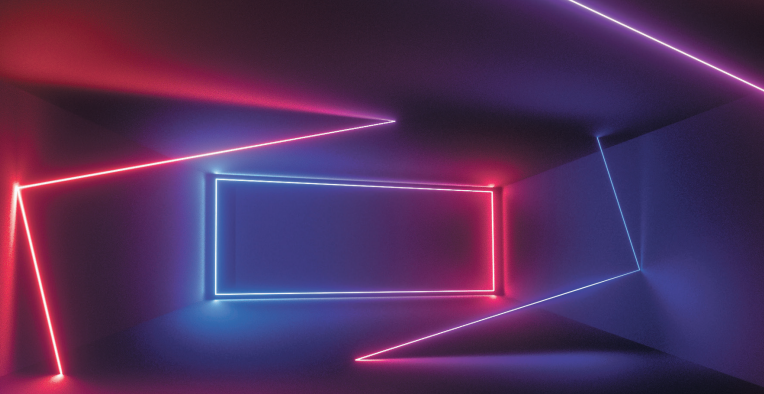


Cinema Screen Product Brochure

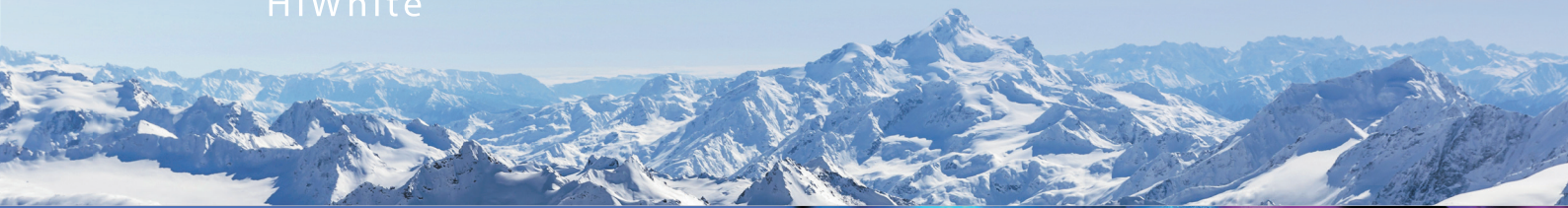




MATT PLUS



Perlux[®]
HiWhite



CLARUS XC
DEEPER, RICHER AND MORE IMMERSIVE



PWT



SPECTRAL™



Our Heritage

From humble beginnings to manufacturing worldwide, over 100 employees and thousands of large screens in more than 130 countries.

This is the Harkness Story.

1929

It starts back in 1929, amidst the film studio lots of Borehamwood in the UK, when Andrew Harkness began manufacturing cinema screens with his son Tom.



The company grew rapidly, supplying woven and washable woven screens; then in the early 1940s, Tom devised a revolutionary method of welding PVC that produced a flat seam – making it ideal for screens.

Perlux®

With a demand for larger screens but limited projection technology, Harkness developed its first coated gain screen – Perlux® – offering a brighter, more vivid presentation, and helping turn the company into the world leader.



By the mid-1990s, Harkness was already using its experience in coating screens to develop 3D screen technology, resulting in the world's leading polarised silver screen brand, Spectral™.

And just as it was in Andrew and Tom's day, Harkness still has innovation, creativity and the desire for continuous improvement at its heart.



MATT PLUS

PRODUCT NAME:

Matt Plus and Matt Preview

Matt Plus is a versatile 2D or active 3D screen surface intended for a variety of auditoria and where the projector power is relatively high. The flexible uncoated PVC-based material is manufactured to a unique formulation and specification providing incredibly wide viewing angles, high contrast, bright pictures and excellent colour temperature.



90th Edition v1.1

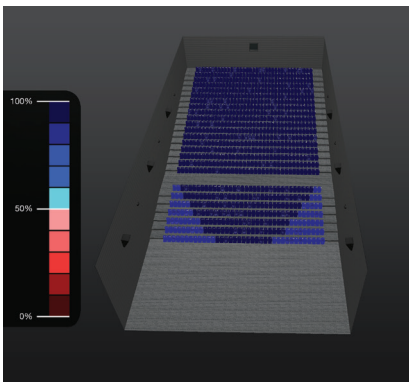
Matt Plus has been engineered to completely mitigate laser speckle using phase, angular and polarisation diversity and provides the base product for all other Harkness screen surfaces.

Harkness Matt Preview screens are a premium 2D or active 3D coated Matt Plus surface used in preview theatres and in small theatres where seating positions are close to the screen and the projector power is relatively high.

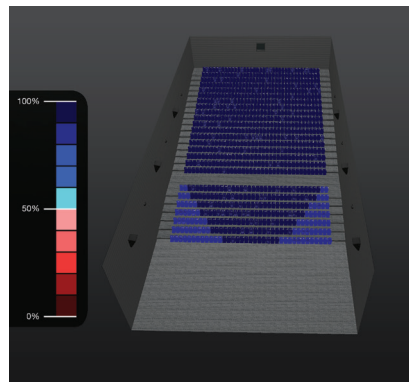
Features and Benefits

- Breath-taking image quality for 2D and non-polarised 3D projection.
- The whitest screen surface technology, providing a bright image with rich colours and improved contrast that accurately conveys the creative intent of the filmmaker.
- The best in brightness uniformity, with zero hot spotting and complete laser speckle mitigation.
- Matt Preview uses a water-based, environmentally sensitive screen surface coating. This incorporates Nanolast™ technology; offering a significantly more robust and durable surface; which minimises the risk of surface damage during installation and everyday use.

MATT PLUS



MATT PREVIEW



Technical Overview

	Perforation	Maximum size	Packing method
Matt Plus	Digital perf, mini-perf or mini-perf super	No maximum size	Rolled; folded as an option
Matt Preview	Mini perf recommended	44.19m x 18.28m (145' x 60')	Rolled
	Gain	HGA	ER
Matt Plus	1.0	N/A	N/A
Matt Preview	1.0	N/A	N/A

Perlux[®]

HiWhite

PRODUCT NAME:

Perlux HiWhite

For cinema exhibitors aiming for the best in customer experience, Perlux HiWhite is the next generation 2D and active 3D screen technology innovation that delivers a new standard in image quality.



90th Edition

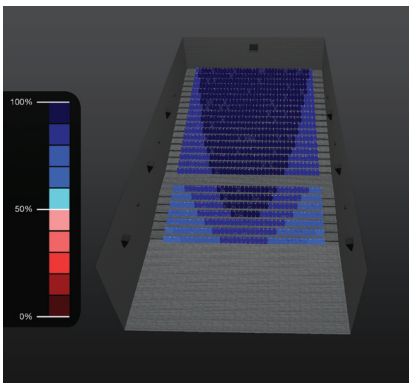
Unlike conventional white gain screen technologies, Perlux HiWhite offers a much whiter matt finish. Gain without gloss, and increased Half Gain Angles thereby greatly enhancing the viewing experience from all seats.

Part of a wide portfolio providing breath-taking picture quality with lamp, laser phosphor and RGB projector technologies. Considered the industry standard for white gain screens and the screen of choice for the leading PLF theatre locations.

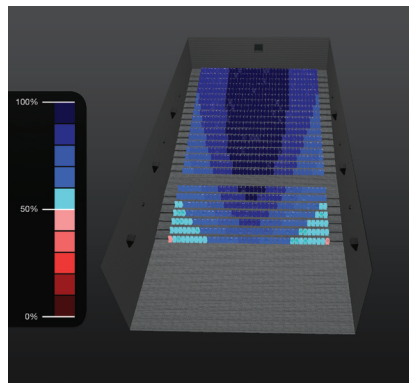
Features and Benefits

- Breath-taking image quality for 2D and non-polarised 3D projection.
- Visibly whiter appearance providing a bright image with rich colours and improved contrast that accurately conveys the creative intent of the filmmaker.
- Widest viewing angles meaning half gain angles within the Perlux HiWhite family are increased by up to 40%. Enhanced brightness uniformity and reduced perception of hot spotting contribute to an improved visual experience.
- From uniformity maximising lower gain through to higher gain; a variety of surfaces designed to optimise performance and achieve optimum brightness levels for 3D.
- A low odour, water based surface coating that is environmentally sensitive. The coating incorporates Nanolast™ technology offering a significantly more robust and durable surface which minimises the risk of surface damage during installation and everyday use.
- Perlux HiWhite can be shipped as a foldable option if required.

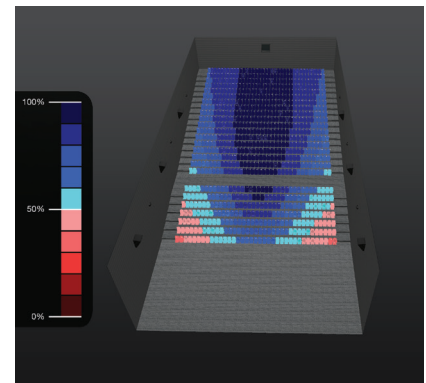
PHW140



PHW180



PHW220



Technical Overview

	Perforation	Maximum size	Packing method
	Digital perf or mini-perf	44.19m x 18.28m (145' x 60')	Rolled; folded as an option
	Gain	HGA	ER
PHW 220	2.2	28°	N/A
PHW 180	1.8	42°	N/A
PHW 140	1.4	85°	N/A

CLARUS XC

DEEPER, RICHER AND MORE IMMERSIVE

PRODUCT NAME:

Clarus XC

From breath-taking 3D through to its spectacular performance in 2D, Clarus XC technology allows cinema exhibitors to dramatically improve both 3D and 2D cinema presentation like never before!



90th Edition v1.1

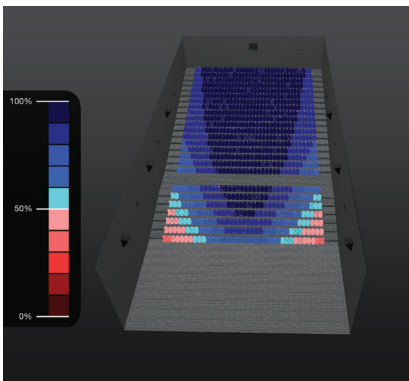
Clarus XC incorporates 4th generation d-smooth coating technology which contains specific properties more commonly seen in white screens giving a whiter appearance with deeper blacks and richer colours.

Part of a wide portfolio providing breath-taking picture quality with lamp, laser phosphor and RGB projector technologies, Clarus XC is considered by many to be the polarised 3D screen of choice for laser projection.

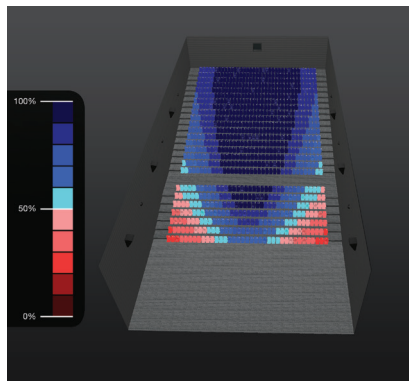
Features and Benefits

- Significantly improved viewing experience compared to standard polarised silver screens for both 3D and 2D viewing.
- From uniformity maximising lower gain through to higher gain; a variety of surfaces designed to optimise performance and achieve optimum brightness levels for 3D.
- The screen surface has been designed to increase reflectance, improve light distribution, optimize clarity, 3D depth and colour. This ensures no compromise on any element of viewing performance allowing movie-goers to receive a truly incredible cinema experience.
- All Clarus XC screens feature Harkness' exclusive Nanolast™ technology giving additional durability and proprietary 4K Digital Perforation Pattern for improved audio fidelity, light reflectance and reduced Moiré fringing.
- The improved viewing angle benefits are noticeable not only from the best seats in the house but from the traditionally challenging seats.
- Nanolast™ technology offers a significantly more robust and durable surface which minimises the risk of surface damage during installation and everyday use. This is achieved with a water-based environmentally sensitive screen surface.

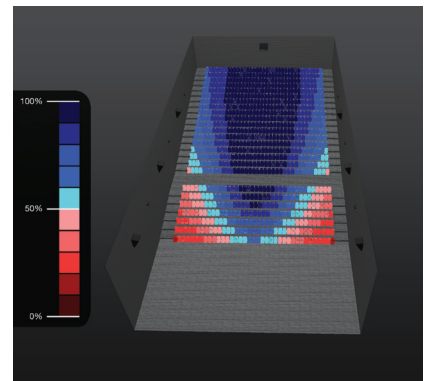
C170



C220



C290



Technical Overview

	Perforation	Maximum size	Packing method
	Digital perf or mini-perf	44.19m x 18.28m (145' x 60')	Rolled
	Gain	HGA	ER
Clarus XC 290	2.9	19°	200:1
Clarus XC 220	2.2	26°	180:1
Clarus XC 170	1.7	31°	145:1



PWT

PRODUCT NAME:

Precision White for RealD

We've combined the industry expertise of RealD with Harkness' state-of-the-art screen engineering and manufacturing techniques to create the best performing premium 3D screen surface exclusive to RealD customers, Precision White Technology (PWT).



90th Edition v1.1

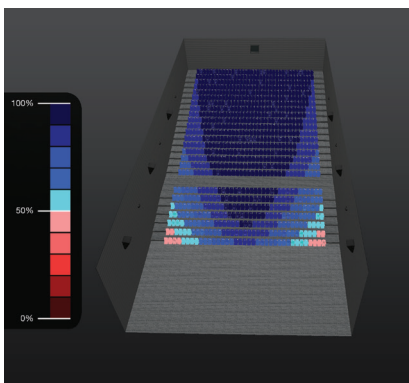
“The future of screen technology is here”, announced RealD in 2013. The RealD Precision White is a revolutionary, highly sophisticated, scientifically engineered surface technology that delivers incredible images in both 2 and 3D formats.

A truly engineered screen surface that is smooth in texture, creating a beautifully sharp, perfectly colored, clean and precise image.

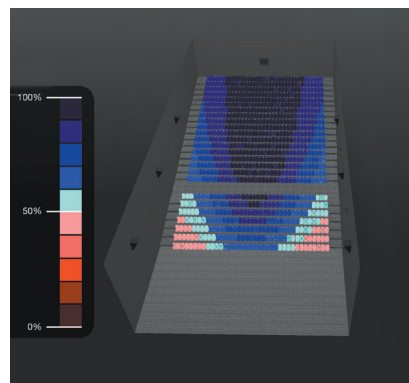
Features and Benefits

- 2D performance from a 3D screen.
- Designed to deliver enhanced 2D and 3D presentations with wide viewing angles similar to white screens of equivalent gain, PWT features edges substantially brighter than a standard silver screen.
- PWT features a smooth, white surface under projection, which generates better image contrast for improved image quality in both 2D and 3D presentations
- The improved screen efficiency results in 40% more total light coming off the screen, providing more uniform brightness than a standard silver screen.
- A water-based low odour environmentally sensitive screen surface, incorporating Nanolast™ technology offering a significantly more robust and durable surface which minimises the risk of surface damage during installation and everyday use.

PWT



PWT+



Technical Overview

	Perforation	Maximum size	Packing method
	Digital perf or mini-perf	33.0m x 14.0m (108' x 45'9")	Rolled
	Gain	HGA	ER
PWT	1.4	40°	133:1
PWT+	2.0	30°	195:1

SPECTRAL™

PRODUCT NAME:

Spectral

With over 30,000 screens installed around the world, Spectral is considered the industry standard for polarized 3D screens by cinema exhibitors to provide the optimum 3D projection surface for “passive” 3D applications using polarised light.



90th Edition v1.1

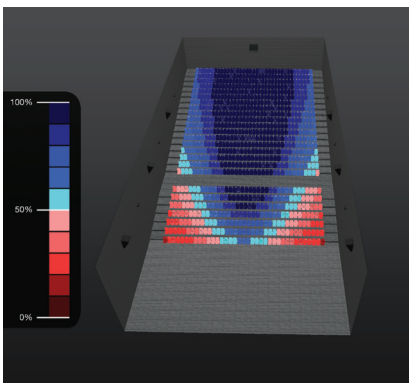
The unique coating formulation provides a perfect balance between peak brightness and light distribution allowing for crisp, dynamic and visually outstanding 3D pictures whilst supporting conventional 2D content.

Part of a wide portfolio providing breath-taking picture quality with lamp, laser phosphor and RGB projector technologies.

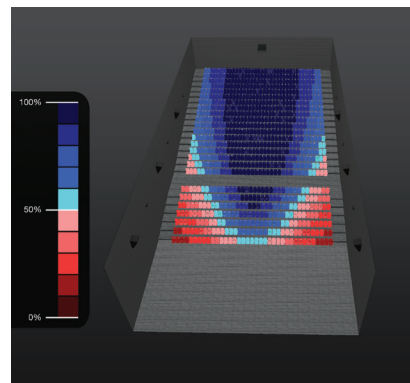
Features and Benefits

- Cost effective and suitable for all polarised 3D systems.
- Spectral™ 3D screens are considered by cinema exhibitors and special venue operators worldwide to be the trusted 3D projection surface for 3D applications.
- Higher gain screen which offer improved peak brightness and can help manage operational costs for lamp-based projection systems.
- A water-based low odour environmentally sensitive screen surface incorporating Nanolast™ technology offering a significantly more robust and durable surface which minimises the risk of surface damage during installation and everyday use.

S240



S300



Technical Overview

	Perforation	Maximum size	Packing method
	Digital perf or mini-perf	44.19m x 18.28m (145' x 60')	Rolled
	Gain	HGA	ER
Spectral 240	2.4	24°	155:1
Spectral 300	3.0	18°	270:1

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.

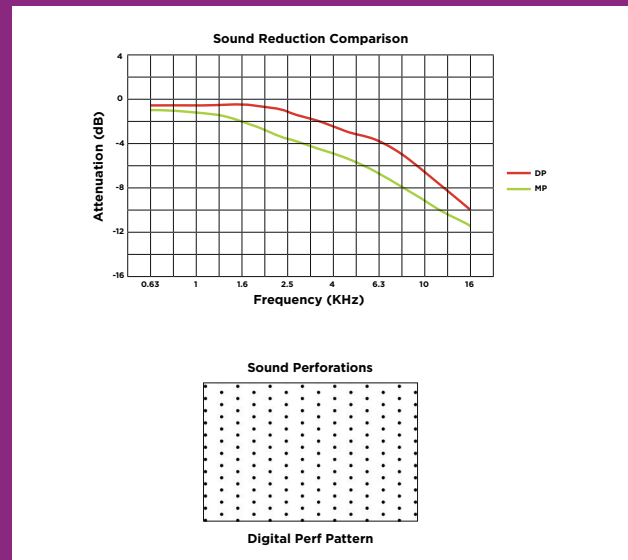
For most cinema auditoria, Harkness' custom standard Digital Perforation Pattern (DPP) pattern is used. For close viewing situations such as preview theatres or premium auditoria where seats are typically close to the screen (less than 5m/16ft). Harkness always recommends the use of its custom mini-perforation 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 M2, Germany B1, Spain M2, Italy Class 1, 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.



4K Digital perforation pattern

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

Nanolast™ Technology

Nanolast™ coating technology is an improvement added to the formulation of all of Harkness' coated screen families (including Clarus XC, Perlux HiWhite and Spectral). This proprietary technology adds a stronger polymer structure to the surface coating technology to create a significantly more robust and durable surface with added visual performance improvements.

Nanolast technology is a major enhancement providing exhibitors with a more durable screen less prone to installation or surface damage. By adding additional strength to the base coating technology, the most often seen types of screen damage are mitigated and therefore risk of exhibitors requiring screen replacements is reduced thus improving total cost of ownership from their Harkness coated cinema screens.

Whilst improving robustness, Nanolast technology also enhances the visual performance of screen surfaces by creating an even smoother, whiter and more uniform finish. This improvement creates a more immersive viewing experience by increasing the richness of colours, adding further depth of field to 3D presentations and widening viewing angles.

The unique properties of Nanolast provide a complementary surface for showcasing the visual improvements offered in the latest generation of laser cinema projectors such as 4K, HDR and wide colour gamut.

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