



HARKNESS SCREENS™

LEADING 2D & 3D CINEMA
SCREEN SURFACES

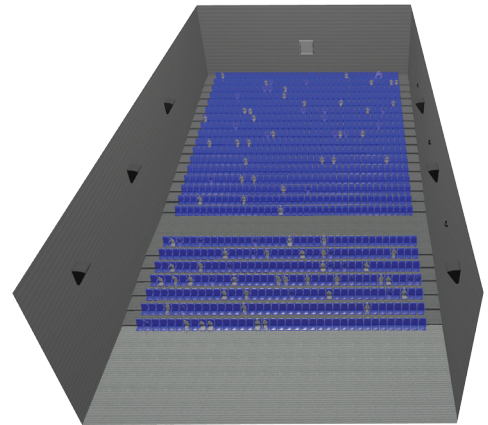
MATT PLUS

Matt Plus is a versatile screen surface intended for a variety of auditoria, generally in dark conditions. The flexible PVC-based material is manufactured to a unique formulation and specification providing wide viewing angles, high contrast, bright pictures and excellent colour temperature.

APPLICATIONS:

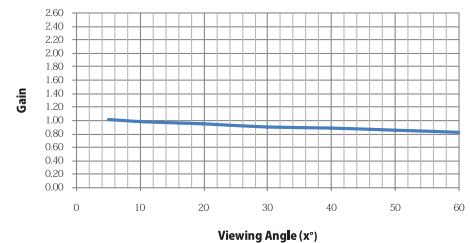
- Cinema – 35mm film, 2D digital, and 3D digital
- Home cinema
- Film production
- Events

VIEWING PERFORMANCE



- Good
- Ok
- Below Standard

Matt Plus



- Perforation: Standard or mini-perf
- Maximum size: No specific limit
- Packing method: Folded; rolled as option

MATT PREVIEW

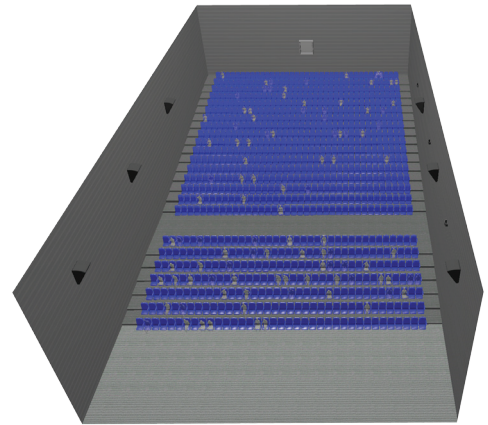
Matt Preview screens are considered by leading cinema exhibitors and laboratories worldwide to be the premier projection surface for screening rooms and preview theatres.

Matt Preview screens are used in preview theatres and in small theatres where seating positions are close to the screen and the projector power is relatively high, generally in dark conditions. The flexible PVC-based material is manufactured to a unique formulation and specification providing wide viewing angles, high contrast, bright pictures and excellent colour temperature.

APPLICATIONS:

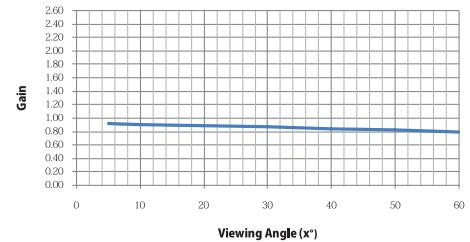
- Cinema
- Home cinema
- Film production

VIEWING PERFORMANCE



- Good
- Ok
- Below Standard

Matt Preview



Perforation: Mini-Perf recommended
Maximum size:
USA: 23.77m x 12.19m (78' x 40')
Europe: 33.0m x 14.0m (108' 3" x 45' 9")
Packing method: Rolled

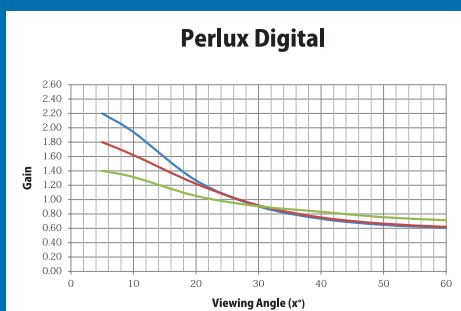
PERLUX® DIGITAL

Perluxe® Digital screens, our most popular projection surfaces, are considered by leading cinema exhibitors worldwide to be the premier gain projection surfaces because they reflect more light back to the audience than matt white surfaces, while still offering high contrast and wide viewing angles. Perluxe® Digital requires minimal colour correction during projector setup, thus reducing the complexity of converting to digital. Screens are available in three gain levels (1.4, 1.8 and 2.2) to meet the needs of any auditoria.

Harkness Screens™ recommends Perluxe® Digital screens particularly for digital cinema auditoriums because they can cut digital operating costs in half - without compromising performance - by enabling reduced power consumption, smaller lamps and less frequent lamp replacements.

APPLICATIONS:

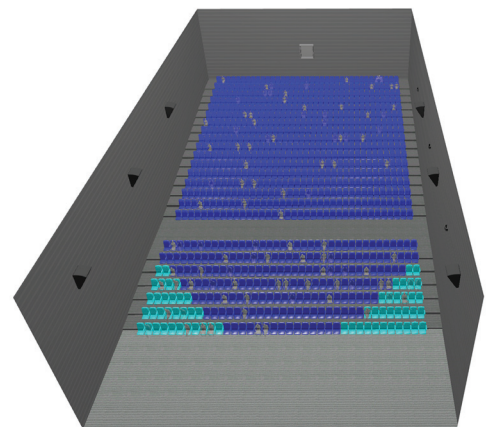
- Cinema – 35mm film, 2D digital, and 3D digital
- Events



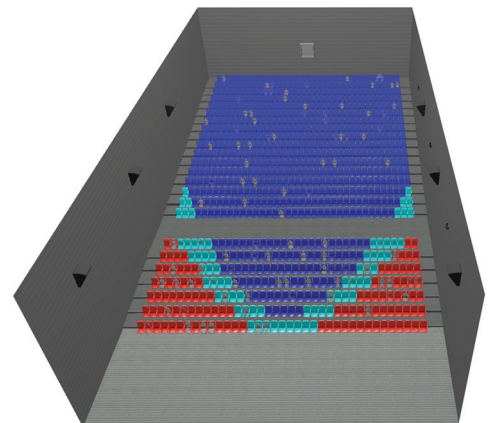
Perforation: Standard or mini-perf
 Maximum size:
 USA: 23.77m x 12.19m (78' x 40')
 Europe: 33.0m x 14.0m (108' 3" x 45' 9")
 Packing method: Rolled; folded as an option



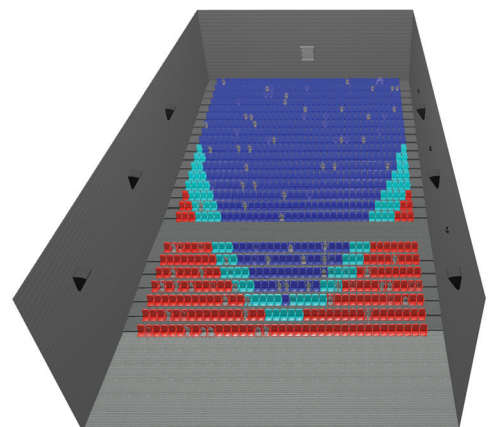
VIEWING PERFORMANCE



Perluxe Digital 140



Perluxe Digital 180



Perluxe Digital 220

- Good
- Ok
- Below Standard

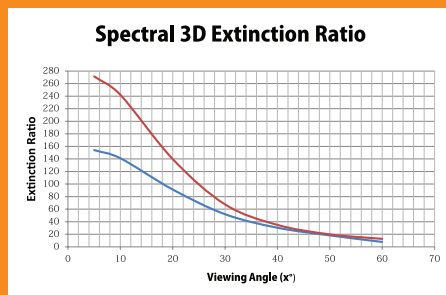
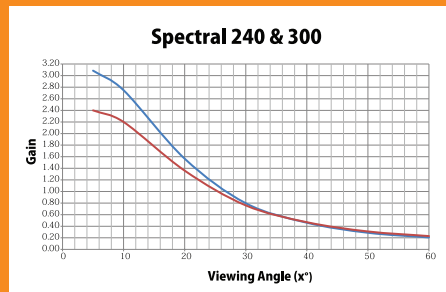
VIEWING PERFORMANCE

SPECTRAL™

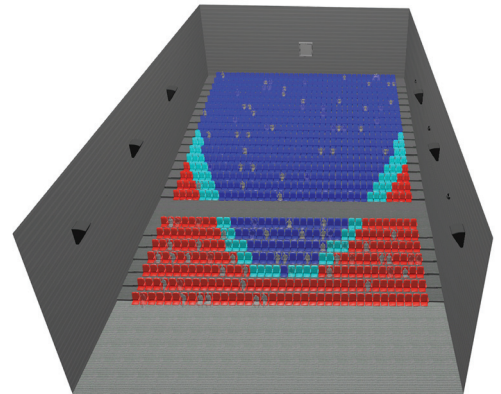
Spectral™ 240 3D screens are considered by cinema exhibitors and special venue operators worldwide to be the optimum 3D projection surface for “passive” 3D applications using polarised light such as RealD. It also performs well under 2D conditions. An aluminium flake-based coating applied to the unique base material provides high gain characteristics, a high extinction (signal to noise) ratio, and a good viewing angle.

APPLICATIONS:

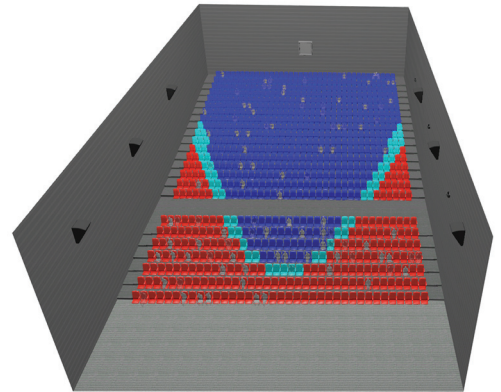
- 3D cinema including large format
- Simulators and 3D/4D rides
- Special effects



Perforation: Standard or mini-perf
 Maximum size:
 USA: 23.77m x 12.19m (78' x 40')
 Europe: 33.0m x 14.0m (108' 3" x 45' 9")
 Packing method: Rolled



Spectral 240



Spectral 300

- Good
- Ok
- Below Standard

CLARUS XC

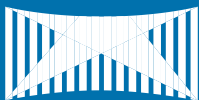
Clarus XC is Harkness' latest screen technology for 2D and polarised 3D.

Clarus XC technology is the result of significant work by Harkness' Research and Development team and brings together a number of proprietary technologies to create a screen surface for the age of immersive cinema which has been approved by major Hollywood film studios and 3D manufacturers including RealD.

Designed to work with all passive 3D systems, Clarus XC screens create visibly deeper 3D content which is designed to draw in the audience creating a more captivating viewing experience. A whiter look under projection mean that colours look visibly richer and more accurate both in 2D and 3D resulting in a more defined, sharper and crisper picture.

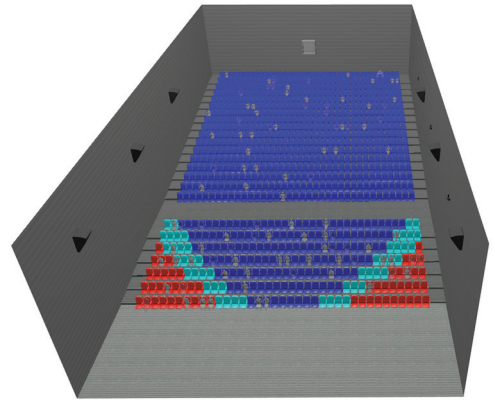
Harkness' proprietary and unique seam welding process along with Harkness' brand new d-smooth coating technology means Clarus XC screens have no visible seams under projection conditions and most importantly a smooth visual finish.

The 4th generation d-smooth coating technology has specific properties more commonly seen in white screens. This technology enables Clarus XC screens to benefit from significantly improved light distribution compared to traditional 3D silver screens.

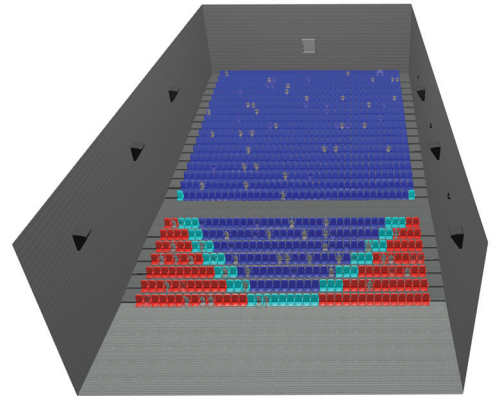


HARKNESS SCREENS™

VIEWING PERFORMANCE



Clarus XC 140



Clarus XC 170

- Good
- Ok
- Below Standard

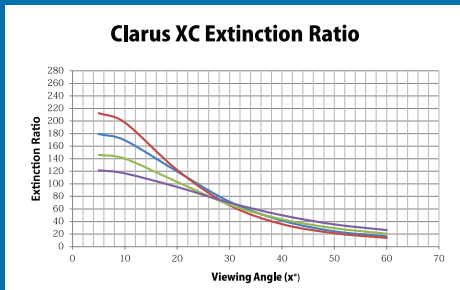
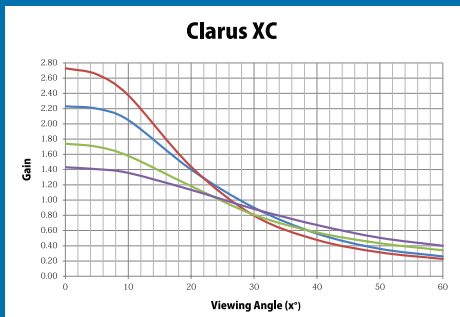
VIEWING PERFORMANCE

Through this, visible hot-spotting is reduced and uniformity is greatly increased, making compliance with 2D industry standards such as those specified by SMPTE more easily achievable.

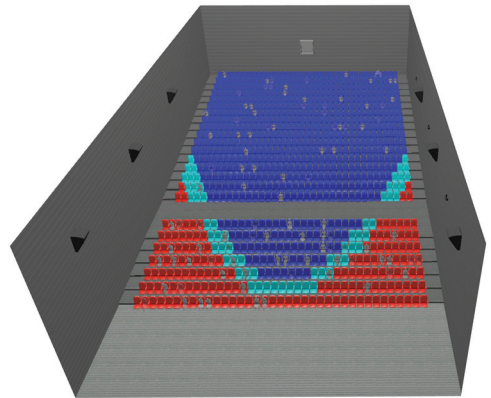
Clarus XC screen technology has become the screen of choice for cinema conventions, movie premieres and premium large format theatres as well as the exhibitors choice for those wanting a true 2D/3D screen.

APPLICATIONS:

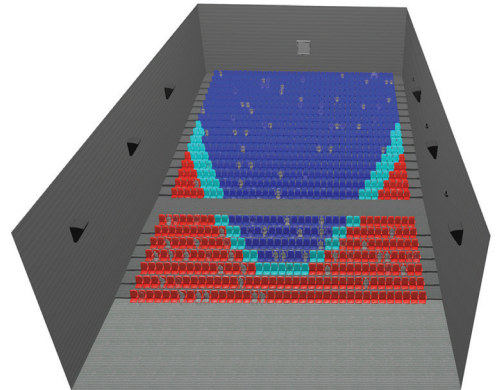
- 3D cinema including large format
- Simulators and 3D/4D rides
- Special effects



Perforation: Standard or mini-perf
 Maximum size:
 USA: 23.77m x 12.19m (78' x 40')
 Europe: 33.0m x 14.0m (108' 3" x 45' 9")
 Packing method: Rolled



Clarus XC 220



Clarus XC 270

- Good
- Ok
- Below Standard

VIEWING PERFORMANCE

PRECISION WHITE FOR REALD

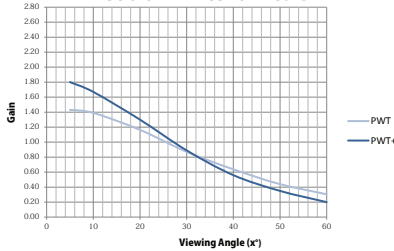
Precision White technology (PWT) combines RealD coating technology with Harkness' high quality screen materials to form a premium offering to RealD customers.

Designed to deliver enhanced 2D and 3D presentations with wide viewing angles, Precision White technology features edges substantially brighter than a standard silver screen. The improved screen efficiency results in 40% more light coming off the screen, providing improved brightness uniformity.

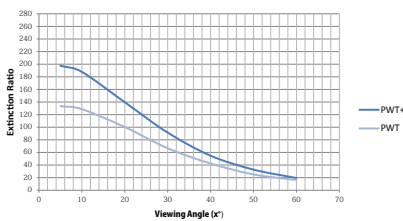
APPLICATIONS:

- 3D cinema including large format

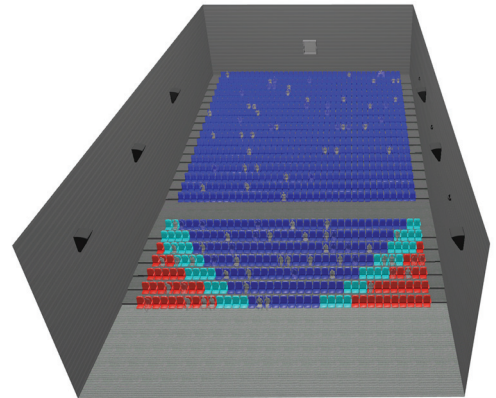
Precision White for RealD



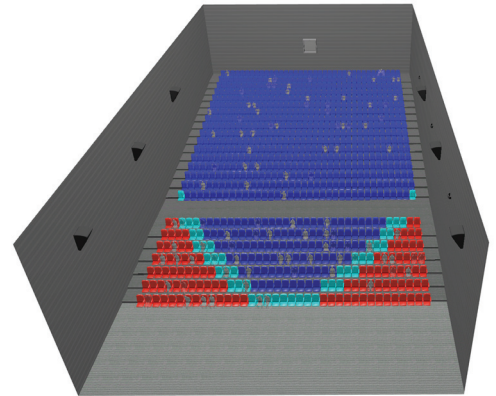
Precision White Extinction Ratio



Perforation: Standard or mini-perf
 Maximum size: Europe 33.0m x 14.0m
 (108' 3" x 45' 9")
 Packing method: Rolled



Precision White



Precision White +

- Good
- Ok
- Below Standard

SOUND PERFORMANCE

ACOUSTIC PERFORMANCE

All of Harkness' cinema screen products are available either perforated or unperforated. Screens are typically perforated to optimise the acoustic performance of behind-screen speakers.

For most cinema auditoria, Harkness' custom standard perforation (DP) pattern is used. For close viewing situations such as preview theatres or premium auditoria where seats are typically close to the screen (less than 5m/16ft), Harkness always recommends the use of its custom mini-perforation pattern (MP) products. The mini-perforation pattern has smaller diameter perforations (less than half the diameter of Harkness' standard perforation pattern) but a greater density of holes to provide the best surface type for close viewing conditions. Non-perforated screens are available for use when there are no speakers situated behind the screen.

Harkness' perforation patterns have been independently tested by audio companies to ensure that they perform suitably inside an auditorium.

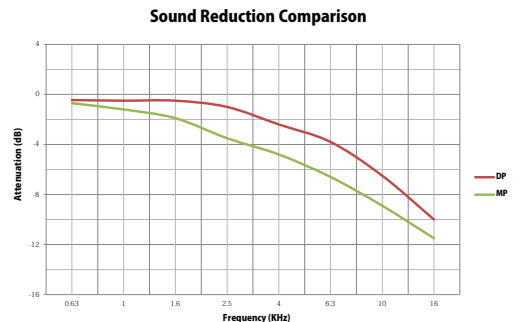
FIRE TESTING & CERTIFICATION

All of Harkness' cinema screen products are independently tested and certified to meet local fire regulations.

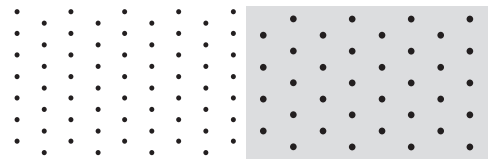
These include: UK BS 5867 Part 2, USA NFPA 701, France M1, Germany B1, Spain M2, Italy Class1, Japan BT-08-050, Korea and Australia. Fire certificates for individual products are available on request. Harkness is also able to provide small samples for local fire testing should this be required.



HARKNESS SCREENS™



Sound
Perforations



New Digital
Perf Pattern

Old

4K DIGITAL PERFORATION PATTERN

- Exclusive to Harkness Screens
- Designed for 4K Digital Projection
- Reduces Moiré fringing
- Smaller perforations
- Acoustics optimised for spoken voice range
- Allows closer viewing experience

SCREEN INSTALLATION

DESPATCH/STORAGE

Screens should normally be transported and stored at temperatures between 5° C and 30° C (40° F and 85° F), with relative humidity less than 80%. If screens are very cold (e.g. following air transport) then they must be allowed to warm up before unpacking, otherwise cold cracking may occur. Screens should be installed within a maximum of 2 months of shipping. Packages should be handled with care to avoid damage. Coated silver screens cannot be folded for transit or storage; roll packing must always be used.

INSTALLATION

The following principles should be followed when installing Harkness screen surfaces:

- The auditorium should be clean with no building works taking place
- Installation should be at ambient temperature (20/ 24° C-68/ 75° F)
- Care should be taken to avoid the screen coming into contact with sharp objects during installation.
- Excessive loads should not be placed on any specific point of the screen
- Use of cotton gloves is recommended
- The viewing surface should not be touched (the rear of the screen is identified by the product label)
- Creasing should be minimised during installation

There are two principal methods to install the screen:

- Flying the screen by attaching several tie lines to the top of the screen, passing these over the top of the frame and using them to pull the screen into place
- Unrolling the screen vertically across the front of the frame

Using one of these methods, the screen surface is loosely attached to the top of the frame. After this, the top of the screen is fully attached to the top lacing bar by working from the centre out using each eyelet.

The lower edge of the screen should then be laced from the centre outwards, applying sufficient tension to pull the screen flat. Typically, the screen can be stretched up to 5% of its height at ambient temperature of 20/ 24° C-68/ 75° F using sisal cord lacing. Side lacing should be from the top down and sufficient to remove the flutes. Excessive side tension should be avoided, particularly on a curved frame, as it will result in straightening of the screen across the curve (belly). Springs or elasticated ties are not recommended to install Harkness surfaces. The above method can be used for both lace-in and for wrap-round frames. Normally, two people are sufficient to install a screen.

CARE AND MAINTENANCE

The general environment where the screen is installed should be kept reasonably clean to avoid dirt and dust build-up. Screens can be periodically cleaned using a soft brush or cloth, doing this vertically with limited pressure. Screens can be cleaned using a damp cloth wetted with water and a mild detergent. Under no circumstances should screens be cleaned with abrasive materials or harsh chemicals such as acids, bleaches or solvents. Harkness Screens is not liable for damage caused to screens through the use of inappropriate cleaning methods or chemicals.



VALUE ADDED SUPPORT SERVICES

What makes Harkness the leader in screen technology is its ability to add recognisable value to its range of proprietary leading screen surfaces by applying its expertise and knowledge in the field of light-on-screen.

That added value is aimed at ensuring that Harkness' customers obtain the best return on their investment in digital cinema technology.

AUDITORIUM DESIGN

From pure geometry through to seating rake, seating configuration or projection port height there are a number of factors which can influence the quality of on-screen presentation. Harkness' technical consultancy team is able to assess potential impacts from proposed new-build or refurbishment designs by interrogating either technical information or 2D/3D CAD drawings and make recommendations for improvements accordingly.

SCREEN MAINTENANCE

Maintaining a clean auditorium environment can ensure that screen performance is maintained. In the event that screen become dusty/dirty or is in need of a minor repair, Harkness' consultants are able to advise on cleaning or repair procedures to enable the screen to be returned to the best possible condition.

SCREEN OPTIMISATION

Harkness has long argued that the screen is one of the most important parts of a cinema auditorium. Optimising the screen by adding a curve or tilt can help reflect the maximum amount of light back into the seating area in the auditorium and improve brightness uniformity both of which can have a significant impact on visual performance. Harkness' consultants are able to assess proposed 2D or 3D CAD designs and provide recommendations on screen optimisation.

SCREEN INSTALLATION SUPPORT

Large cinema screens, particularly coated 3D screens are by nature somewhat fragile and prone to damage when appropriate care is not taken during unpacking, handling or installing the screen. Harkness' technical consultants are able to provide guidance on best practice for screen installation or in some cases able to attend site to supervise installation.

LIGHT MEASUREMENT PROGRAMMES

Given the significant light output degradation that occurs in digital projection, maintaining on-screen brightness levels can be extremely challenging for cinema exhibitors. Implementing regular on-screen brightness monitoring programmes can ensure that remedial action can be taken to ensure that high quality on-screen presentation can be maintained. Harkness' technical consultants are able to advise on best practice for measuring on-screen brightness, how best to implement light measurement programmes and train exhibitors staff on how to take light measurements.

INTERPRETING LIGHT MEASUREMENT DATA

From underperforming, defective or ageing lamps, through to dirty or ageing screens or 3D systems left in situ for 2D presentation, there are many reasons why on-screen brightness levels might fall below the expected levels. Harkness' consultants are able to examine light measurements taken in the auditorium along with equipment specifications and auditorium geometry to suggest areas of concern or remedial fixes.



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