

MEMBER NEWSLETTER

October 2018



Welcome and View from the Chairman, Jan Daem

Welcome to our new format LIPA Bulletin. This is the first in a series of periodic communiques. The LIPA Board has taken the view that it would be beneficial to all our members to increase both the amount and frequency of our communications outreach to you, our valued members, and to other key audiences. So, as is traditional, we would like to start with this update from me, your acting Chairman. We hope this new communications tool will serve to keep all our constituents up to date on what we as an organization are doing, as well as keep you abreast of important trends, developments and news in our industry.

In this Newsletter

LIPA's Laser-focused Aims: Joining and Benefits.....	2
Manufacturer Landscape: A Roundup of LIPA Member Companies' Recent News.....	5
Studio 'Creative' Execs Discuss Laser Projection at IBC 2018.....	10
An Update on Safety Standards for Laser Illuminated Projectors.....	11

As always, considering our mandate as an industry association, we will focus on subject matter that is pertinent in terms of Laser Illuminated Projection and related topics, and industry movements. We want to make this content as valuable as possible and provide more information and education to our stakeholders with videos, handouts and articles, blog posts and other communications, distributed across various platforms. It is also my and the Board's aim to have our members contribute to this in order to inform other members, and non-member audiences alike.

I'd like to kick this off with an update on some of the good news for our industry. In mid-June, this year, against the backdrop of the CineEurope 2018 industry event in Barcelona, LIPA's Board was pleased to issue a news release that detailed some key successes for our industry in the last couple of years.

At that time, we were pleased to be able to report that the industry has witnessed continuing strong growth over the last two years in the adoption of digital laser projectors, worldwide.

As of the end of 2017, the global installed base of high-end RGB laser projectors had reached nearly 700, an increase of nearly 100% since 2016, according to industry analysts

at IHS Markit, a prominent cinema-industry observer and research firm. In addition, the analyst firm also reported that, according to industry sales figures estimates, the number of laser phosphor projectors installed in cinemas has now surpassed 10,000; again, an approximately 100% growth rate over the previous year.

For me, these numbers are outstanding. LIPA and its member companies, prominent manufacturers, are seeing the benefits of their combined promotional and industry governance work reflected in this success. In addition, based on input from our member manufacturers, in 2019 we're expecting similar growth rates to last year for both RGB unit installations and laser-phosphor units. With such strong growth for the whole industry, it is more essential than ever that LIPA is there to represent the interests of its members and worldwide cinema viewers.

As you hopefully already know, as an industry association, our mandate is to focus on speeding the adoption of laser illuminated projectors (LIPs) across all venues worldwide and to help enable the enacting of regulatory change for the industry. LIPA's mission supports you our members, all leading providers of laser projection solutions, to markets worldwide.

I and our Board also believe the market is increasingly convinced about installing LIPs because of the ever-improving quality of the technology being developed by its member companies, which is evident in the higher resolution, higher

MEMBER NEWSLETTER



contrast, brighter and more varied colours, brighter and more vivid 3D films, and vastly better energy efficiency. In addition, the industry has continued to improve TCO (Total Cost of Ownership) for customers, across the spectrum of projector solutions, including OEM retrofits/upgrades, fibre solutions, phosphor and full RGB.

Talking to IHS Markit's analysts, we found that they also believe growth is helped by the fact that prices for high-end lasers have been coming down now that all laser projector manufacturers are offering RGB machines, including industry leaders such as Christie, Barco, NEC, and IMAX.

I believe the industry is headed in the right direction, but more work is to be done. We will continue our efforts to assist the industry to speak with one voice, lowering potential market confusion and strengthening our members' seat at the table of regulatory discussions.

Going forward, LIPA's Board and I see evidence that market product safety regulations are slowly harmonizing worldwide, and as that happens, LIPA will put more effort into communication, education and support of new markets. LIPA believes its role should increasingly be as the key source of reference when it comes to guidance, white papers, studies, research data from surveys and other tools for LIP end-users, as much as it is today with regulators and standardisation bodies.

As part of that overall effort, we look forward to working with you all to advance our industry and improve business for all our members. I encourage you to see below some more detailed notes from our recent Board meetings.

AGM Update

The next AGM will be hosted by Panasonic, December 9-10th, in Osaka. Members will get a tour of the new Panasonic Museum.

LIPA'S LASER-FOCUSED AIMS: JOINING AND BENEFITS

This year has been a bumper one for growth in LIP adoption across the business spectrum, and LIPA proved to be the kind of industry association that truly works to achieve the goals of its industry members. In the last year, LIPA membership grew with the addition of Epson.

If your business embraces, develops and sells laser projection technology, we believe joining LIPA could be beneficial to your company. So, we have outlined here some thoughts on why you might want to join, the objectives of LIPA, a look at the membership levels and benefits, and a link to the actual joining process. We've also included some sample feedback from a couple of our members on why they joined LIPA and what it means to them.

Why Join LIPA

LIPA members believe that laser projectors hold many advantages over traditional projection techniques and that by joining their voices they can improve the business and regulatory environment for all.

The Primary Objectives of LIPA

- **To be a single industry voice in rationalizing laser regulations.** Inappropriate and outdated governmental regulations put onerous and costly requirements on cinema exhibitors who integrate laser projectors into their offerings.
- We believe regulators are willing to consider new, appropriate requirements, but these need

Speeding the adoption of laser illuminated projectors through cooperative industry activity.

Laser Illuminated Projector Association (LIPA) 5177 Brandin Court Fremont, CA 94538, USA www.lipainfo.org +1.510.492.4030

MEMBER NEWSLETTER



- to be driven by industry stakeholders, speaking with a single, unified voice.
- **To provide companies a forum to develop evaluation methods and provide that information to standards bodies.** Laser projectors hold the potential for numerous benefits for theatre/cinema owners, including dramatic reduction of operating costs, expanded colour gamut, as well as increased 3D brightness. Methods of evaluating laser benefits need to be developed and provided to standards organizations for review and ratification at an industry level.
- **Educate key constituencies.** Education and safety will continue to be key concerns for all
- stakeholders in the value chain and LIPA can assist in compiling and dispersing this information.

- **Coordinate best practices.** While LIPS have many advantages compared to traditional, lamp-based projectors, their usage brings new requirements for safe and correct handling. LIPA as an organization is well-situated to help projector users to understand and implement best practices in handling their laser-based systems.

LIPA membership is encouraged for ALL companies active in the area of laser illuminated projectors — since all companies will benefit from the market-opening activities in which LIPA specializes. It is also a valuable networking forum. Visit the membership pages on the LIPA website to learn about more benefits from LIPA membership and join our activity.

How to Join:

Follow this link to start your journey to joining us and experiencing all the benefits of LIPA membership:
<https://www.lipainfo.org/about-lipa/how-to-join/>

Current LIPA Members and Benefits

Current Members			
Barco NV	Leader	Nichia Corporation	Observer
Casio America, Inc.	Observer	Oristar Technology Development	Leader
Christie Digital Systems	Leader	OSRAM GmbH	Observer
Cinemeccanica S.P.A.	Observer	Panasonic Corporation	Leader
Coretronic Corporation	Leader	Philips Lighting Belgium NV.	Observer
IMAX Corporation	Observer	Power Technology, Inc.	Observer
Lighting Technologies International LLC	Observer	Seiko Epson Corporation	Leader
Mitsubishi Electric Corporation	Observer	Sony Electronics, Inc.	Leader
Moving Image Technologies	Observer	Texas Instruments, Inc.	Leader
NEC Display Solutions of America	Leader	XYZed	Observer

MEMBER NEWSLETTER



Benefits / Contributions	Leader	Participant	Observer
Direct representation on the BOD and a vote on strategic direction	X		
Invited to meet with regulators as LIPA	1st Invitation	2nd Invitation	
Shared expense for common needs – research and SMEs	X	X	X
Approve new members	X		
Website links & logo placements	X	X	X
Speaking opportunities	1st invitation	2nd invitation	
Chair committees – determine strategic direction	X		
Committee Membership	X	X	
Submit White Papers	X	X	
Review White Papers	X		
Regular Industry Newsletters	X	X	X
Neutral, non-biased information & education for customers	X	X	X
Discounts on 3rd Party Reports	X	X	X
Briefing, Webinars & Tutorials	X	X	Limited
Access to LIPA sponsored research	X	X	
Dues Level per year	\$25,000	\$10,000	\$2,500
In-Kind Contribution	8/hrs/mo	4/hrs/mo	0

LIPA MEMBERS ON WHY THEY JOINED

From Hongda Lee, Product Manager, Oristar:

LIPA is a very important industry organisation that enables the Oristar team to better understand all aspects of laser projection standards. As a member, Oristar's laser team has access to vital information about the progress of regulatory issues such as health, safety and projection quality. This information helps us to inform our product design teams for development and upgrades. In addition, we are able to meet with professional engineers from different companies and exchange any new developing ideas with them. We also believe that LIPA helps all members push one global laser standard. LIPA has a very good name awareness in the industry, and Oristar appreciates that it helps our development, especially in China. In terms of direct benefits for Oristar, in addition to increasing our understanding of laser technology overall, we are also able to find more potential partners to work with and to better understand different markets in different countries.

Moving forward, Oristar believes that LIPA members need to try to attract more companies to join LIPA. One day, we hope to see LIPA promoting and running large global industry exhibitions. We would also like to see LIPA strengthen its awareness and influence in China, especially considering China has the largest number of installed laser projectors in the world.

From Shoji Mitsuhashi, Chief Coordinator-Product Safety Assurance, Sony:

As a founding member of LIPA, Sony was there when the group was established in 2011, after several years preparation. Our foremost interest in being in this industry association was to be able to join other manufacturers in influencing and driving the adoption of standards, and of influencing the various regulatory bodies around the world, most notably, the FDA in the U.S. Although the original scope of LIPA was only for cinema projector technology, it is now being expanded to business-use projectors and home-use projectors. As

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MEMBER NEWSLETTER



the scope grows, so too does the membership. Now LIPA is the only organization that bodies like the FDA will discuss laser projection issues with and this in itself is a huge benefit of membership for us. Besides the deregulation activity, we feel LIPA has made a positive influence in the projector market and its levels

of awareness. By way of exhibitions, web-media and other communications tools, LIPA has introduced – and raised the awareness of – many opinions regarding the safety of laser lamps. We expect to see LIPA accelerate this stream in future.

Manufacturer Landscape: A Roundup of LIPA Member Companies' Recent News

Here's a sampling of news from LIPA Leader members. It's been a busy year and based on the many product and customer announcements rolled out, it appears that the industry is moving at a remarkable pace to establish Laser Illuminated Projection as the way of the future.

Barco

In May, as part of its ongoing commitment to providing innovative products for the fixed install and event markets, Barco introduced a whole new range of laser projectors, the XDL. Designed specifically for very large venues and events, the XDL is powerful, offering stunning Rec. 2020 colour, super-crisp images, remarkable contrast and native 4K resolution up to 120Hz.

Barco said the XDL series offers unparalleled brightness compared with other laser projectors – up to a massive 75k lumens - that provide images with extraordinary colours from a single unit. So professionals can play with bigger screens resulting in higher impact experiences while removing complexity from installations.



More at: <https://www.barco.com/en/News/Press-releases/Barco-XDL-laser-projector-the-largest-venues-and-events-can-now-have-access-to-an-impressive-75k-lum.aspx>

In April, Barco, China Film Co. Ltd, Appotronics, and CITICPE announced the formalization and naming of their joint venture. The new company was named as Cinionic, which they said is a combination of 'cinema' and 'ionic' and which they defined as "the coming together of forces to create energy in the cinema industry". The joint venture was announced originally in December last year but April's news, released just prior to CinemaCon 2018, included the unveiling the new company name, logo and branding taglines.

Cinionic will focus on a combination of innovative cinema solutions, flexible financing and a comprehensive service model that enables exhibitors to focus on engagement with their moviegoers while simplifying their technology and operations.

The new brand comes with a matching tagline: 'Experiences. Delivered'. Carl Rijsbrack, Chief Marketing Officer at Cinionic, said at the time of the news announcement: "Our tagline is our commitment to customers — that they can count on Cinionic to deliver the ultimate cinema experience. It's simple, direct, and reflects our commitment to deliver compelling audience experiences."

Barco will be the exclusive OEM partner for all projection and image processing technologies in the joint venture. ALPD will provide industry-leading laser technology and retrofit solutions while CGS contributes

MEMBER NEWSLETTER



high-quality solutions for Premium Large Format (PLF) screens.

More at: <https://www.barco.com/en/News/Press-releases/Introducing-Cinionic—a-new-brand-launching-a-new-era-in-cinema-experiences.aspx>

Christie Digital

CGR Cinemas has chosen Christie®, a leading cinema technology manufacturer, as its exclusive laser projection partner, as it moves to convert all 700 of its theatres to RGB pure laser technology. In a landmark agreement that sees CGR becoming the largest investor in Christie RealLaser™ systems in the world today, to begin with, 200 CGR Classic auditoriums will be redeveloped for Christie RealLaser over the next two years.

Complementing CGR's hugely-successful ICE (Immersive Cinema Experience) theatres, which also utilize RGB pure laser systems, CGR will deliver the premium cinema experience. Christie's proprietary technology uses next-generation

RGB pure lasers to deliver the highest levels of brightness, contrast and colour reproduction, fulfilling the long-heralded potential of laser illumination as the preferred successor to lamp-based cinema projection technology.

"Following the ICE premium screen success with our cinemagoers, this investment demonstrates our commitment to offering the best quality experience for our audiences, as we look to keep them coming back to CGR time and time again," says Jocelyn Bouyssy, CEO of CGR Cinemas. "Having experienced what RGB pure laser can do with ICE premium screens, we believe it is the future of cinema, and, having successfully upgraded to digital projection with Christie 10 years ago, we are delighted to again be utilising the company's latest technology developments."

The first 100 projectors will be installed in 2019, with the remaining 100 projectors to arrive in 2020. To accommodate the variety of screen sizes required to facilitate projection across CGR Cinemas' 73 locations,

the projectors will be selected from across Christie's portfolio of RGB pure laser cinema projectors. This portfolio includes the CP4325-RGB, the soon to be released CP2315-RGB and CP2320-RGB models, and further Christie RealLaser cinema projector models to be released in the next 12 months.

"Our trusted relationship with Christie has created an environment where we can continue to lead the way by using the best technology available," says Sebastien Bruel, CTO, CGR Cinemas. "We've worked together since 2007, and in that time, they've helped us to advance our offering and remain at the forefront of the cinema experience. They're breaking new ground once again with RGB pure laser projection, and we're delighted to be offering it in our cinemas." CGR Cinemas has experienced strong interest in its current premium screen ICE experience, which utilises Christie's first generation of RGB pure laser cinema projectors. As a result, the company has several years of experience and customer data with the technology. CGR believes now is the best time to invest, as Christie's next generation of Christie RealLaser deliver 4K, high frame rate, DCI performance and even higher contrast.

With the support of Christie and Ciné Digital Service (CDS) – the leading French cinema integrator – the company will oversee the upgrade of 200 classic auditoria across its network from lamp technology to RGB pure laser.

"Our relationship with CDS and CGR Cinemas goes back many years." says Adil Zerouali, Senior Sales Director Cinema Europe, Christie. "It continues to flourish. As CGR looks with us to the future of cinema, seeking out the best technologies; first digital and now RGB pure laser to excite and entertain cinema audiences. And CGR's enthusiasm to do so, makes them a pleasure to work with."

The RealLaser family of projectors offers all the advantages of a high-performance laser projector in a compact 'all-in-one' form factor that eliminates the need for sub-ambient external cooling, while providing a low cost of ownership, excelling in image quality and posting an impressive operational lifetime. RealLaser delivers superior and more consistent brightness levels

MEMBER NEWSLETTER



according to DCI standards throughout the entire lifetime of the projector.

"Christie is strongly committed to developing technologies that add real value for our customers. With Christie RealLaser, we are the first manufacturer to make available the world's first laser illumination technology that qualifies as a true replacement of lamp-based illumination," said Dale Miller, Executive Vice President, Cinema, Christie.

Christie RealLaser offers directors and producers a much-increased colour palette, approaching Rec. 2020 and over 30,000 hours of theatre operation without lamp changes. It is the only laser technology to offer brightness levels above DCI standards throughout its natural life.

Coretronic

In February at the Integrated Systems Europe (ISE) trade show for the audio-video industry, held in Amsterdam, Coretronic Corporation, a leading provider of innovative display solutions, constructed a mock-up of a train station featuring its unique "Smart Seamless Signage Display Solutions" for creating an immersive user experience. The new solutions are designed to help business partners expand the gap between projection and flat panel displays as well as lower the entry threshold to the multi-display advertising market. The "Smart Seamless Signage Display Solutions" not only can continuously operate around-the-clock for up to 20,000 hours without interruption, but also support all types of multimedia devices, providing advertisers with fascinating display performance. Stations, retail store, dynamic advertising walls, corporate conference rooms and lobbies, hotel hallways, exhibition halls, museums, and other public spaces are all potential applications for the solutions. It can also be customized to different market requirements. Conventional projection blending requires a team of specialists for equipment installation, cabling and calibration, a process that often takes a great deal of time, money and manpower. The proprietary "Smart Seamless Signage Display Solutions" developed by Coretronic solves this problem by providing one-button configuration for all displays, the company said. Only

one cable is necessary for all video and audio signals, greatly reducing installation difficulty and installer training costs. The main pain points of the blending market have therefore been successfully overcome, Coretronic believes.

More at:
<https://www.coretronic.com/en/news/DZznpZ/detail>

NEC Display Solutions America

In May, NEC Display Solutions announced the release of a new ultra- high definition installation projector, the PX1005QL.

With 8.3 million visible pixels, NEC said the PX1005QL laser projector enables presentations with extreme detail, brings content to life and alleviates the traditional need for multiple displays. The laser light engine allows for constant brightness and image integrity, lowering both audience frustrations and maintenance concerns, and keeping TCO to a minimum.



"This new projector combines brightness, 4K/UHD resolution, and multi-picture capabilities," said Richard McPherson,

Senior Product Manager at NEC Display Solutions. "We're excited about this high-resolution projector because it's designed for maximum detail and the ability to display four separate images at once to create the ultimate presentation experience." NEC said that with four times the resolution and superior colour reproduction, the PX1005QL is ideal for auditoriums, museums, theatres, sanctuaries, network operation centres and similar venues. It's particularly well-suited for artwork, photos, and other colour-critical applications, as well as for CAD and architectural drawings where the maximum amount of detail is required.

The projector features a 1-Chip DLP that produces 10,000 lumens and a viewable resolution of 3840 ×

MEMBER NEWSLETTER

2160, creating amazingly detailed images. It boasts 20,000 hours of near maintenance-free performance with a sealed optical engine for low maintenance and low TCO.

More at: <https://www.necdisplay.com/about/press-release/nec-announces-release-of-new-10,000-lumens-project/793>

Oristar Technology Development

In recent years, Oristar Technology presented its large-laser screen high-quality projection solutions for CineLab. In a combination of Oristar Technology's coaxial line array audio and top-grade electronic architectural acoustics technology, Oristar Technology has cooperated with various mainstream projection equipment manufacturers to create CineLab's high-end movie projection, which set a new standard for the digital cinema. In China, Oristar Technology is the only provider of cinema huge-screen building solutions. Most recently available numbers from Oristar Technology say it has provided technology solutions for more than 2,000 cinemas, and signed contracts with 460 cinemas, with its scope of business covering 30 provinces, autonomous regions, and municipalities directly under the Chinese Central Government.

More at:
<http://en.nanhaicorp.com/business/i=65&comContentId=65.html>

Panasonic Corporation

Earlier this year, Panasonic supplied the competition venues and other facilities at the PyeongChang 2018 Winter Games with 154 high-brightness professional projectors and around 1,000 professional displays, supporting the operation of the Games with powerful images and unique solutions.

Solutions supplied through high-brightness laser projectors: These projectors covered the arenas with projection mapping images and coloured the ice rinks with brilliant light. They have become an indispensable part of venue productions in winter sports. Panasonic

supplied two different types of newly-developed, high-brightness laser projectors to the competition venues and other facilities at the PyeongChang 2018. The models supplied were the WUXGA resolution, 31,000-lumen PT-RZ31K; and the 4K+ resolution, 27,000-lumen PT-RQ32K. Jace Oh, the organising committee's ceremony director, was impressed with the projectors' performance.



"I had seen Panasonic's projectors in use at the Sochi 2014,

so I had no worries about their performance. I felt that the laser projectors supplied this time offered excellent colour reproduction and even better picture quality than conventional lamp-based models. They were much easier to control than the lamp-based projectors, too, and the brightness never changes even when used over long periods."

More at:
<https://www.panasonic.com/global/olympic/pyeongchang/support/dlp.html>

Seiko Epson Corporation

Early in 2018, Seiko Epson Corporation announced the LightScene EV-100 series, a new type of 3LCD laser projector that expands the company's presence in the signage and lighting sector. With a sleek, low-noise design, the 2,000-lumen WXGA, 20,000-hour maintenance free EV-100 the company said the series can work as either an unobtrusive projector or spotlight. Epson began rolling out the new projectors in limited markets in June, with a gradual rollout in other regions to follow.

Epson said the LightScene EV-100 series is ideal for curated visual environments such as retail showrooms, shop window displays, museum exhibits and art installations, where minimal visual clutter is key. The new projectors can be used to provide information or show

MEMBER NEWSLETTER



videos and moving patterns in innovative ways, and even for projection mapping onto small objects. The new projectors are said to offer a fresh solution for retailers, restaurants, bars and hotels facing an increasingly competitive environment. Offering an innovative experience, Epson believes they will serve to attract customers by bringing displays to life and enhancing the customer experience.

"The LightScene EV-100 series are a first move into a completely new type of projector for Epson, and are a great addition to our range of laser signage solutions," said Yasunori Ogawa, COO of Epson's Visual Products Operations Division. "Epson's Corporate Vision expresses a strong commitment to driving visual communications innovation, and I firmly believe that the potential of these products to create innovative and outstanding visual experiences will bring us one step closer to achieving our goal."

More at:
https://global.epson.com/newsroom/2018/news_20180206.html

Sony Electronics

In September, Sony Professional Solutions began shipping its cutting-edge laser projector line-up across Europe. The new **VPL-FHZ120L** (12,000lm) is Sony's highest brightness model yet, to meet the needs of large venues, from conference halls, auditoriums and lecture theatres to museums and other large scale visitor attractions. While the **VPL-FHZ90L** (9,000lm) is ideal for both mid and large-size venues. Sony said the new models are now available across Europe and have seen significant interest from dealers with circa 100 pre-orders already placed. Amidst growing demand for high brightness projectors for large venues, Sony said its customers are excited for the new models and are looking forward to installing them and impressing their audiences.

Both the **VPL-FHZ120L** and **VPL-FHZ90L** use a newly-developed LCD panel with enhanced light resistance and for the **VPL-FHZ120L**, an optical compensator to

realise high contrast that delivers stable brightness and high image quality with vibrant colour reproduction. Furthermore, Sony's unique Z-Phosphor Laser uses a blue laser as its light source alongside a 3LCD optical system, to achieve the full spectrum of light and continuous, clear RGB colour.

"Sony has always believed laser technology is the future for installation projectors, and the huge response to our new models announced at Integrated Systems Europe (ISE) earlier this year demonstrates our customers are also looking to inspire their audiences with new, high brightness models that bring clear, bright imagery with nearly zero maintenance costs" said Robert Meakin, European Product Manager at Sony Professional Solutions Europe. "By working alongside our customers, we're confident that Sony will continue to lead the way in projection technology."

More at: https://pro.sony/en_GB/press/new-laser-installation-projectors-debut-europe-shipping-commences

Texas Instruments

This year, Texas Instruments continued to develop key technologies for its Academy Award® winning DLP Cinema® technology, which it said is the most compelling choice in projection, powering more than eight out of 10 digital movie screens worldwide. TI said its DLP technology continues to be trusted for delivering vivid pictures and incredible video to any display system. Whether a stand-alone projector or integrated display unit, high resolution and large screen projection displays can enhance any viewing experience.

TI said its DLP products now offer chipsets that span many resolutions, from nHD to 4K UHD, to display beautiful videos and images. The company believes these products provide the best resolution for enhanced readability and sharp detail and that customers can rely on the same core MEMS-based technology used in DLP Cinema® solutions for their next display system.

More at: <http://www.ti.com/dlp-chip/display-and-projection/dlp-advantages.html>

Studio 'Creative' Execs Discuss Laser Projection at IBC 2018

One of the stand-out benefits of attending the IBC show at the RAI Amsterdam each September is the quality of the conference programme. Regularly drawing the finest minds and thinkers from broadcast and related industries, including cinema, the conference sessions are an excellent forum to test the temperature on issues and ideas currently facing our industries. This year, continuing its long-standing relationship with the Big Screen Experience at the show, Christie Digital hosted a panel discussion entitled The "Laser Tech – Science Becomes Art" panel, designed to debate the benefits of the next generation of Solid-State, laser-based display technologies. The session was chaired by Brian Claypool, vice president of product management for cinema at Christie and featured Dominic Glynn, chief scientist at Pixar; Michael Zink, VP of production technology at Warner Brothers and Annie Chang, VP of creative technologies at NBC Universal Media.

The session began with a technical introduction by Claypool followed by several content demonstrations introduced by the panel participants. These included clips from Pixar's *Inside Out* and *Batman v Superman* from Warner Brothers, that had been specially chosen to draw comparisons between traditional DLP lamp-based projection and the 'enhanced contrast' capabilities of RGB-laser projection. Clips were projected using the Christie CP4325-RGB.

Claypool opened the panel discussion by asking the audience for a show of hands on their preference in the contrast levels demonstrated by the clips, with the result being a clear majority in favour of the RGB laser content. This kicked off the conversation and the panel quickly picked up on the creative potential offered by HDR (High Dynamic Range) enhanced contrast technology. Dominic Glynn spoke of the "insatiable creative appetite of filmmakers" and that the opportunity to have more "colour gamut, contrast and illuminance" would always be welcomed by creatives.

He also acknowledged, with a nod to other studios, that as an animator, Pixar was in the lucky position that more 'light' didn't necessarily mean more money, unlike live-action film. Michael Zink drew attention to the fact that "expectation levels of the consumer are always going to be the highest for a cinema-goer, and that differentiating that experience (from the home) is an important challenge for the future of the industry."

The panel moved on to discuss the proliferation of display technologies, including HDR, since the transition to digital, and all agreed that, while technical innovation was very welcome, "fitting the current economic model for cinema exhibition was also extremely important." That said, if an audience could "see in the film, where their extra dollars had been spent [for an enhanced version of a movie], they would be happy." In terms of defining what HDR cinema is and how it might evolve, Annie Chang drew attention to the work of the DCI and their recent memo which has been put together in part to prepare for the arrival of large-size LED cinema displays in the sector.

The strongest theme to emerge from the discussion and one which points the way to how the HDR landscape may evolve was the need for creatives and technologists to work more closely together in the future. This partnership is important to ensure that a trip to the cinema continues to be "an event."

An Update on Safety Standards for Laser Illuminated Projectors

Since its founding in 2011, the primary objective of LIPA has been to reduce the industry's regulatory burden, and thereby simplify operational requirements for laser-illuminated projectors (LIPs). Laser-illuminated projectors behave very differently than bare laser beams, and substantial progress has been made in updating worldwide laser regulations to reflect this simple fact. Today, laser-illuminated projectors can be installed at any venue globally, with no unreasonable regulatory burdens imposed to ensure safety. In 2019, we expect improved harmonization of regulations to further optimize the classification and operation of LIPs.

Background

The fundamental issue regarding regulation of LIPs is that when laser safety standards were originally written in the 1970's, they envisioned laser applications where the light output would be "laser-like" – that is, with highly columnated beams capable of very high lumance energy. These laser beams are capable of damage to eyesight and skin tissues, if unrestricted direct exposure is allowed. Under the traditional laser safety system, lasers were assigned a "class" based on their accessible emission limit (AEL). A Class 1 laser device is considered safe under all conditions of normal use. Such Class 1 lasers are often found in optical disc drives and laser pointers. At the other extreme, Class 4 is the highest category of laser devices, generally including all visible-light laser devices with AEL exceeding 0.5 Watts. Unlike bare laser beams, laser-illuminated projectors are designed to optically process the laser source, changing the light characteristics to produce an output nearly identical to light emissions from a traditional lamp-based projector. Recognizing this fundamental difference, and prompted by LIPA, regulatory agencies began updating safety standards to address devices – such as laser projectors – that might contain Class 4 laser devices, but use this light source to produce a lamp-light projected images, not raw laser beams. The IEC is a global organization based in Europe, that prepares and publishes international standards for electrical, electronic, and related technologies, including laser products. In 2014, the IEC published IEC 60825-1:2014 "Safety of laser products – Part 1: Equipment classification and requirements". In this important new standard, laser-illuminated projectors could be classified into "Risk Groups" based on the actual light emissions. A 2015 standard, IEC 62471-5:2015, covers the photobiological effects of projectors, whether illuminated by laser or lamps.

Under 62471-5, most laser-illuminated projectors are categorized as either Risk Group (RG) 2 or 3, each with different requirements for markings, and installation. In determining the RG, the projection light is assessed at a distance of 1.0m from the closest point of human access (such as the front of the projection lens), along the light beam axis. This measurement determines the "hazard distance", which is the distance where accessible emission presents a potential hazard for retinal thermal injury, when directly staring into the projection lens. For installation in the United States, an important milestone was reached in February 2015, when a new Guidance Document was published by the Food and Drug Administration (FDA), the agency responsible for US laser regulations. This new document, issued in response to LIPA and other industry requests, addressed *Classification and Requirements for Laser Illuminated Projectors*. For the first time, this guidance allowed US installations to follow the IEC standards in regard to assigning Risk Groups rather than laser Class for determining

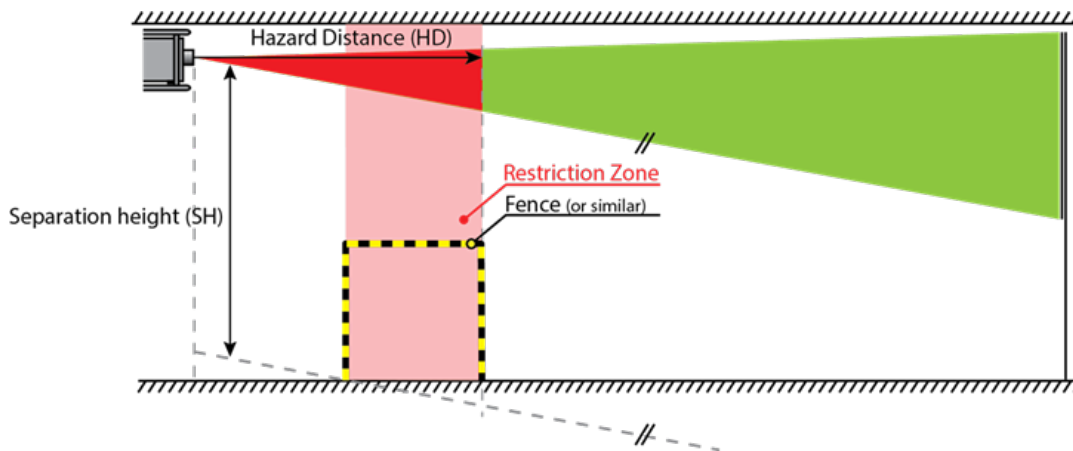
Risk Group	Risk
Exempt	No photobiological hazard
1	No photobiological hazard under normal behavioral limitations
2	Does not pose a hazard due to aversion response or thermal discomfort
3	Hazardous

regulatory requirements. A high-power laser-illuminated projector could be assigned a modest Class 1 laser designation (since lasers were inside) but the light emissions would be considered RG 2 or RG 3 for determination of labeling and installation, rather than as a Class 4 laser. While this was a big step forward in unifying global standards, the FDA Guidance differed from the IEC regulation in several aspects. For example, the FDA's technical assessment details were different than IEC, in some cases requiring assessing projected light at 200mm rather than 1.0m from the closed point of human access. Further, there was still the need for applying for, and receiving, a "variance" from the FDA, in which the agency agrees to specific exceptions from the historic federal laws addressing laser devices.

Regulatory Impact

Current regulations for laser-illuminated projectors are easy to follow. They facilitate straightforward compliance. First, for US installations, a label specifying the variance (issued by the FDA to the projector manufacturer) should be visible on the projector. Secondly, installation and maintenance staff must be properly trained and all signage and instruction manuals must be in compliance with applicable regulations. All manufacturers of laser-illuminated projectors will be able to help with this. Thirdly, the end-user must ensure that the projector installation complies with safety regulations. This is often dictated by the hazard distance defined by the projector design, and the lens throw ratio selected for your installation. Additional requirements may apply to temporary installations such as rental installations.

An example of projector installation to restrict access within hazard distance and separation height, as defined by IEC and FDA requirements. Your projector manufacturer will help in determining specific requirements. (Image courtesy Barco)



Progress in US Regulations

A little over a year ago, in early October 2017, the FDA issued an updated Laser Notice 57, a notice for proposed rulemaking, to revise *Classification and Requirements for Laser Illuminated Projectors*. The FDA made it clear that "this draft guidance document is being distributed for comment purposes only – not for implementation". The issuance of this proposed update was a welcome step forward to fully harmonize the US requirements with international standards. But there are still a number of open issues that require resolution. LIPA has already responded to the FDA requesting that they modify the guidance to address projectors with smaller source sizes, often an optical property of using smaller DLP or LCoS chips, as well as the new generation of ultra-short-throw projectors. We anticipate that these recommendations will be taken into consideration as the FDA publishes the final version of this Guidance Document in early 2019.

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In the future, LIPA plans to continue working with the FDA to simplify the variance application process, to ensure that end-users of laser-illuminated projectors – including in the rental and staging market – can readily deploy projectors with minimal administrative requirements. Of course, safety always is a top priority, and we look forward to finalizing regulatory policies that both ensure safe installation, operation and maintenance with frictionless operational constraints.

In Summary

As a high-efficiency source of light, lasers provide a remarkable advancement in technology. Laser-illuminated projectors offer notable benefits in light output, thermal efficacy, power consumption, brightness and image quality. But underneath the hood, high-power Class-4 laser components must be integrated and maintained with the appropriate respect for safety. New worldwide laser regulations have addressed the specific attributes of LIPS, including regulations under the more appropriate Risk Group definition rather than simply by laser Class. Now, further work is continuing by the FDA to update US regulations to even better align with IEC International standards, and – in the future – to simplify the variance process. Laser Illuminated projectors are both able to readily achieve current (and future) safety requirements, but to also advance the state of the art in imaging.