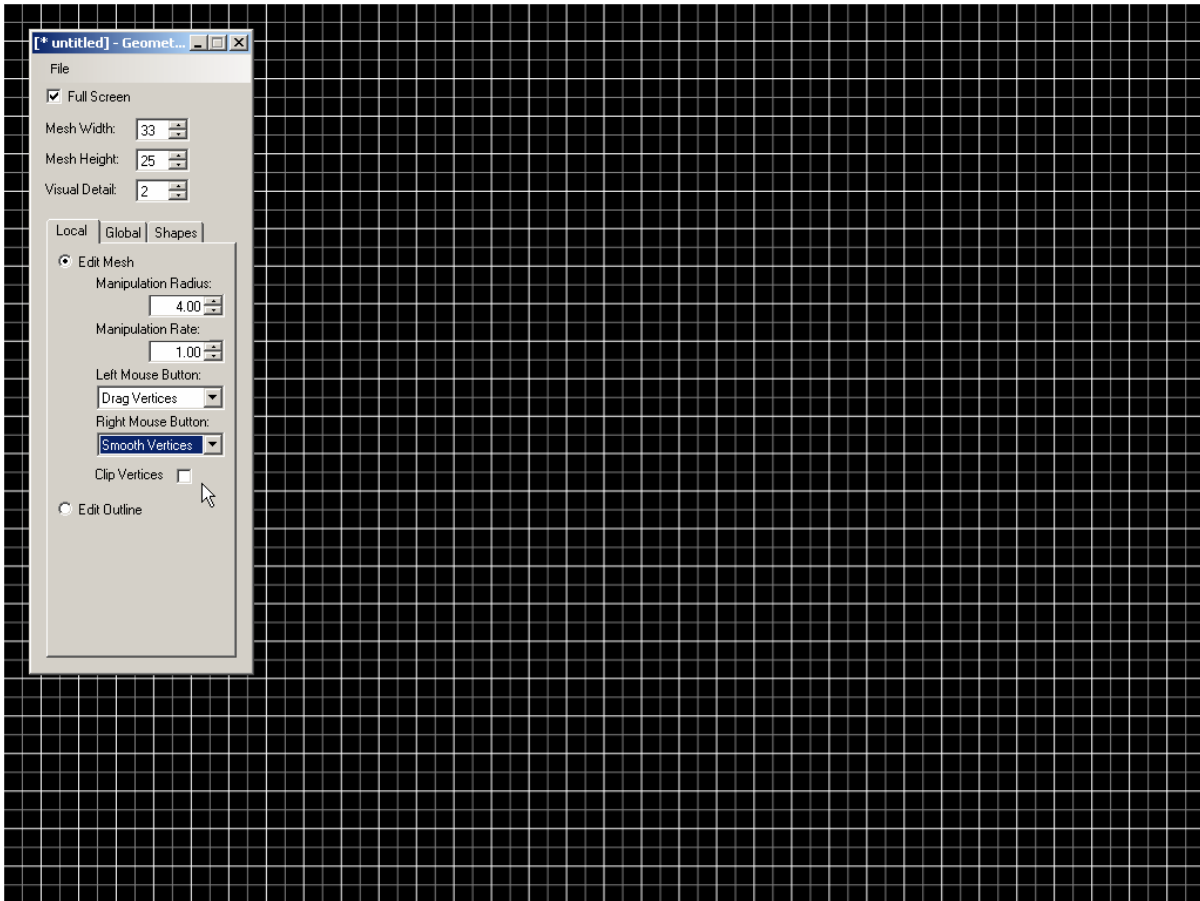
The need then is to place the projector in a location other than “straight on”. Most projectors, even the lowest cost models, have basic alignment functions such as keystone or trapezoid compensation. These controls allow the projector to be imperfect in placement; however any placement that exceeds the functional limits of the projectors adjustments requires geometrical compensation devices.

There are very few hardware based video processor devices that perform scan-conversion as well as some geometric conversion functions. Such device adds at the minimum \$2,500 to the installation per channel. The bill of materials for such an application consists of a projector, a screen, a playback device (media player, PC, other), and a video processor.

Adding Keywest Technology MX-XWarp software to the MediaXtreme player combines the media player, video processor/scan converter, and the geometric correction device. This melding creates a pixel specific correction capability that is faster, more accurate, and lower cost than any competitive device available.

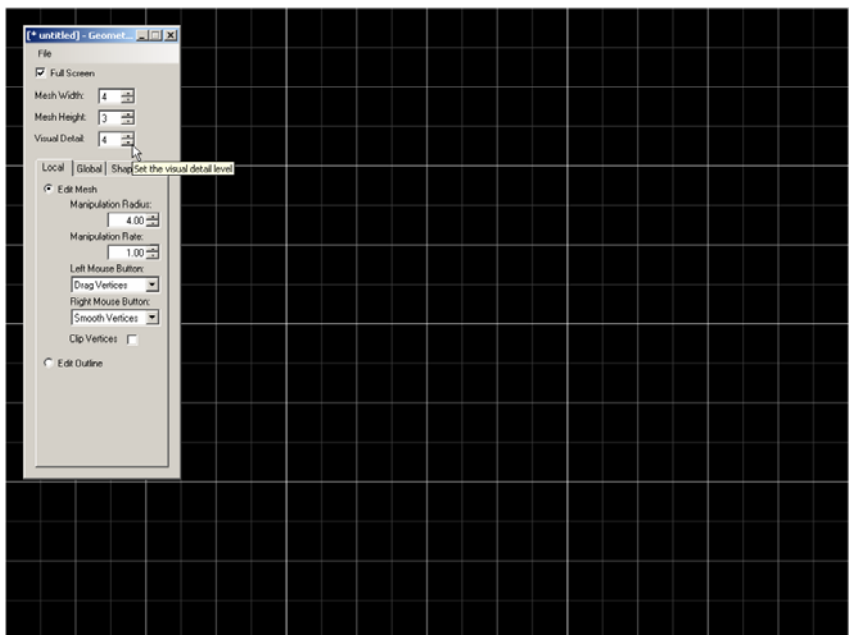
In real-world applications, video projector alignment with the MX-XWarp software was performed in 1/10th the time as the same alignment with an external device. The most popular competitive external processor requires the user to connect an external computer to the projector in question; the connected computer must be then loaded with the competitor’s geometry software; the user opens the software and performs the manual alignment through the projector. The alignment file is saved and downloaded into the external processor and finally activated for use. With the Keywest Technology MX-XWarp software installed on the actual media player, the user is able to simply stop the current schedule, open the alignment tool, make the adjustments and save the file. A process that took at least 30 minute per channel with an external device is reduced to three minutes with MX-XWarp and since calibration is made on the actual playback device (eliminating known variables from adjustment software running on devices other than the actual playback hardware) huge increases in alignment precision are realized.

MX-XWarp software produces a full-field grid pattern through the actual projector being used, on the actual screen, with the actual player. All external variables are removed. The user is able to use a mouse

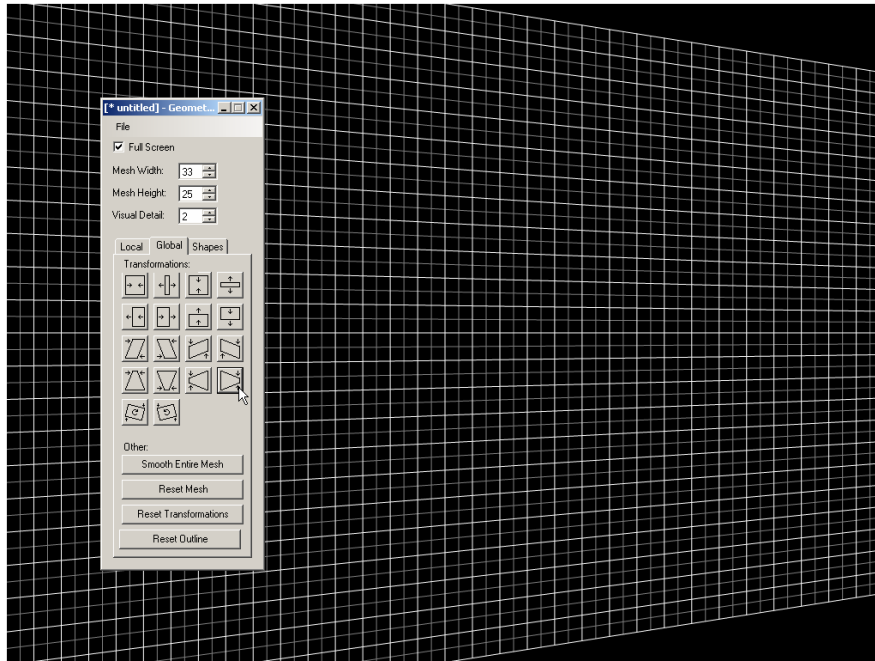


to set various parameters.

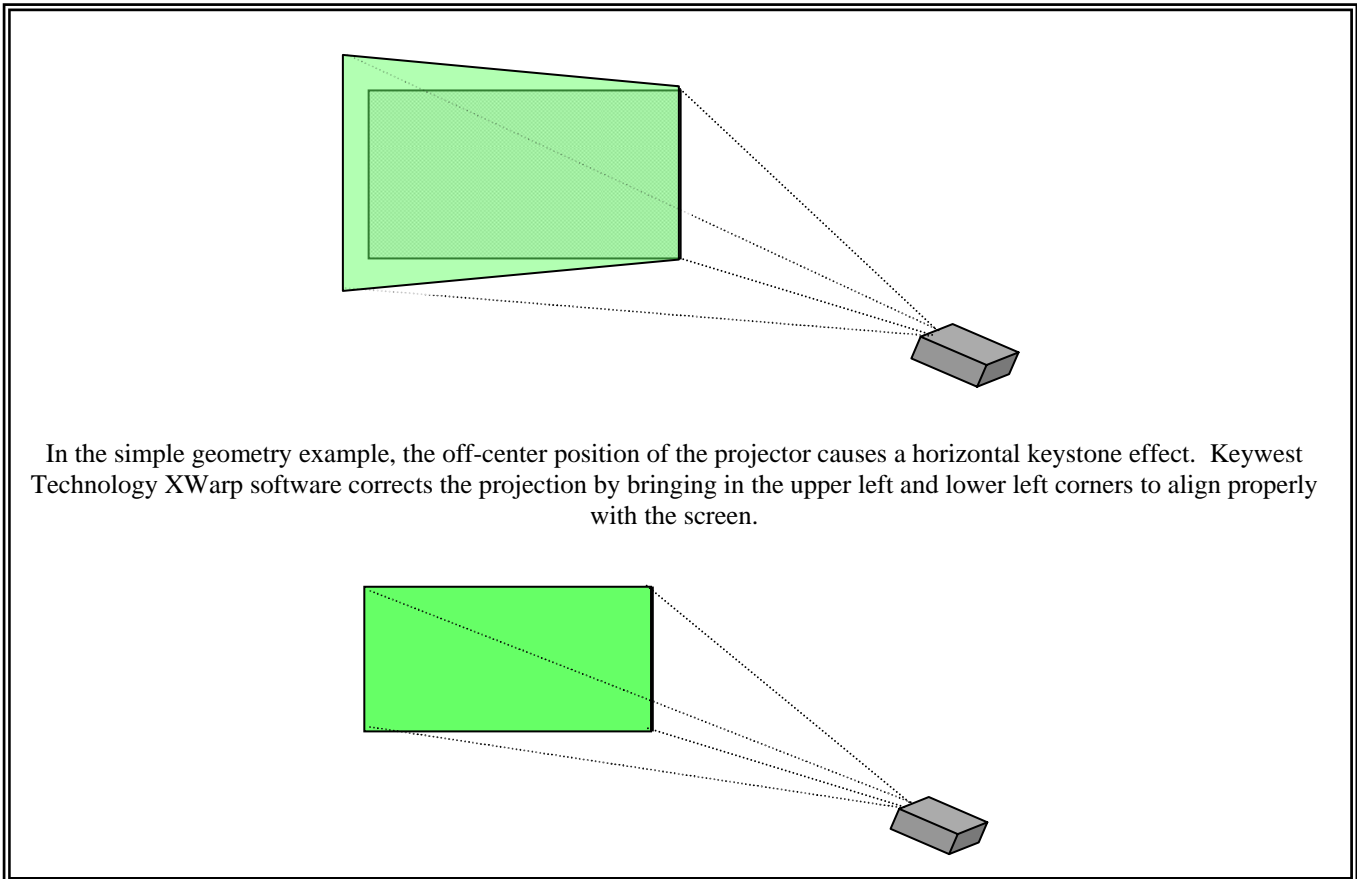
Grid size, adjustment rates, and even mouse functions are user-settable features. Each installation has unique needs, and in the finest tradition of Keywest Technology, MX-XWarp is flexible for all those needs. Reduced grid sizes for example can make the simple alignments for minor corrections easier—or even can increase precision when overlaying two projected images.



Once a grid size and manipulation attributes are set, creating an MX-XWarp map is simple.



If the display requires simple correction for an offset projector, the user is able to use the global transformation buttons to compensate for keystone, trapezoiding, or even rotation.

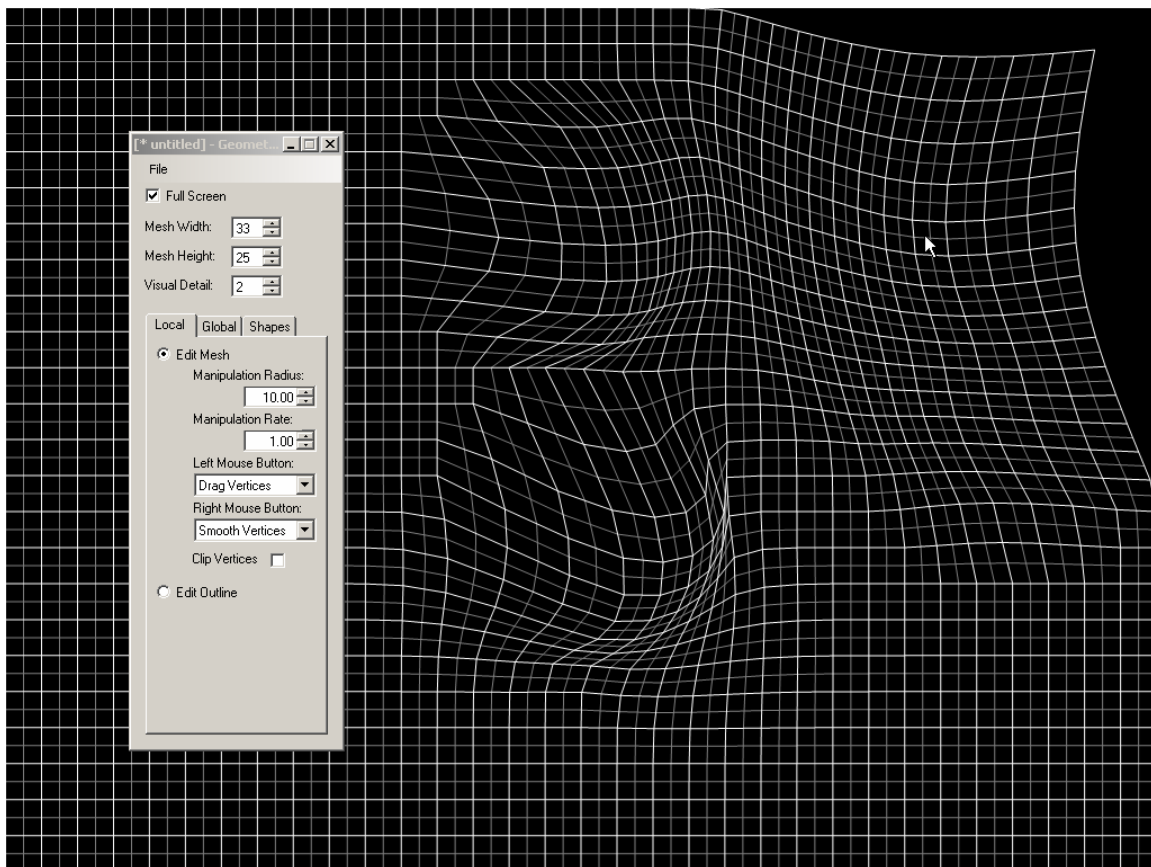


In the simple geometry example, the off-center position of the projector causes a horizontal keystone effect. Keywest Technology XWarp software corrects the projection by bringing in the upper left and lower left corners to align properly with the screen.

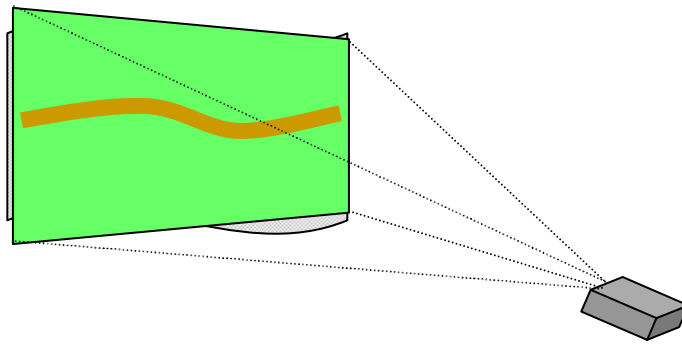
Complex Geometry

While most projectors contain basic correction functions, those in the right price range for presentations or digital signage do not contain any non-linear capabilities. Keywest Technology MX-XWarp software not only corrects the standard functions such as perspective, keystone, and size required for projector placement, but also corrects complex curves and odd shapes.

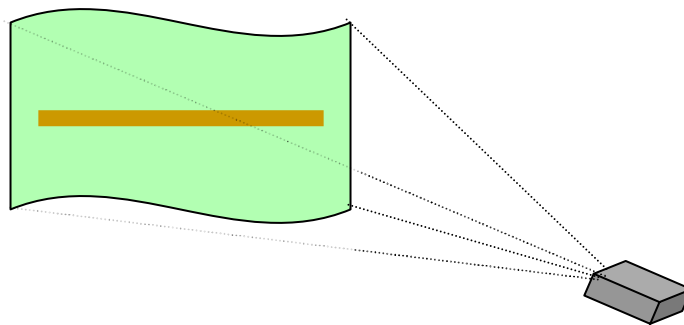
Specialized convex or concave projection screen dimensions can be corrected by a manual alignment consisting of setting the grid to the desired precision and detail, and grabbing and dragging vertices to virtually “straighten” the grid on the actual screen. Multiple correction methods can be combined, for example, to correct for a convex screen and an extreme angle projector placement simultaneously.



The operator uses the mouse to grab vertices and drag—while viewing on the actual screen, the operator is actually straightening the grid...while the output shape on a flat screen would be significantly distorted, the result on the abstract screen will be an effect of “aligned” visuals as though the screen were flat.



The complex geometry example illustrates a projector offset creating a horizontal keystone problem. The application is further complicated by the wave-shaped screen. Step one would be to offset the keystone using XWarp software by pulling in the upper and lower left corners. Next, the operator would use the XWarp alignment grid to create a projection warp map. The map is immediately applied to the output video, effectively “canceling” the geometry of the screen. The gold line in the upper figure demonstrates how a projected straight line would appear without XWarp—the lower figure demonstrates the XWarp correction.

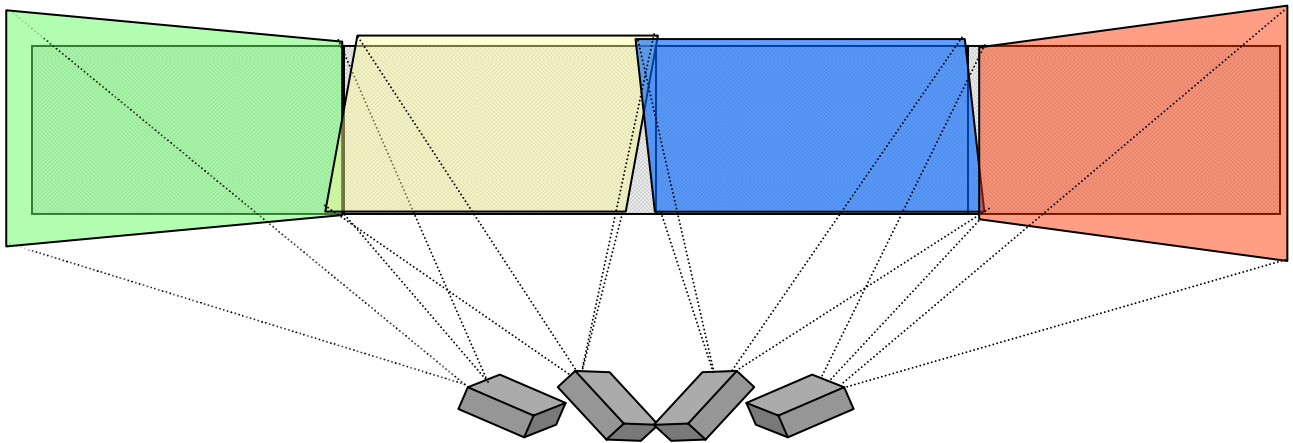


Multiple Projectors

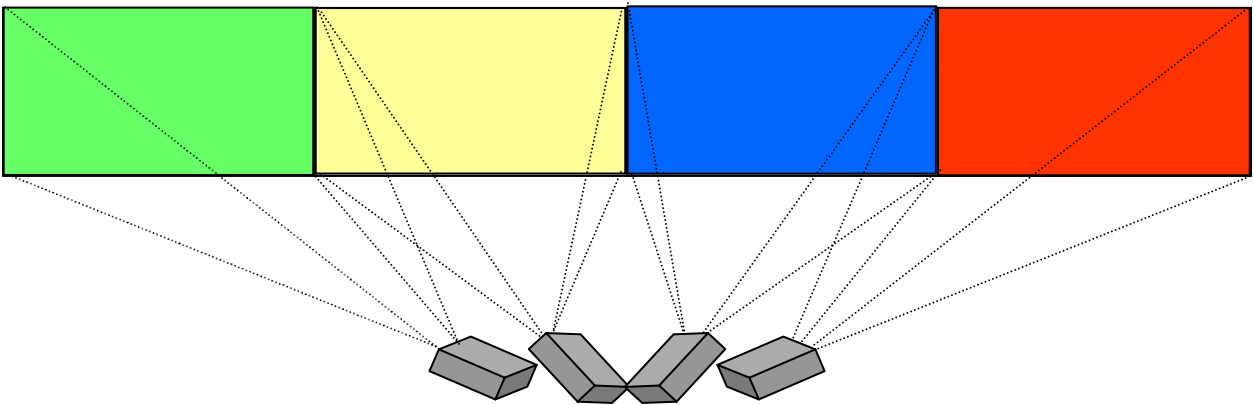
Additional parameters in a projection application include the use of multiple projectors to increase the viewing area and angle or for special effects. Also, content play out usually will require synchronizing between projectors—this is an expensive problem unless a single multi-channel playback device is used. The only multi-channel playback devices available with geometry correction software installed is the Keywest Technology MX series.

Geometry correction with multiple projectors allows for easy mounting—projector placement can be compensated for by the geometry software. MX-XWarp gives the MX series devices the power to run individual geometric correction algorithms (saved patterns) on each individual channel simultaneous. For example, a quad-channel MX device feeding 4 projectors for four screens aligned edge to edge in a landscape fashion; the four projectors can be set in one small area, fed by one player, each channel

correcting image geometry independently—the flexibility simply removes the bounds that prevented wide-spread projection proliferation in the digital signage market and creates new possibilities.



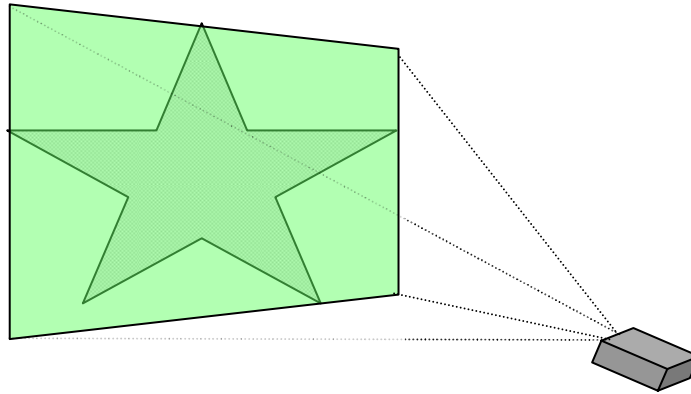
Since correction on a multi-channel device, such as the Quad-head MX IV is independent per channel, an array of projectors is easily aligned for stunning presentations. Perhaps the application is a string of four 16:9 landscape video screens, rear-projected, running the length of a corridor or along a single wall in a concourse—without great expense or significant effort, a 12' tall by 48' long presentation would leave a lasting impression on viewers.



Projection Masking

Keywest Technology geometry software also features masking functions. The user can create a custom template for the output video. This is useful for situations where an unorthodox or undersized screen is used and the operator wishes to eliminate over-shoot.

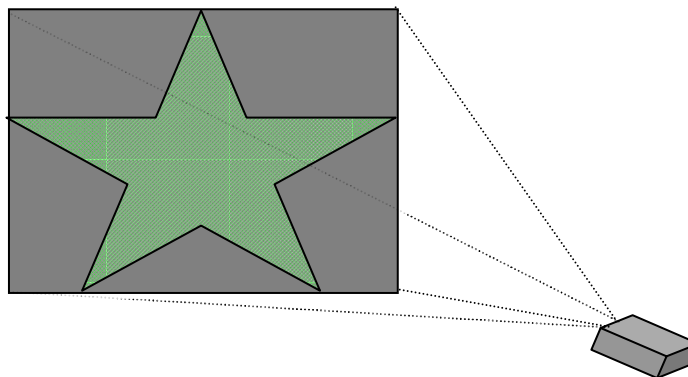
This geometrical masking or cropping function is not available on any competitive geometry correction devices.



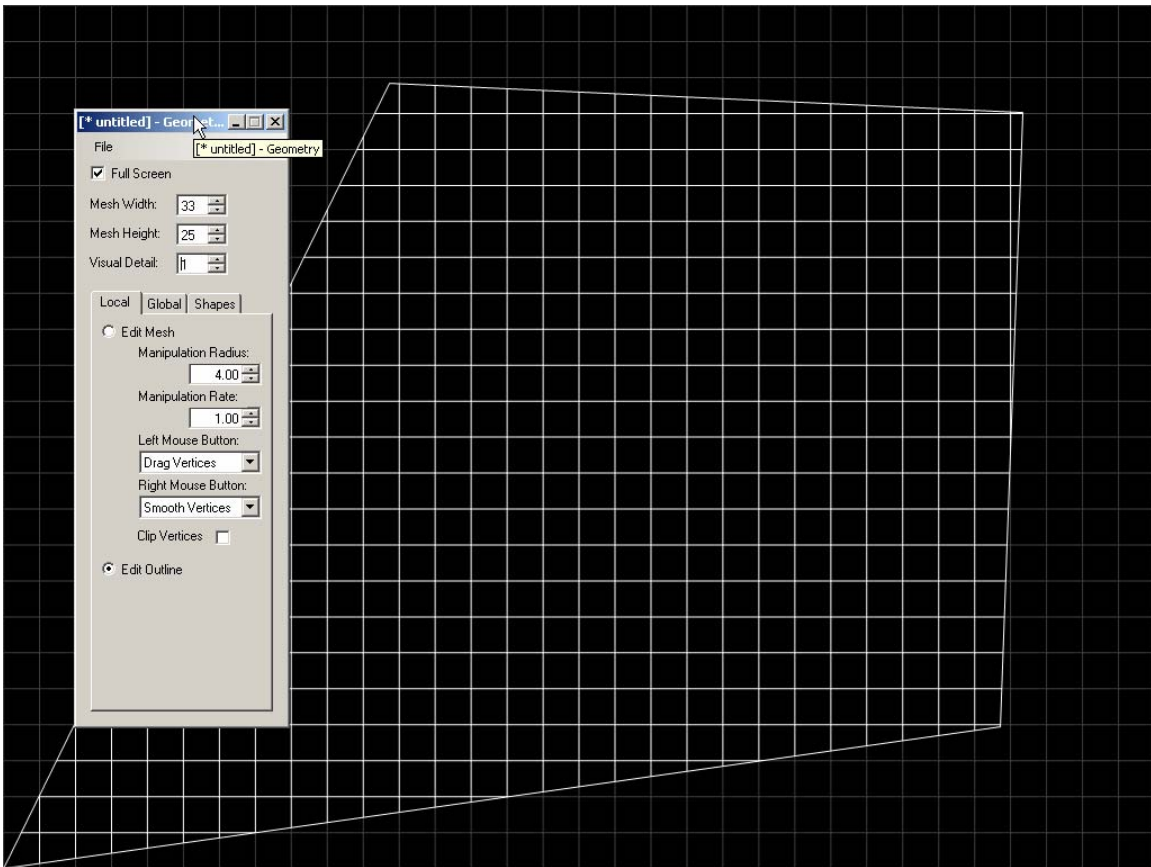
Our drawings illustrate an odd-shape screen, a star shape, and a standard projector off-set. We have two issues to work out: First, compensate for the keystone using XWarp software; second, use the Masking function of XWarp to virtually key the video onto the exact shape of the screen. This gives presentation, staging, and marketing professionals a brand-new tool...to effectively use screens of any size and shape (2D or 3D) and hit the imagery accurately on the screen and only on the screen—no overshoot, raising the term professional display to a new level. In the lower drawing, the gray area outside the screen represents where the projector would be illuminating but is producing no light (projecting black) due to the XWarp mask; no overshoot in the eyes of those walking behind, no overshoot striking a separate display, nothing detracting from the message.

Also to be noted, the XWarp software could very well be used without a mask to physically shape the output video onto the star screen exactly—this type of distortion special effect may be desirable in some applications and is easily accomplished.

Any combination of masking and warping is allowed with XWarp software.



Setting the mask is as simple as setting a warp



As the image illustrates, the MX-XWarp editor is set to EDIT OUTLINE and the mouse is used to drag that outline into shape. The grayed area in the above illustration indicates the areas that will “blacked-out” during projection.

Finally, saving and implementing the warp and/or mask files is as simple as saving the map in the SETTINGS folder and denoting it as the active geometry correction file in the player Setting.INI file. Multiple map files can be stored in the player for multiple locations.

