

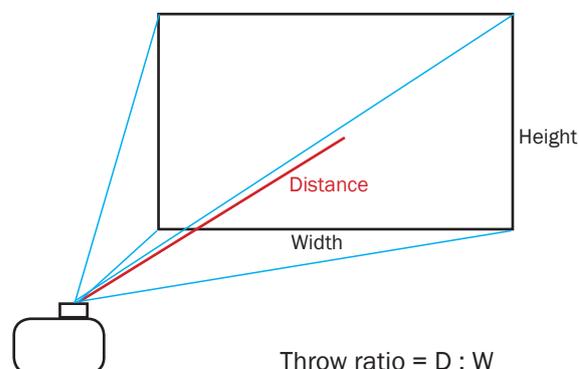
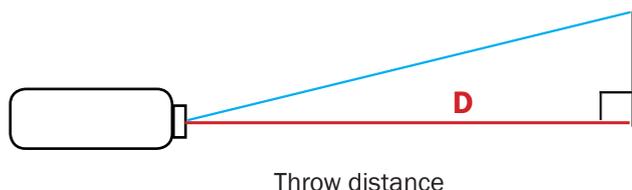
Fact Sheet:

Using Projectors in a Gallery Space

The following resource outlines the factors to consider when selecting and installing a projector and contains a troubleshooting guide for common issues encountered when using projectors in a gallery setting.

Essential Knowledge

Throw distance - The distance between the projector and the screen or wall is called the throw. If you are severely limited in installation options there are 'Long Throw' projectors that project large images across longer distances and 'Short Throw' projectors that produce large images when installed close to the wall.



Throw ratio - Is derived from the throw distance over the width of the screen size (D/W). This measurement will help you determine how far away the projector needs to sit from the wall to achieve a certain image size or, conversely, how wide the projection will be according to the projector's position. Consult your projector's manual or the manufacturer/retailer's website to find the throw ratio of your projector or simply measure it yourself. There are also useful calculators on the Internet that use the specifications of your projector model to calculate the optimum distance for install (see 'You might also like...' section on page 8).

Example: If a projector has a throw ratio of 2.0 (2/1) this means that when the projector is 2m away from the wall, the screen will be 1m wide.

Placing your projector

Ideally, a projector should be placed perpendicular to the wall/screen. However, this is not always possible. If the projector is angled towards the wall vertically or horizontally, the resulting image will generally be distorted. Thankfully, there are now numerous features on a projector that help correct the image, allowing you to be flexible with projector placement.

Follow these steps when determining the placement of your projector:

Physical considerations

The physical placement of the projector should be the first consideration. Try to minimise the angle the projector needs to be tilted in order to project on the wall/screen. Also take into consideration the throw distance/ratio of the projector. Accessories can be used to assist in perfecting the physical position of the projector, including:

- Ceiling mounts – An additional accessory that makes it possible to install a projector at a height where visitor's heads will not disrupt the path of light and provides a cleaner look in the gallery space. If the gallery has high ceilings, you may need to invest in an extension pole. The closer a projector is to being perpendicular to the wall/screen, the better.
- Shelves – A more affordable option is to place the projector on a shelf high on the opposite wall or on a moveable wall (throw distance permitting).

Technical considerations

Projectors include an array of useful technical features to allow greater flexibility in projector placement.

Projection modes

Some projectors have multiple projection modes that allow you to be flexible with the placement of your projector.

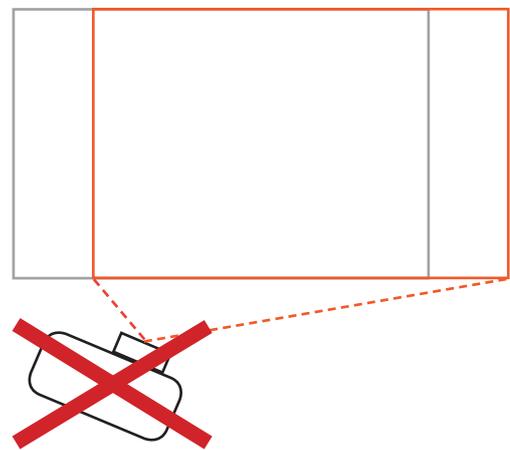
- **FRONT:** This standard setting allows you to project directly onto the wall/screen.
- **FRONT/UPSIDE DOWN:** If you are projecting from a ceiling mount, the projector unit will be flipped with the bottom facing the ceiling. This mode will flip the image vertically so you can project when ceiling mounted.
- **REAR:** This mode allows you to project on to a translucent screen from behind by flipping the image horizontally so it is correct when viewing from the front of the screen. Not on all projectors.
- **REAR/UPSIDE DOWN:** This mode allows you to project onto a translucent screen from behind and ceiling mounted. The image is flipped both vertically and horizontally. Not on all projectors.

Zoom

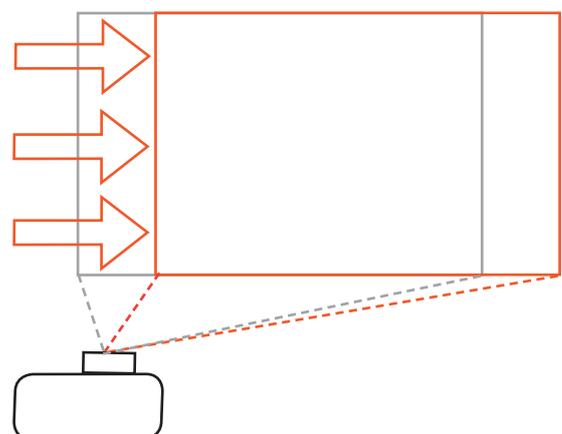
Zoom allows you to enlarge the projected image without moving the projector. A zoom of 1.6x allows the image to be enlarged by 60%. Try to use zoom for more minor adjustments, but it will allow you more flexibility.

Lens shift

This feature allows the lens within the projector to move vertically or horizontally within the housing unit. The projector can then be positioned off-centre without needing to tilt it on an angle to hit the wall (see diagram). This allows greater flexibility in placement, especially when using ceiling mounts. Lens shift is preferable to using keystone correction, as keystone correction can compromise the quality of the projected image. Read the projector's operational manual to learn how to use lens shift on your specific model. It is not a feature on all projectors. If you are buying a projector consider one that has this useful feature.



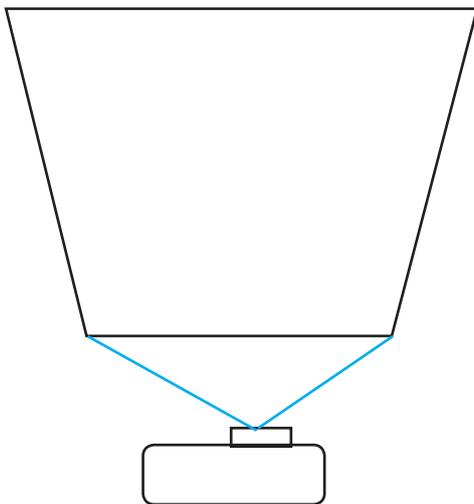
Tilting projector to move projection across wall



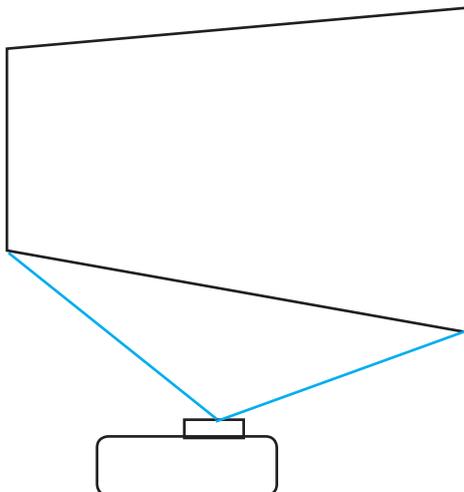
Using lens shift to move projection across wall

Keystone correction

If your projector is positioned on an angle from the wall/screen then it will create a trapezoidal image. Vertical keystone occurs if the projector is tilted up or down and Horizontal keystone occurs when the projector is placed to the side of the screen and pointed diagonally towards it. Some projectors have a Keystone correction feature that allows you to correct the image. Vertical keystone correction will compress or expand the bottom or the top edge and Horizontal keystone will compress or expand the left or right edge. There are limits to keystone correction, therefore utilise the lens shift feature as much as possible before you tilt the projector to achieve the image you require.



Vertical Keystone



Horizontal Keystone

Resolution and Aspect Ratio

Resolution refers to the number of pixels, or squares of light, that make up your image. Generally, the greater the resolution, the greater the quality of your video. Projectors have a fixed or 'native' resolution. This means that the projector will always display at this resolution, regardless of your video's resolution. Determining your projector's native resolution is important as this will determine how well your video is displayed. It is ideal if your video's resolution matches your projector's resolution. If they do not match, they will still play, but at a lesser quality. Aspect ratio is another important measurement that refers to the ratio between the height and width.

The most common resolutions/aspect ratios are:

Resolution	Aspect Ratio	Description
1920 x 1080	16:9	HDTV
1280 x 720	16:9	HDTV - 1st iteration note: will compress videos with 1920 x 1080 resolution
640 x 480	4:3	Standard definition (eg. CRT)
4096 x 2160	16:9	4K - newest release, four times the resolution of HDTV
1280 x 800 / 1920 x 1200	16:10	WXGA / WUXGA - a resolution that matches the size of a computer screen for presentations etc. Avoid buying these projectors for media work

Tip: Resolutions are generally referred to by the unit of pixels along the vertical axis (ie. 1080 HDTV or 720 HDTV)

Troubleshooting Guide

Issue: My projected image is upside down or back to front

Check that the projection mode selected on your projector corresponds to the orientation of your projector in relation to the screen.

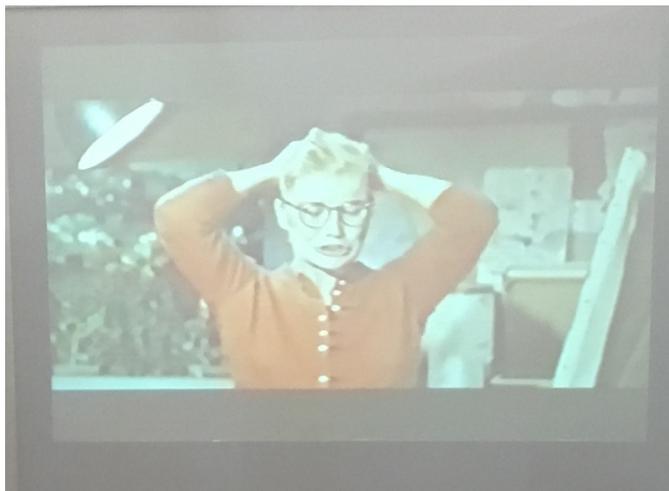
See **Projection modes** on page 2 for more information.

Issue: I can see black bars along the edge of my video

Check the aspect ratio of your video and the native resolution of your projector. If they do not match, you will be able to see black bars on your projection. This will most likely occur if you play a standard definition video (4:3) through an HD projector (16:9). This also occurs if you play an HD (16:9) video through a WXGA (16:10) projector, which is a common native resolution for projectors made for use in business settings.

You will see black bars because a projector emits light across the whole area of its native resolution. Even when a projector is projecting an area of solid black, it will still be visible as it is impossible to replicate the colour black using a light source (see image to right).

See **Resolution and Aspect Ratio** on page 3 for more information.



Issue: My projection looks squashed, elongated or cropped

If your image looks squashed, elongated or cropped the issue likely stems from the aspect ratio settings. If the projection is trapezoidal in shape, see **Keystone correction** on page 3.

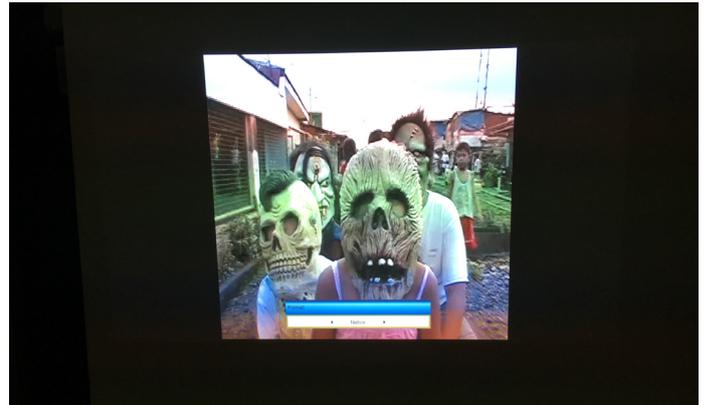
Check if your projector has a setting that is automatically controlling the aspect ratio of the image. Every projector has a native resolution, which is fixed. As mentioned previously, if the aspect ratio of your video matches the native resolution of your projector, it will display cleanly with no black bars along the edges if no additional settings have been applied.

However, there are multiple settings on projectors that, when selected, will automatically adjust the aspect ratio of your video. The images below illustrate a 4:3 video being played through a projector whose native resolution is 16:9. The first setting was 'Native' and maintained the original aspect ratio of the video. The second was 'Superwide' and stretched the image across the full screen. The third was '4:3' and it resulted in a squashed image. This demonstrates that settings that manipulate the original aspect ratio of your video should be avoided.

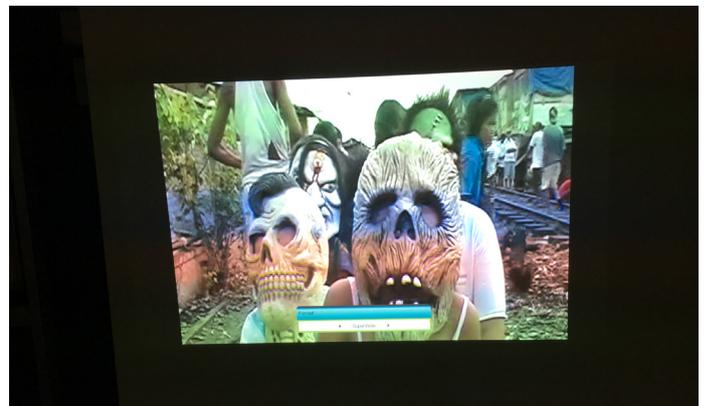
Issue: My projection is crooked/trapezoidal

See 'Keystone correction' above

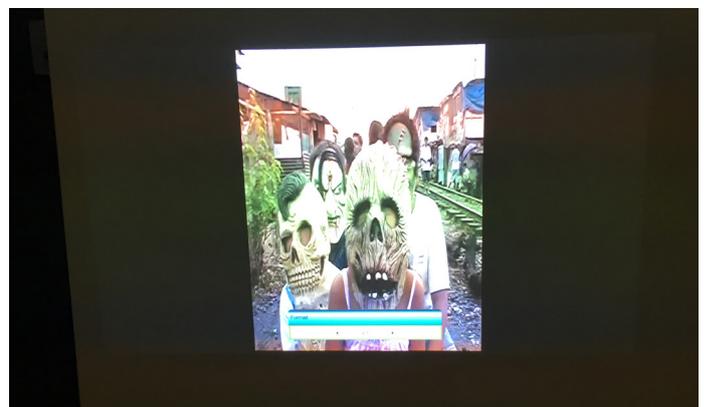
If your projector is sitting on a shelf or plinth, adjust the legs of the projector to ensure it is level



'Native' setting



'Superwide' setting



'4:3' setting

Issue: The colour of my projection is washed out

There are a number of factors that may be interfering with the colour of your projection and numerous ways to correct it.

Light bleed

Try to minimise the amount of light entering the area where you are projecting. You can utilise moveable walls to block light in a space or remove/reposition lights to reduce ambient light. If you have the budget, painting the room black lowers ambient light as well.

Colour modes

Your projector may be set to a particular colour mode which automatically adjusts various colour settings to suit a particular environment (ie. low light, bright rooms etc.). Test out different colour modes to see if one matches your particular space. Avoid using 'Auto'.

Settings

Various individual settings can be manually adjusted to improve the colour of your image. Settings may vary depending on the brand of projector, below are some general settings. Take note of initial values when adjusting in case you need to restore to original set up:

- **Brightness** – lighten or darkens the overall image. Avoid changing the brightness as it digitally alters your image rather than increasing the amount of light emitted by the projector, which remains constant.
- **Contrast** – adjusts the difference between light and dark areas of the image – a low contrast will cause a washed out image, however the more you increase the contrast, the more colour detail you sacrifice as you decrease the colour spectrum being used and variation in colour becomes more limited.
- **Colour saturation** – Adjusts the intensity of colours in the image
- **Sharpness** – Adjusts the sharpness of image details
- **Colour temperature** – Sets the colour tone of the image, higher values make the image 'colder' with a blue tint and lower values make the image 'warmer', with a red tint.

Other modes or settings may affect the colour/brightness of an image, for example power consumption settings that reduce lamp brightness to conserve power and lamp life.

Lamp

Your lamp's brightness will decrease with prolonged use. Lamps have a limited life span and need to be replaced periodically. The quality of the image may be related to the age of your lamp.

Lumens

Lumens is the measurement of light emitted by your projector. The higher the lumens, the more effective the projector will be in spaces with lots of ambient light. Generally anything between 2800-6000 lumens is suitable for such spaces. For darker spaces, the lumens can be lower and still be effective.

Screen size

Most projectors will have an optimal screen size (dependent on other factors such as ambient light) where the image will be its brightest. The larger the screen size, the more washed out the image will become.

Wall/Screen colour

The colour of the screen/wall you are projecting on impacts the resulting colour of the image.

- If your space has very low/no ambient light a white screen is generally the best option.
- If you're unable to tightly control the ambient light in your space, a grey or black wall/screen can be preferable. Darker tones tend to become washed out on white screens when ambient light is present as the ambient light is reflected back to the viewer. A grey/black screen absorbs ambient light making the contrast more vivid.

TIP: Use test boards to decide on a shade for your screen. Grab a few spare pieces of plywood and paint each one with a different shade of grey to create a decent spread of shades. Line them up next to each other along the wall and project your video on top. This will allow you to see which background produces the best colour in your space. A good all-purpose grey screen colour is *Dulux Flooded Gum*. Ensure any paint you use is low sheen.

Painting a screen onto gallery walls

- Once you have installed the projector in the correct position, project your video onto the wall and trace the outline of the projection using painting tape. Align the inside edge of the tape with the edge of the projection
- Paint over the inside edge of the tape with existing wall colour to seal this edge. This will prevent any paint bleed of your grey coat
- Apply at least 2 coats of grey paint to area of the screen
- Peel back tape for a crisp line

Keep in mind that you will need to sand back the taped line when deinstalling otherwise it will protrude when you paint over the screen. It will take approximately 3 coats of paint to take it back to the original wall colour.

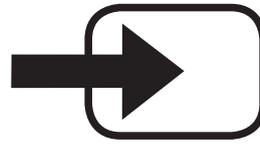
TIP: If you are unable to paint the gallery walls, you can paint a thin sheet of MDF grey and affix to the wall. Remember to fill the screw holes so they aren't visible on the screen.

TIP: Make sure your projector is installed in a position that is unlikely to be knocked/moved if painting in a screen, otherwise any slight movement in the projectors angle will be very noticeable.

TIP: Projection screens can also be made quite easily using canvas. Build a structurally sound wooden frame and stretch the canvas tightly over the top. Paint canvas with Dulux Flooded Gum or similar.

Issue: My video is not playing through the projector

Select the correct source using the control panel on projector or remote – source is often denoted by the following symbol:



Check the port that your media/device is plugged in to for a name and select the corresponding option with the controls. Most media players play through the HDMI source. Some projectors will have 2-3 HDMI ports, ensure the port number matches with the source ie. 'HDMI 1'

Make sure the media player/device is plugged in/switched on otherwise the screen may not recognise it. Test it on a monitor you know is working (ie. a computer monitor) to eliminate the possibility that the media player is malfunctioning



Example of available ports/outputs on a projector

Issue: My projector won't turn on properly when I press the 'On' button

Projectors will not power on properly if they have just been turned off. Avoid switching your projector on and off in quick succession.

Make sure you power down the projector properly. Select the 'Off' (sometimes labelled 'Standby') button on the remote or body of the projector. Generally, a notification will pop up on the screen asking to confirm the power down. Follow the prompts to turn off the projector completely.

Many projectors need to be given sufficient time to cool once they have been shut down before unplugging at the wall. It is a good idea to read your projector's manual to understand any lights/prompts on the projector that may indicate it has cooled completely to aid you in unplugging at the correct time.

If the projector has been left to cool overnight and still doesn't switch on, the lamp may need to be replaced. Lamp life is limited and can run out quickly if being used all day in a gallery space. Replacement lamps can be purchased online, ensure you check the make and model of your projector to find the corresponding equipment.

**You might also like ...****Projector Throw Distance Calculator**

Projector Central

<http://www.projectorcentral.com/projection-calculator-pro.cfm>

Equipment and Technical Issues Guide

Electronic Arts Intermix

<http://www.eai.org/resourceguide/exhibition/singlechannel/equiptech.html>