

CHRISTIE SCREEN GAIN AND PORT GLASS EFFICIENCY

Two components of a cinema that greatly affect image quality and perceived brightness are screen gain and port glass efficiency. For cinemas, the projected image must pass through a port glass and then reflect off a screen before it reaches the viewer's eyes. It is obvious that dirty port glass and screen can degrade the image quality, but it is less obvious how much brightness is lost or miss-calculated due to unknown screen gain and port window efficiency. Using accurate values for both screen gain and port window efficiency will enhance the accuracy of CineMaster.

Screen Gain

Screen reflectivity or gain play a big part in how much of the projected light reaches the viewer's eye. There are many types of cinema screens to choose from, each with their own characteristics. A new screen will have a reflectivity or gain rating that can be used in CineMaster input. As screens age, gain will change, possibly by a large amount, resulting in screen brightness loss. If the screen is not new or the gain is unknown, measurements can be taken to find the actual screen gain. It is especially important to enter the most accurate value possible for screen gain in CineMaster.

- Accurately measuring screen gain requires a matte white reference surface, and a suitable light spot meter with tripod.
 - Matte white reference surface material (test reference):

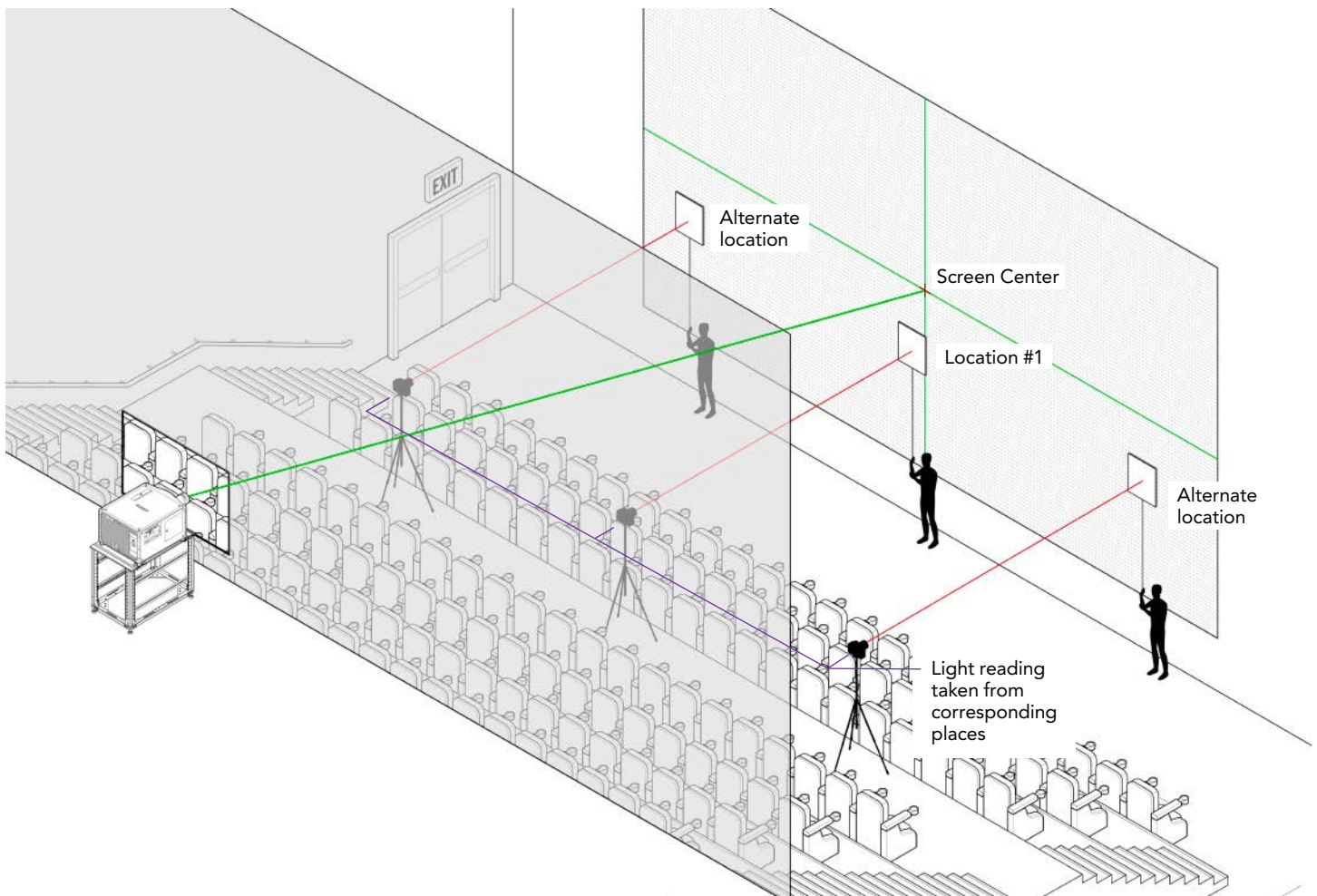
The test reference surface can be any matte white material that has a known reflectivity gain of 1.0. The most accurate material to use would be a calibrated ceramic matte white reference plate. If this is not available, a new section of matte white cinema screen material in good condition with a gain of 1.0 will provide sufficient accuracy.

- Test reference size:
The size or surface area of the test reference must be large enough for a standard spot meter to capture readings off the material from a distance back from the screen without including area outside of the test reference. 24" X 24" is adequate for large cinemas and will work well for most cinemas.
- Practical method for holding the test reference in place for measurements:

The test reference can be attached to a frame which is mounted to a telescoping extension pole. It is best to take measurements away from the screen edges requiring the test reference to be held higher by using an extension pole that can extend to about 6' or 1.8m



1. With the auditorium dark, project a 100% white test pattern on the screen. Place the test reference up against and in front of the screen surface in the positions recommended below. Place the spot meter on a tripod and position it roughly perpendicular to the test reference, back from the screen about one quarter to one third the length of the auditorium in the seating area. Aim the spot meter at the center of the test reference and take a light measurement then record the value.
2. Without changing projector settings or spot meter placement, move the test reference away and take another light measurement directly on the screen surface then record the value.
3. The screen gain equals the brightness from the screen surface divided by the brightness from the test reference. For example, if the light measurement from the test reference is 10.0fL and from the screen surface is 14.0fL, the screen gain at that place is: 14.0 divided by 10.0 which is 1.4 gain.
4. Repeat steps 1 and 2 in different places around the screen to understand any gain variances.
5. If multiple measurements are taken, any erroneous values should be eliminated with remaining good values averaged. Use this averaged screen gain estimation in CineMaster.



Port Window Efficiency

Good quality projection port window glass will block very little light to the screen. Typical high quality port glass is of a specific type with anti-reflective treatment which increases transmissivity by reducing back reflection. If the glass is not new or the transmissive efficiency of the glass is not known, light measurements can be taken to verify the efficiency.

- Accurately measuring port glass efficiency requires moving the port glass out of the projection path.
 1. With the port glass in place, project a 100% white test pattern on the screen and measure the brightness from a place roughly in the center of the auditorium to the center of the screen and record the value.
 2. Without changing the projector settings or the position of the light meter, remove the port glass from the projection path. Measure the screen brightness in the same spot on the screen and record the value.
 3. The port glass efficiency is the brightness value with the port glass in place divided by the brightness value without port glass multiplied by 100 for the percentage. For example, If the brightness with the port glass in place is 14.0fL and without the port glass is 14.2fL then the port glass efficiency is: 14.0 divided by 14.2 multiplied by 100 which is 98% efficiency.

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