

the Laserist

In this issue:

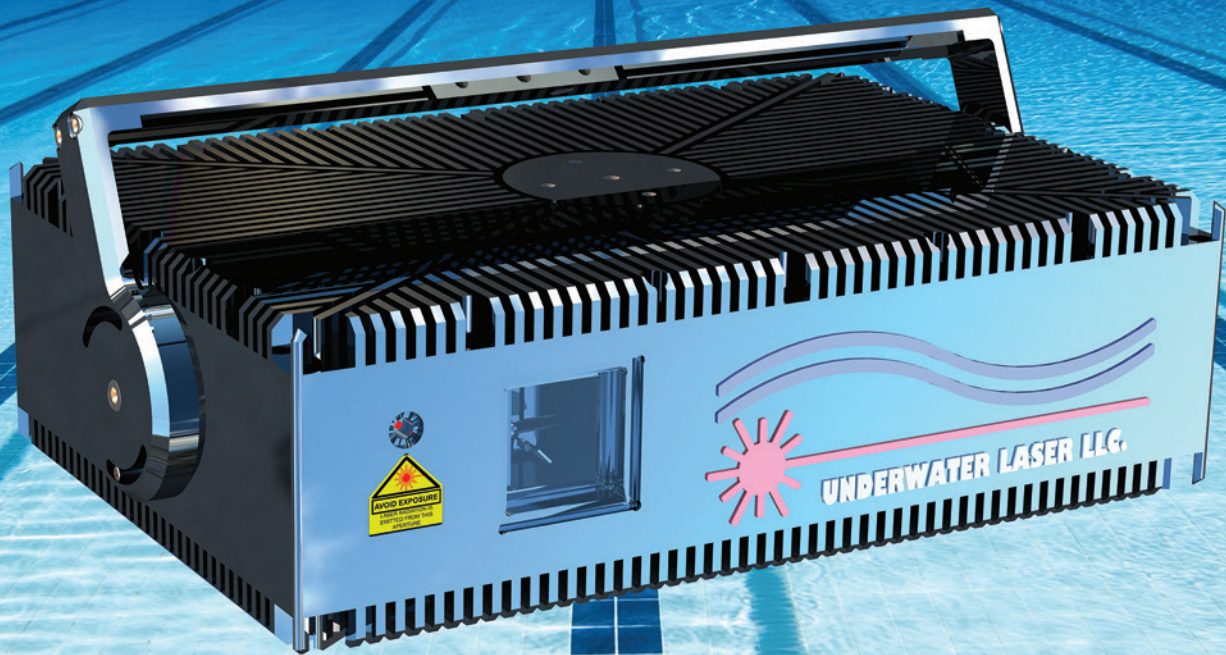
LASER SHOW PROJECT PROFILES

LASER SHOW SAFETY

2017 ILDA AWARD WINNERS

ILDA MEMBER DIRECTORY

UNDERWATER FREQUENCIES

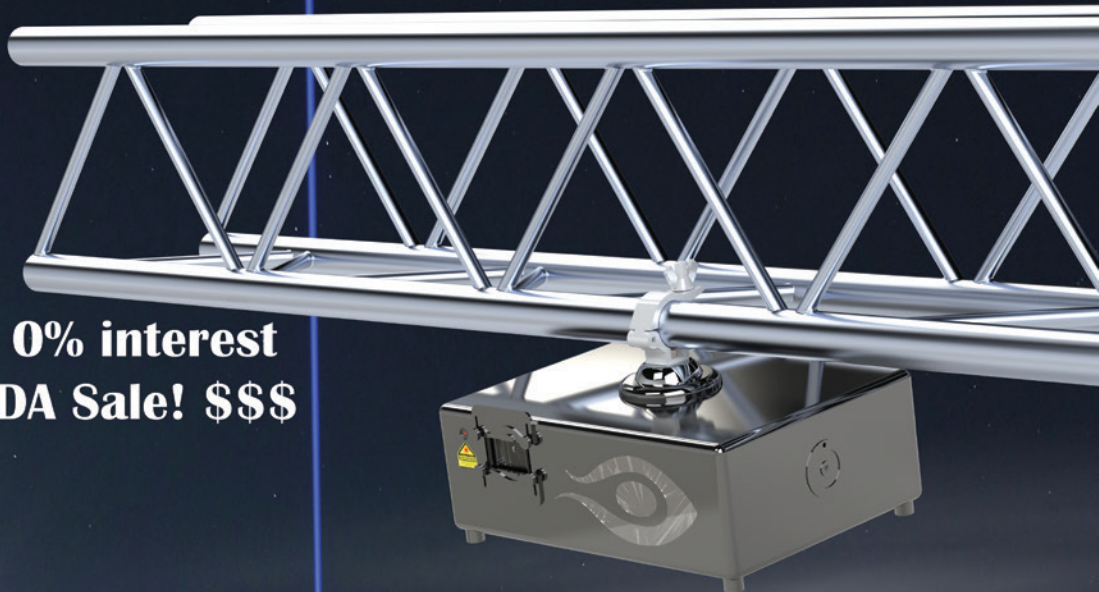


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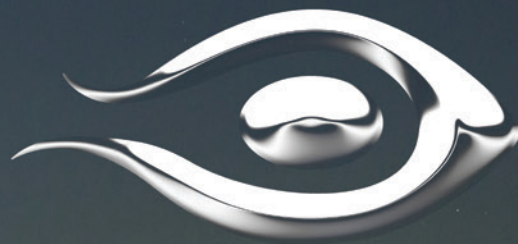
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Hometown of the 2017 ILDA conference and KVANT's new Clubmax FB4 laser display machine.



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ILDA, founded in 1986, is the worldwide organization for companies and individuals who produce laser shows and displays, or who provide lasershow-related products and services.

Awards programs showcase excellence

The annual ILDA Awards recognizes our Members' best work in laser graphics, shows, and technology. You can see each recent year's winners at ILDA's YouTube channel. (Search for the "ildalasershow" channel; we currently have 92 videos online.)

Code of Ethics protects clients

Every ILDA Member must agree to our Code of Ethics and our Code of Business Practice. This is an important reason to work with an ILDA Member. If anyone has a problem with a Member, they can submit an ethics complaint to ILDA. We will then try to resolve the issue to everyone's satisfaction.

Upholding safe and legal laser shows

Every ILDA Member also must agree to a detailed list of basic laser safety principles. This is another important reason to work with ILDA Members who know the complex legal requirements and who create safe shows.

ILDA is an active member of safety groups, including the ANSI Z136 laser safety committee and the SAE G10-T and G10-OL laser/aviation safety committees. ILDA has helped write regulations and requirements for outdoor safe laser use.

Technical standards

ILDA helped create worldwide interchangeability of laser projectors and laser shows through a series of standards created in the 1990s and still in use today.

ILDA's Technical Committee, under the direction of Dirk Apitz, has published a new set of standards for the "ILDA Digital Network" or IDN protocol.

ILDA Annual Conference

Each year, ILDA holds a conference where laserists from all over the world can share ideas and interests. The ILDA Conference includes seminars, workshops, an informal "lase-off," and the formal ILDA Awards Banquet, as well as other activities.

The 2017 ILDA Conference is hosted by KVANT Ltd., with Coherent Inc. as Gold Sponsor. It will be November 6-8 in Bratislava, Slovakia.

Past Conference locations have included Baltimore, Dubai, Las Vegas, Germany, San Antonio, Moscow, Amsterdam, China, Rimini – and even two conferences aboard cruise ships!

We welcome new members

If you work with laser shows, we invite you to join ILDA. For many ILDA Members, the Awards and Conference are highlights. Others are glad to help ILDA's efforts in improving safety and professionalism by their membership support.

More information online

Please visit our comprehensive site, ILDA.com, to find out more about laser shows, safety, and how to join. We also have a site primarily for Members, ildamember.com, and the site LasershowSafety.info for anyone wanting to know regulations and safety procedures.

Membership Directory

In this issue is our Membership Directory. We have three main categories of Membership:

- Corporate (with three levels)
- Non-Profit Organizations
- Individual, Hobbyist, and Student

In addition, we have a program where companies can submit documentation about their credentials. Currently, four ILDA Members also have achieved "ILDA Accredited Professional Lasershow Company" status.





My fellow Laserists,

I'd like to personally welcome you to the newest edition of *The Laserist* magazine, the industry publication for the laser display community worldwide and the official publication of The International Laser Display Association (ILDA), the leading organization for the advancement of laser in display applications.

The laser display industry has experienced dramatic growth over the past 31 years of ILDA, paralleling the proliferation and commercialization of laser technologies in and across other industries and other markets such as health, digital media, and manufacturing. The availability and advancement of technologies in these other markets often drive the technologies available to the laser display industry. It is through cooperation within the laser industry that we can promote a better understanding between professionals, the general public, and the agencies which regulate public health and safety of laser products.

We have seen the laser display industry rapidly grow from a small community of laser specialists to a large and ever expanding community of professionals and hobbyists, engineers and artists who are constantly treading new ground for the professional application of laser display. This industry in particular attracts many individuals and organizations with diverse backgrounds across many disciplines and specialties.

In the early days of laser display the industry was limited to niche market of specialized deployments. Nowadays, our industry faces a new challenge, knowing that laser technologies are affordable to consumers, readily accessible, and have become indispensable in our everyday lives. With the former cost and knowledge barriers that once kept our industry highly specialized lifted, the laser display industry has now found itself deeply woven into theatrical and architectural lighting, marketing and advertising, cinema and film, and consumer holiday products, just to name a few.

Our role as leaders in the laser display community now includes reaching out to the growing number of laser display consumers who span the gamut of laser knowledge and experience. We have a unique opportunity to increase public awareness of laser display by delivering on the inherent value in laser display technologies and by showcasing the impact of laser artistry in a safe and professional manner.

It is my sincerest hope that you will find *The Laserist* a useful resource for yourself and your organization to stay current with the latest news in our industry and an outlet to share your technologies and creativity with others.

A handwritten signature in blue ink, reading "Brian Gonzalez". The signature is fluid and stylized, with a large, sweeping loop at the end.

Brian Gonzalez, President, ILDA



ILDA ACCREDITED PROFESSIONAL LASERSHOW COMPANIES

In addition to being ILDA Members, the following four companies have also submitted documentation in the areas of Professional Performance & Experience, Safety, Education & Professional Development, and Volunteer Service.

ILDA PRO LEVEL 1

Annual lasershow-related sales over USD \$1,000,000

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ILDA PRO LEVEL 2

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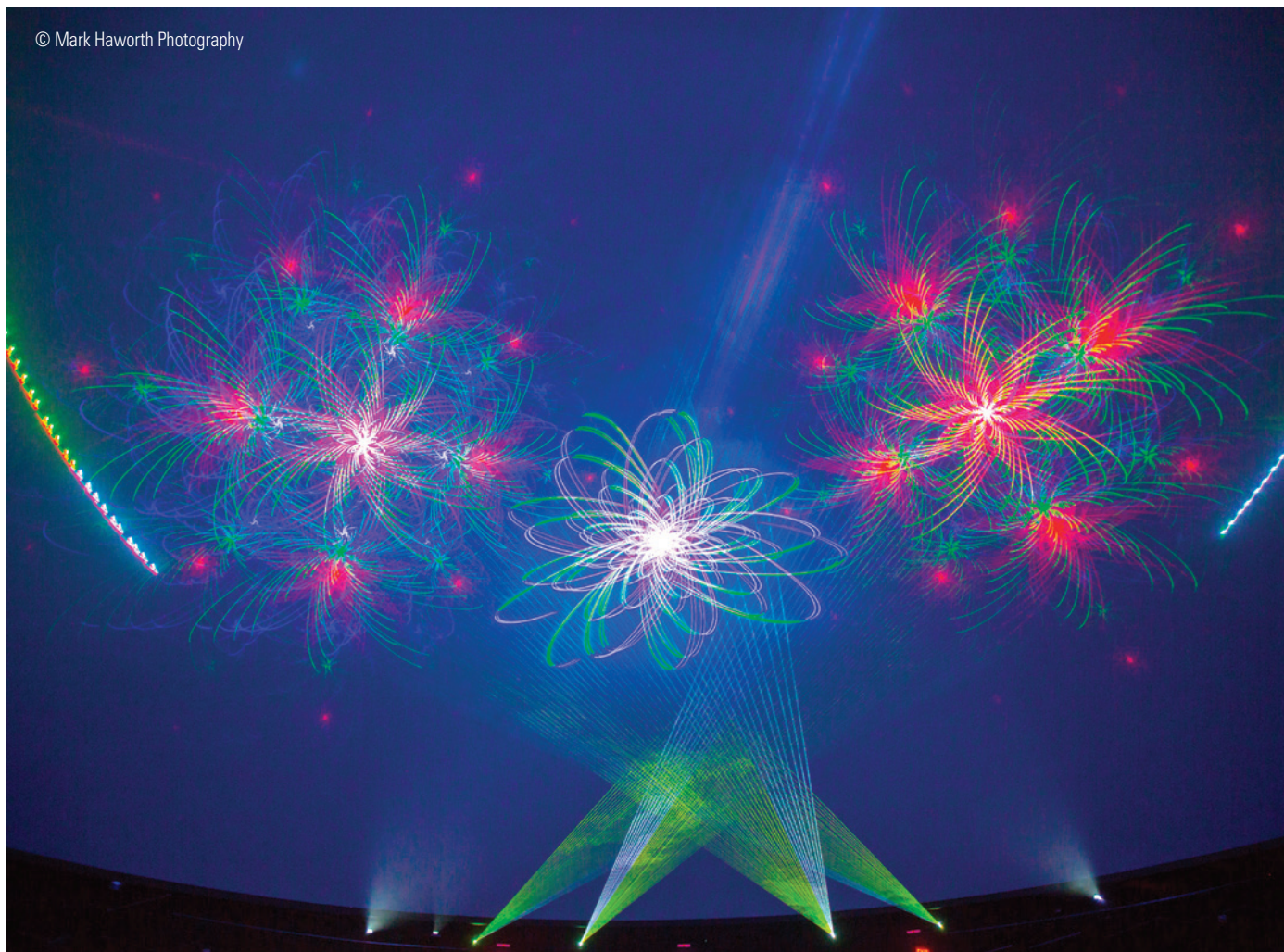
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© Mark Haworth Photography



Lasers and planetariums have a long and intertwined history. In fact, as far back as 1968, Miami's Laser Production Network (LaserNet) was doing laser light shows in planetariums with a presentation originally called "Eye See The Light."

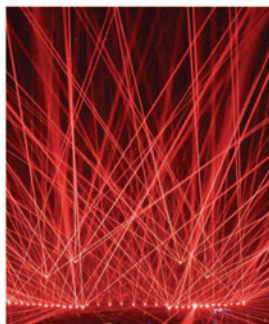
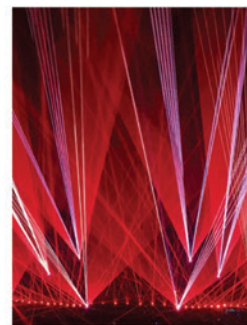
In their hometown, LaserNet has recently designed and installed lasers for the planetarium at Miami's new Patricia and Phillip Frost Museum of Science. It is one of only 13 planetariums in the world to feature an 8K 3-D full dome video system.

When the Frost Museum opened on May 8, 2017, the planetarium included 8 LaserNet systems: two 3-watt RGB projectors with special effects wheels, one projector with two independent 3-watt RGB lasers for two sets of scanners allowing for dual projection images into one zone, and five 1-watt lasers for aerial effects over the audience. In addition, LaserNet also included four atmospheric lasers to project star fields as an entrance effect. Control for these lasers uses the very latest Pangolin FB4 and Beyond software. The computer is located in a server room near the dome, and a hands-on control has been remoted into the control console in the dome.

Along with the planetarium, the Frost Museum's Traveling Gallery is host to the all new LASERsHOW show. This is a visual educational show about lasers, designed and produced by visual artist Matthew Schreiber. It fills the entire room with laser special effects. In addition to the center display of "how lasers work," LaserNet installed four 10-watt RGBB lasers that were programmed to support the artist's visual presentation. All the high-powered lasers are terminated onto special hanging truss covered with black particle board which surrounds the production area.



FAITH HILL & TIM MCGRAW



ER Productions have been touring with **Faith Hill and Tim McGraw** on the duo's Soul2Soul tour. The visually impressive two-hour show was designed by Mark Butts and Raj Kapoor, who collaborated with ER on the recent Backstreet Boys Las Vegas residency.

Project manager, Andrew Turner, said, "We relished the opportunity to be involved in such a high-profile tour in the USA. This is the first-time ER Productions has been involved with a Country music act, which was an interesting creative opportunity from the outset."

Once the laser concepts had been agreed, Turner devised a rig consisting of sixteen Laserblades, thirty-two BB3 units and eight of ER's new Excellent 25 fixtures, which spanned the length of the stage.

Two Excellent 25 units were floor mounted out wide, while another four were rigged onto two, 5-metre long steel poles, creating a unique effect that could be pulled back to avoid a 24-metre video wall. The remaining

two Excellent 25 units were rigged onto custom brackets creating laser effects that terminated on stage around the Country music stars. Finally, to frame the stage and achieve a lovely static focus, ER's skilled technicians set the Laserblades in trays along the left and right downstage edge.

Turner concludes, "Raj, Rita Maye Bland and Lighting Designer Mark Butts gave us the freedom to throw our creative hats into the ring for the laser moments, which is always a dream for us and we are thrilled with the results."

Stay tuned to our news section for more information on ER Productions' outings around the world this year at www.er-productions.com/news



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LEADING LIGHT:

HOW ONE COMPANY IS HELPING CHANGE THE FACE OF THE LASER INDUSTRY

Putting on a great show these days requires many elements. Today's brands and artists want to create moments that deliver unforgettable experiences.

One of the pioneers helping to create never-before-seen visual effects is ER Productions. Founded 10-years ago by Marc Webber and Ryan Hagan, the award-winning laser show and laser system design

specialist operates internationally, providing lasers for concert tours, television, advertising, and high-profile events.

Constantly innovating, ER Productions has brought numerous cutting-edge laser technologies to market, which have helped shape the industry. Below are profiles about some of the products and concepts that make up the British company's ground-breaking work.

PEDAL TO THE METAL

With an impressive portfolio of projects, it's hard to single out one project that typifies the company's ethos of breaking new ground. For example, in the last 12 months, ER Productions has created the world's largest laser display at an award-winning event in Milan for the launch of the Samsung Galaxy S7. However, nothing illustrates its approach to laser innovation more than a recent collaboration with Jaguar for the London Design Biennial.

The prestigious annual event at Somerset House in London celebrates international design and how it affects every aspect of our lives, so it's no surprise that the brief from Jaguar and its agency Imagination was both complex and challenging.

"When we were first approached by Jaguar, the concept was to take a laser beam on a journey through the brand's history, creating the levitating 2-D form of an E-Type and F Pace sports car, which transitions into the 3-D silhouette of its latest concept car," Webber comments."

Housed within two rooms of an impressive historic building, Jaguar wanted the location free of wires, brackets, and clamps, which meant that Webber had to think outside the box when it came to directing the beam.

"After testing many different options, we decided upon 1.5mm plastic side glow fiber, which worked best with the Tripan lasers we had specified for the job. The reason we chose Tripan is because it utilises Coherent OPS technology, which enabled us to confidently pump small fiber optic with clean overlaid red, green, and blue diodes," he continues.

The installation was separated into 3 sections - E-Type & F Pace, the beam transition sequence, and concept car. With lasers built into the exhibition stands, the side glow fiber was filled at both ends to give a neat, continuous glow. To create the sleek 2-D silhouette of the E-Type, the fiber was thread through custom made poles and eyelets, easily achieving the desired effect. However, when it came to the more angular outline of the F Pace, the team had to compensate by pumping the laser harder through the fiber. "We found that the fiber could take up to 1.5 watts before saturation; surprisingly we did not see the plastic fiber burn at this power."

For the beam transition section, four lasers with beam splitters filled the fiber optic cable. The fiber was then thread through a hole in a wall and looped back on itself to give the impression of a beam bouncing off the wall.

The final and perhaps most significant stage of the exhibition was the recreation of Jaguar's 3-D concept car. To create the vehicle's futuristic edges, eight Tripan lasers were pumped through long pieces of fiber optic cable from both ends. "Over 150 eyelets were intricately threaded with multiple laser feeds. The challenge was to get each section of fiber to join so that the car looked like it was formed from a single laser beam."

To stop the exhibition's pièce de résistance from looking static, a proximity sensor and Arduino interface was programmed to sense visitors as they approached the concept car, which in turn triggered a Beyond channel, changing the car's color.

MASTERS OF REINVENTION

ER Productions has recently launched two significant new laser technologies, which have evolved through its continual R&D process. This includes the BB3 – the latest fixture in the manufacturer's Beamburst range – and the Kinekt, which was launched earlier this summer. "Taking our existing range to the next level is central to our ethos, and we always bring our experiences out on the road back into the shop," comments co-director, Ryan Hagan.

Launched in 2016, the compact yet powerful BB3 includes all of the elements that made its predecessors great. Fully DMX controlled, it does not require laser software and has 18 channels as standard, as well as an advanced 33 channel mode. Additionally, BB3 has full color capability and features three beam apertures - two for audience exposure and one for scanning.



"The BB3's rotating burst grating comes from the Beamburst, but it now benefits from the addition of an extra aperture and indexable linear grating. The once static high-powered beam has high speed x/y scanning through the third aperture where users can opt for single beams or upload frames from the macro library. There are 24 macros to choose from and extra effects channels like zoom, rotate, scan rate, color, and strobe. The fact that you can plug this straight into a lighting console is such great news for LD's who want overall control. It also helps our internal team to create spectacular shows quickly and fill in gaps on stage."

The BB3 created a wow factor on the current Faith Hill and Tim McGraw Soul2Soul Tour of North America and at super-star DJ duo, Axwell & Ingrosso's headline performance at Amsterdam's ADE Festival last year. Although both shows took very different creative directions, the versatility of the unit meant that it could create a range of individual looks.

Another fixture used in the huge Hill/McGraw rig is ER's iconic Laserblade, which has gone through the company's stringent development process and given life to a unique modular laser system called Kinekt.

"The Kinekt is an evolution of our Laserblade and Array products, which dramatically changed the laser industry when they were introduced. They were the first laser fixtures to enable laser beams to project parallel arrays," says Hagan.

Kinekt is a small, lightweight modular laser system, that can connect to any number of additional Kinekt units. The laser beams emitted by each Kinekt meet on an X and Y axis to create laser scanned effects. When joined together, the Kinekt units can create an endless array of laser beams as long or as wide as a venue or stage will allow in any direction.

Kinekt comes with an FB4 control in-built and works with DMX, Art-Net and Beyond. Each Kinekt has a 3-watt laser beam comprised of red, green, and blue diodes. The mounting system and brackets have been designed to enable connection to another unit on any side of the fixture, which means any shape can be created including squares, crosses, circles, etc.

"When we set out to develop Kinekt, we wanted to design an array fixture that wasn't restricted to either a horizontal or vertical axis and could be used modularly, allowing us to create different shapes and forms, some of which were not achievable until now."

Since launching Kinekt this summer, the system has been used to create custom laser designs for Chase & Status, Axwell & Ingrosso's debut at Creamfield's Steelyard, and for the Italian singer Vasco Rossi's record breaking show at Enzo Ferrari Park in Modena.



NEW KIT ON THE BLOCK

As well as evolving their existing solutions, Hagan and Webber have invested almost £3,000,000 in new technologies in the last 12 months. One of these innovations is Cyclone, an impressive multi-directional, rotating, scanning laser system that can be mounted vertically or horizontally and at any angle in between. The Cyclone consists of 60 RGB modules, each with a pair of high speed x/y scanners. All components are mounted inside a 2 meter diameter frame, which can spin up to 60 RPM a minute.

"Our clients often ask us to create cage effects, which we can achieve using scanning units or by creating structures with our range or array fixtures. However, this can be quite labor intensive particularly if time is limited. We wanted to design a fixture that could create an infinite number of cage designs that was also versatile enough to load in quickly," says Webber.

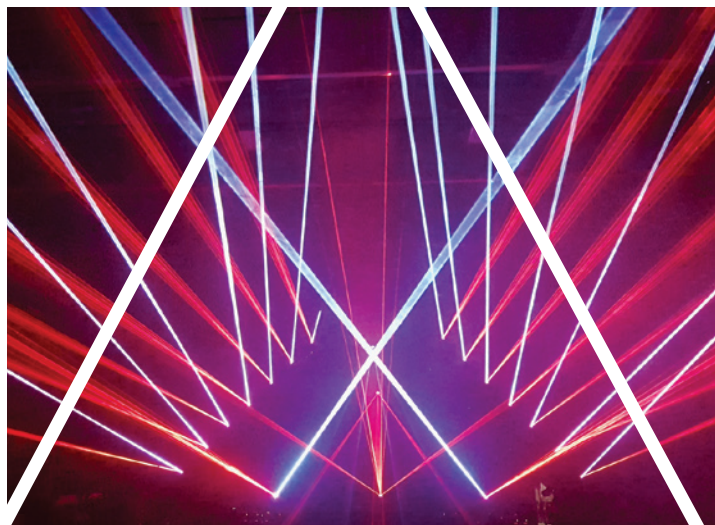
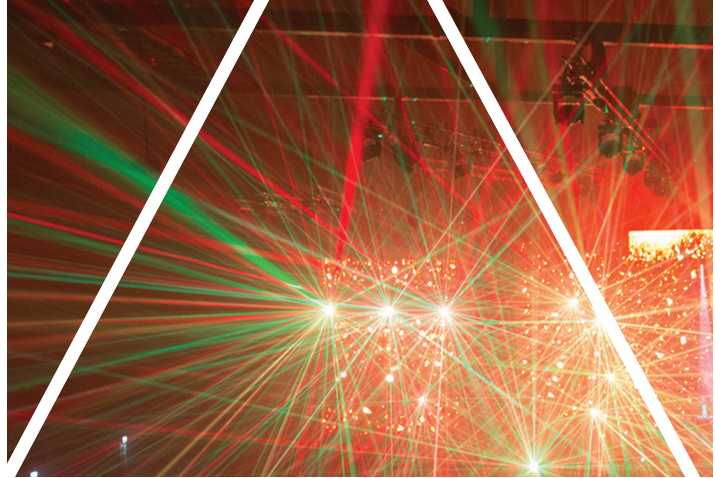
The Cyclone certainly delivers on its promise, which is evident in the singer Zayn Malik's video for his break out single, Like I Would. Surrounded by a full color cage and big, bold, geometric laser effects, it almost beggars belief that Malik's video was shot in one day.

"The benefit of being an end user of our own products is that you have an intimate understanding of how you want that fixture to work. As a company, we want everything we design to be highly functional – Cyclone can be installed by two technicians in 30 minutes, which is quite an achievement. We also wanted to make it easy and cost effective to ship - it packs into three trunk cases and weighs only 160 kg," adds Hagan.

With the expansion of the company's global infrastructure, ER Productions takes around a year to develop a new product and complete a prototype. For Cyclone, the team spent a great deal of time devising ways to control the DMX fixture, which required the creation of bespoke software. "Translating laser effects into DMX and controlling them wasn't easy. Even after the first Cyclone was built, we continued to tweak and modify the software until we had it just right."

By constantly pushing the boundaries of technology, ER Productions is redefining the future of lasers and giving them a broader application beyond live performance and events into the realms of architecture and scenic design. However, cutting-edge kit alone will not do the job – the rest of ER Productions' success is down to the technological expertise and artistic vision the company uses to create magical moments.

To find out more about ER Productions' laser expertise, visit www.er-productions.com.



KINEKT



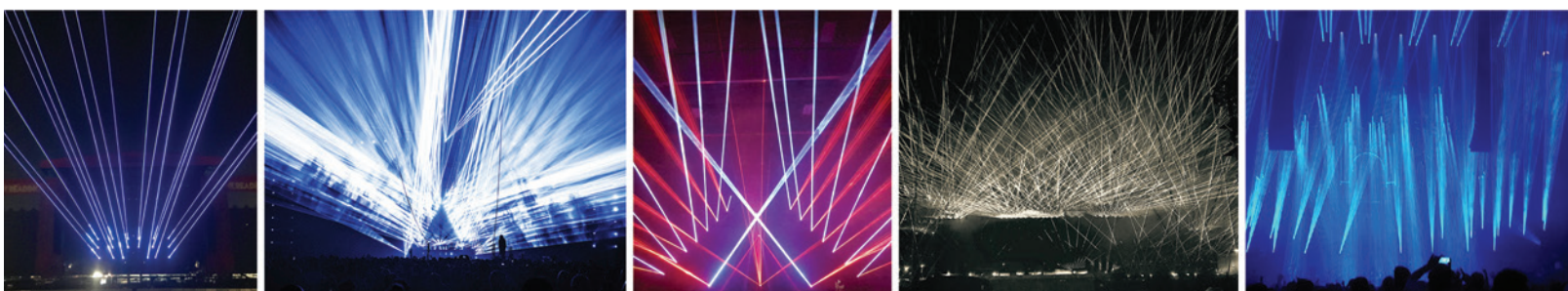
KINEKT IS A SMALL, LIGHT-WEIGHT, MODULAR SCANNING LASER FIXTURE THAT CAN CONNECT TO ANY NUMBER OF ADDITIONAL KINEKT UNITS.

The laser beams emitted by each KINEKT laser fixture, meet on an X and Y axis to create laser scanned effects. As the fixtures are joined together they can create endless array of laser beams as long or as wide as the venue or stage will allow.

KINEKT comes with an FB4 control in-built and works with DMX, Art-Net and BEYOND, the connections on the KINEKT allow for simple in and out daisy chain connection. Each KINEKT has a 3w laser beam comprising of red, green and blue diodes. The mounting system is designed so that the units can be connected on any side of the fixture.

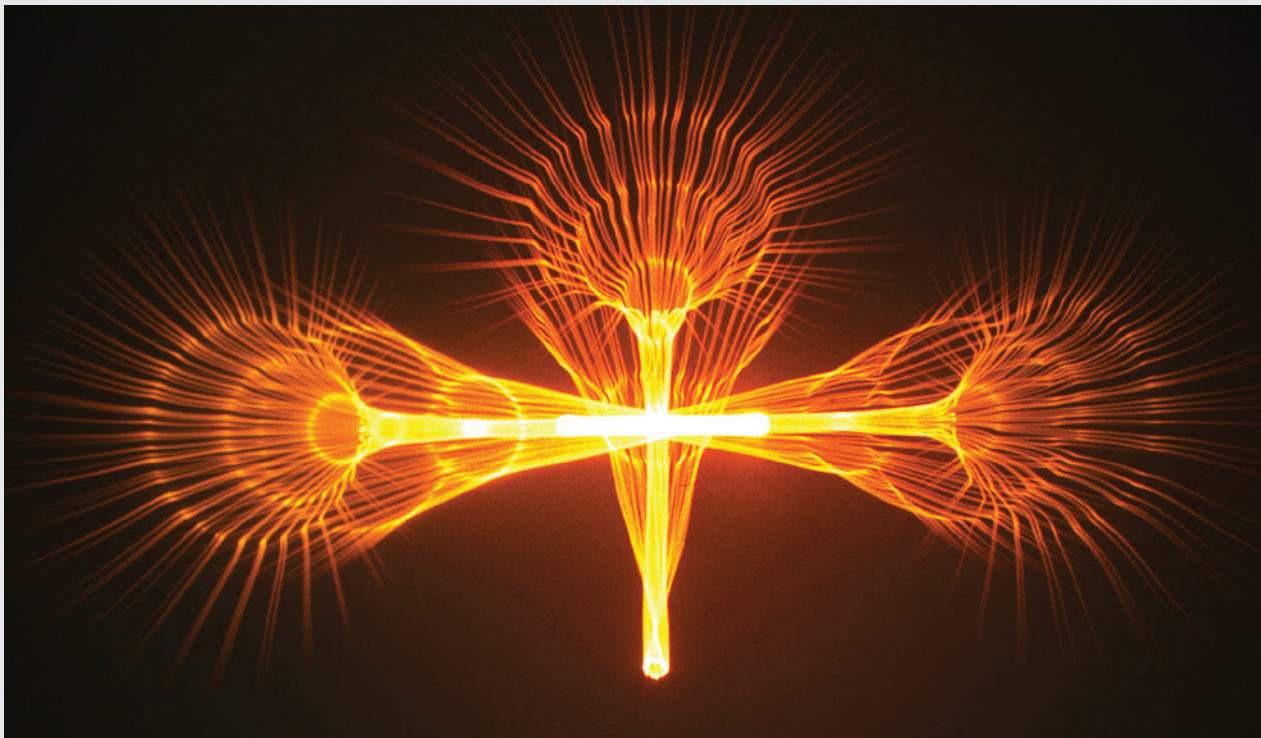


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These are some of the entries in the 2017 ILDA Awards "Laser Photography" category. This year, there were 23 entries from 13 different ILDA Members. The winners were chosen by ILDA Members who viewed the entries online, then voted for first, second, and third places. First place went to the cover photo, "Diamond" by Derek Garbos of LaserTech Canada & 4U2C.



Second place winner "Trinity" from LOBO. Photography and laser art by Udo Gauss.

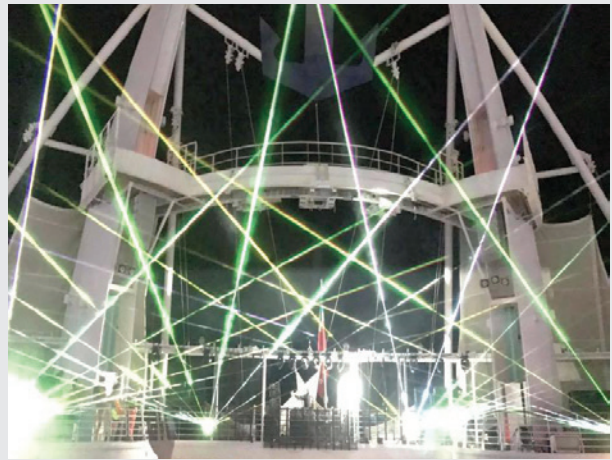


Third place winner "Circle" from KVANT, taken during a multimedia show for opening the Olympic Park RIO in the Czech Republic. Photography by Art4Promotion.





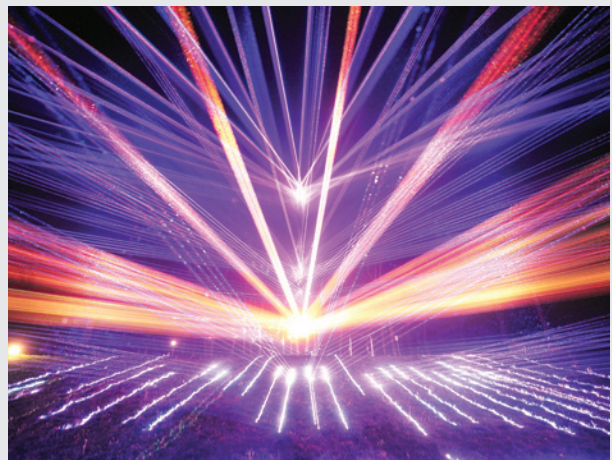
These are some of the 23 photos entered in the 2017 ILDA Awards. They illustrate a variety of projects and artistic approaches demonstrated by ILDA Members.



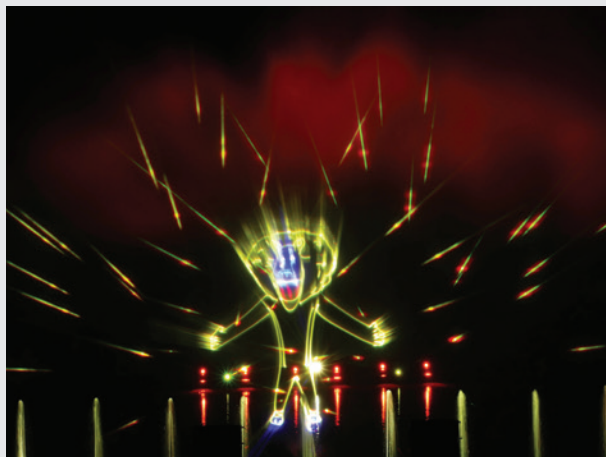
"Aqua Class" by Lasersonics, from an EDM concert event on the world's largest cruise ship off the coast of Mexico. Photo by Kyle Garner and Francis (Poncho) Lucero.



"Purple Silk" by Lapis Laser Display. Photography by Garrett Crabtree.



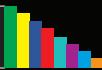
"Stargate" by Lightwave International. Warp speed ahead! 3D laser light sends us down the stargate to explore the unknown. Photography and laser programming by George Dodworth.



"Welcome to Madagascar," photography and laser art by Individual Member Merlin Schaadt.



"Laser Latte," photography and laser art by Individual Member Theo Petrides.



IN MEMORIAM: IVAN DRYER



Ivan Dryer, pioneering laser artist and founder of Laserium® planetarium shows, passed away on July 27, 2017 at the age of 78.

Dryer received the first ILDA Career Achievement Award in 1989. His CAA citation includes this: "Dryer is universally recognized as the father of the laser show industry. His selection by ILDA as recipient of the first Career Achievement Award underscores his unique place in the history of laser displays."

Within ILDA, Dryer was known for his quiet, thoughtful, and kind demeanor. He was a Founding Member of the association, served on the Board from 1990 to 1994, and was ILDA President from 1990 to 1992.

Laser Images was host of the 1991 ILDA Conference, held in Los Angeles. The company won 43 ILDA Awards for artistic and technical excellence in the years between 1988 and 2000.

Earlier in 2017, the ILDA Board designated Dryer's birthdate, March 7, as "International Laserist Day." This is intended to recognize the people and companies who design spectacular laser shows and laser art throughout the world.

Many older ILDA Members had their first exposure to laser displays at a planetarium running Laserium shows. Dryer's example helped inspire these Members to get into the business and often to found their own laser display companies.

ILDA extends its condolences to Ivan Dryer's relatives, friends, employees, and associates.

THEY'RE
GONNA PUT ME
IN THE MOVIES

By Mike Gould

...They're gonna make a big star out of me...

Act Naturally by Johnny Russell
and Voni Morrison, 1963

I don't know about that big star bit, but my lasers will be seen in a feature movie to be released in 2018. This is the story of a small business hitting the big, well, bigger, time by appearing in an indie horror movie, courtesy of web ubiquity and being prepared.

Phantom of the High School

This feature film, which is still being shot as I write this, concerns a teenager haunted by an evil demon and was shot on location at West High School in Salt Lake City; the film is called *Hereditary*. The director of photography, Pawel Pogorzelski, found me on Google by searching for "laser artist." If you do so, my site comes up first after two or three craftspeople offering laser engraving.)

Pawel described the effect he was looking for. Our hero is walking down a school corridor, and a mysterious light appears and scans down the hallway, overtaking him and disappearing into a classroom door.

I was able to offer a solution. It involved expensive lasers, software, and home-made photonic hardware. Piece of cake. Sorta.

This mystery light was dubbed "Tinkerbell" and appears in several places in the movie.



Shooting lasers, from left to right: assistant to producer Tyler Campellone, director of photography Pawel Pogorzelski, laser artist Mike Gould. Photo by assistant to line producer Cameron Thuman.

Timeline

I was contacted on April 8, 2017. I spent the next several weeks prepping the custom “wobbulator” hardware and sending videos back and forth via YouTube to get just the look Pawel and director Ari Aster were looking for. In addition to the wobbulator, I built a custom laser lumia projector, and Illuminatus Lasers chief engineer, Wayne Gillis, built the controls for it. Steve Rich of Photonic Legal assisted in getting contracts and logistics sorted.

On May 15, I flew to Salt Lake City with the custom projector as my luggage. All the rest of the gear was sent by overnight air freight. It cost a small fortune to ship four large road cases crammed with projectors, lumia gear, cables, and two laptops.

Crew

This was no small production – there were more than 80 people directly involved, plus dozens of teenage extras. The high school parking lot was crammed with more than 20 large trucks filled with lighting, sound, makeup, and prop materials. The shooting schedule was May 19 – June 30, with shots at

the school and at a set constructed elsewhere in Salt Lake City.

I really enjoyed working with the various crew members. Most of them were locals, as Utah has very strong incentives for filmmaking locally.

I got to meet set designers, caterers (the food was great), and audio guys, as well as the baffling bunch of best boys, gaffers, grips, greens, and other workers I had no idea existed. I did my best to get up to speed on nomenclature before I left so I wouldn’t look like a total noob. I just looked up one term I saw in the script: - GAK:

GAK (Goods All Kinds): The general slang term for gear, tools, props, etc. used on a film set.

Production

I was very well treated by everyone. In addition, I had a great hotel room with rides to the set (courtesy of the transportation department.) Unit production manager Scott Chester, the go-to guy for any problems regarding logistics, scheduling, and budget, loaned me his personal assistant, Cameron Thuman, to assist in setting up my gear and

filming some of the footage (“B-roll”) to be used in the film.

The producer of the film is Lars Knudsen; his assistant Tyler Campellone was also assigned to me during shooting. Remember these assistants’ names. Cameron and Tyler are both film school students with great resumes and are destined to become significant players in the industry, methinks.

And speaking of significance, producer Knudsen is a major figure in the indie movie scene. In the last eleven years, he has produced a bunch of movies, a good percentage of which made it to the Sundance Movie Festival. I’m told that *Hereditary* already has a distribution deal, so visions of red carpets are starting to dance through my head.

About the Author: Mike Gould is still waiting for his close-up. He was a mouse wrangler for the U of M for 20 years, runs the MondoDyne Web Works/Macintosh Training/Photography mega-mall, is a laser artist (mikegouldlaserartist.com), directs the Illuminatus Lasers, and welcomes comments addressed to mgould@mondodyne.com.



LOBO SUPPLIES SHOW SOLUTION FOR GRAND AMPHITHEATER IN SENISE, ITALY

LOBO Laser and Multimedia Systems realized a digital stage design

by Paolo Atzori

This astonishing theater/multimedia environment was to be custom tailored for *The Myth of Origins*, a recapture of history, enriched by travel, laser, and video projections on waterspray canvas, choreography, magic dialogues, vision of the future, and business dangers, alternating live stage performances with image narrative, combining modern theater and cinema.

The idea was to also animate the ambitious setting of the Greek amphitheater-like Arena Sinni of Senise, an impressive scenic space of 4,000 square meters, 2,500 seats, and a 3,200-square-meters water basin respecting the surrounding environment with the predominance of local natural materials such as tuff and wood – an ideal scenario for experimenting with the most advanced technologies.

For this purpose, LOBO configured, supplied, and implemented a state-of-the-art lasershow system to take care of all arising laser light fantasies. It became a sparks system, equipped with an Optically-Pumped Laser Module, Model sparks-XG15. With a typical brightness (with PCS) ELB200: 1703 W/m², its collimated beam, thanks to the LOBO PCS system, is outstandingly bright and perfectly suited for long distance projections such as in Senise.

Thanks to the triple stage active cooling system, the sparks is suitable for continuous operation at high ambient temperatures of more than



40°C, which can easily be the case at hot climate regions such as Senise. Along with the sparks, LOBO chose a failsafe LACON-5 – a hybrid parallel multiprocessor Laser and Multimedia Workstation in compact version, running in sync also with video, fire effects and other media. The standard optical signal transmission by Digital Data Link DDL-2 was the perfect option for overcoming long distance signal carriage, contrary to copper cable solutions – also underwater! Additionally, this feature generally enables the remote administration and configuration of devices supporting the DDL-2 protocol. The LACON-5 was equipped with all the necessary modules to be able to control any kind of standard DMX devices, RS-232 interfaced peripheral devices, and parallel I/O controlled devices via 20 configurable digital input or output channels (e.g. for remote control of the LACON-5 or fog generators, etc.) A Timecode Module was also implemented – a sort of plug-in electronics for the LACON-5 series with LTC reader/generator for time code according to SMPTE/EBU-standard for synchronization with external media systems.

For sufficient light and imagery projection area, LOBO provided water screens (jet version), respectively one on the left and one on the right. LOBO configured them to be 12 alignable 2m long distributor segments for creating a vertical rectangular water screen according to the fountain principle with a height of approx. 10m, including individually adjustable





nozzles (96 pieces) and special submersible pumps. Additionally, a 28m wide water screen (spray version) with an outstandingly homogeneous high density spray for high resolution imagery was put in the center of the basin. For this purpose, LOBO configured and implemented a central pump unit, consisting of two multi-level submersible pumps, with an integrated spray nozzle in stainless steel design for creating an almost semi-circular water film with a spray diameter, as already mentioned.

A multitude of LOBO fog and fan units were placed for an optimum of visual effects harvesting. Further complementary elements were led walls and video projector units, moving lights and fire walls. And now just envision this playground combined with the grandeur of scenes that play ruins, fleets, battles and giants.

The result is theater, cinema, dance and spectacular effects with state-of-the-art technologies – elements that, in perfect synergy, accompany the audience in the adventure of *Magna Grecia - The Myth of Origins*, the great multimedia show designed by Emir Kusturica. It alternates live stage performances with image narrative, comprising theater and cinema. The spectacle ran in its second season with 25 performances in 2017, that went until September 9, with an immensely positive response. For this purpose, LOBO configured, supplied and implemented a state of the art lasershow system to take care of all arising laser light phantasies. It became a sparks system, equipped with an Optically-Pumped Laser Module, Model sparks-XG15. With a typical brightness (with PCS) ELB200: 1703 W/m², its collimated beam, thanks to the LOBO PCS system, is outstandingly bright and perfectly suited for long distance projections such as in Senise.

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and configuration of devices supporting the DDL-2 protocol. The LACON-5 was equipped with all the necessary modules to be able to control any kind of standard DMX devices, RS-232 interfaced peripheral devices, and parallel I/O controlled devices via 20 configurable digital input or output channels (e.g. for remote control of the LACON-5 or fog generators, etc.) A Timecode Module was also implemented, a sort of plug-in electronics for the LACON-5 series with LTC reader / generator for time code according to SMPTE/EBU-standard for synchronization with external media systems.

For sufficient light and imagery projection area, LOBO provided water screens (jet version), respectively one on the left and one on the right. LOBO configured them to be 12 alignable 2m long distributor segments for creating a vertical rectangular water screen according to the fountain principle with a height of approximately 10m, including individually adjustable nozzles (96 pieces) and special submersible pumps. Additionally, a 28m wide water screen (spray version) with an outstandingly homogeneous high density spray for high resolution imagery was put in the center of the basin. For this purpose, LOBO configured and implemented a central pump unit, consisting of two multi-level submersible pumps, with an integrated spray nozzle in stainless steel design for creating an almost semi-circular water film with a spray diameter, as already mentioned.

A multitude of LOBO fog and fan units were placed for an optimum of visual effects harvesting. Further complementary elements were LED walls and video projector units, moving lights, and fire walls. And now, just envision this playground combined with the grandeur of scenes that play: ruins, fleets, battles, and giants.

The result is theater, cinema, dance, and spectacular effects with state-of-the-art technologies – elements that, in perfect synergy, accompany the audience in the adventure of *Magna Grecia - The Myth of Origins*, the great multimedia show designed by Emir Kusturica. It alternates live stage performances with image narrative, comprising theater and cinema. The spectacle ran in its second season with 25 performances in 2017 that went until September 9, with an immensely positive response.





UNDERSTANDING WHY LASER SHOWS MUST BE SAFE

by Partick Murphy
ILDA Executive Director



At this concert, laser beams are full-strength and sharp high in the air, while beams going into the audience are diffused to provide a safe, comfortable viewing level. Photo by Lightwave International of a Ghostland Observatory concert.

Safety is a vital, central topic within ILDA and for ILDA Members. The industry has an excellent safety record over the past 40+ years. We want to continue this and to improve, using new techniques and new understandings of the hazards.

This article gives some background for producers, clients, new purchasers of laser equipment, and others who may not be fully aware of the whys and hows of laser light show safety.

WHY LASERS ARE REGULATED

One of the key differences between using lasers and using conventional lighting equipment is the increased legal, regulatory, and safety concern with laser safety.

The laws and safety procedures can sometimes be overwhelming for new users who want to do things correctly. And unfortunately, there are many users who don't know or don't care, and thus who use lasers illegally and unsafely.

THE KEY LASER SAFETY MESSAGE

If there is one message ILDA would like to get across to all laser users, it is this:
Do not put laser light on, or hazardously near to, anyone — audience, performers,

technicians — unless the laser use has been specifically analyzed and approved for human access.

It is fine to have laser beams go above people or to the side where there are barriers preventing access. There may be laws about the separation distance. For example, U.S. federal law requires Class 3B and 4 laser beams (those 5 milliwatts or greater) to be at least 3 meters from the floor, and to be at least 2.5 meters laterally from where a person could stand. There may also be laws about ways of maintaining that distance, by monitoring and preventing accidental human access.

(By the way, it should be noted that laser hazards are the same around the world. Countries with regulations, including most major industrialized nations, base their regulations on the same ANSI and IEC standards. Just because a country does not have laws, or does not enforce their laws, does not mean that laser light is somehow safer in those countries! For this reason, **ILDA encourages all laserists everywhere to follow basic principles which are discussed later in this article.)**

BEAUTIFUL AUDIENCE SCANNING

But there are times when laser light can safely go into an audience. This is the ultimate lighting effect. It is a beautiful, dramatic effect that reaches out to literally touch the audience and thus make a strong emotional connection. It's been compared to being in a swimming pool full of light or like being directly inside a fireworks display.

In the lasershow industry, any deliberate human exposure is known generically as "audience scanning." This can be hazardous due to the potential for eye injuries from too-bright laser light. (It should be noted that some conventional light sources such as Sharpies also have brightness and heat concerns as well, even if there may not be specific regulations regarding their use.)

Many people incorrectly think that scanning a beam completely protects the audience. It is true that instead of a single, stationary laser beam in the audience that quickly scans the light in a line, circle, or other shape spreads out the the light energy over a larger area. However, it turns out that scanning only decreases the risk from 4 to 10 times. This means the scanning light level can be turned up 4 to 10 times higher relative to a





stationary beam. This may sound like a lot, but in practice a 10-times light level increase appears only about twice as bright to the eye. And remember, the light is now being spread over a large area due to the scanning, which dims its visual intensity.

DON'T EXPOSE PEOPLE OVER THE MPE

There are three problems with shows that are over the Maximum Permissible Exposure limit.

- The first issue is that the shows can be painfully bright for the audience. It is unpleasant and counterproductive if people must close their eyes or look away every time lasers come towards them.
- Another problem is that an audience member may decide their vision problems — real or imagined — are due to the laser light exposure. If a company cannot prove its safety techniques in court, this is bad for business and for the company's image.
- The third issue is that the too-bright light may be causing actual changes or injuries to an eye. The number of documented injuries from standard audience scanning in 40 years is practically nil. But there are legitimate concerns regarding patrons having unknown or unaware injuries from shows well over the MPE.

SAFE AUDIENCE SCANNING IS COMPLEX

To implement safe audience scanning, experts take into account numerous details and caveats. For example, the laser beam must be measured in a certain way, with a particular type of power meter detector. Also, the laser projector must be equipped with a "scan-fail detector" that cuts off the beam within milliseconds; this is not an easy circuit to reliably engineer.

Some countries restrict audience scanning unless it is done with special permission. For example, a show producer must have explicit permission in advance in Austria, Finland, Germany, Scotland, Sweden, the U.K., and the U.S. In other countries, there is no special permission but shows must still be safe.

For this reason, anyone responsible for safe laser use — a producer, a projector

purchaser, an end client — must not allow audience scanning unless it has been pre-approved under regulations or has otherwise ensured to be safe by an expert in audience scanning techniques.

For countries where laws or enforcement are lax, there still is a moral and legal (lawsuit prevention) duty to keep any audience exposure at a safe level.

EFFECTIVE AUDIENCE SCANNING

Fortunately, there are some tricks that clever laser show companies can do to increase the visual effectiveness of audience scanning.

One method involves using high-powered lasers overhead and to the side, which then are automatically reduced in power by the lasershow software as they go into an audience zone. While it may seem like the audience beams would appear dimmer, on the other hand they are going directly towards the audience so the effective brightness remains about the same.

Note that since audience eye safety now relies on the computer software working properly, such an effect must be analyzed and approved by experts and, in some countries such as the U.S., by regulators.

For any laser show, the final safety measure is to have the laser effects continually monitored by the operator (at least) and other production personnel. If something is wrong — a truss has been bumped or a performer is out of position — the laser light must be terminated immediately. When the condition has been fixed, the laser light can continue.

SAFETY FOR PILOTS

ILDA is active in other areas of laser show safety as well.

For example, up until the mid-1990s, it was considered OK to aim lasers into the air for outdoor shows, as long as the beam power was below eye-hazard levels (e.g., to prevent pilot or passenger injuries.) Regulators were not aware of any other problems. But a series of pilot exposures to safe but bright laser light in Las Vegas caused a new look at these "visual interference hazards."

ILDA responded by working closely with pilots, regulators, and safety experts. By 2000, new regulations were in place that protected pilots from exposure to too-bright laser light while still allowing spectacular outdoor shows.

Since that time, we are not aware of any exposure to pilots caused by a regulated laser light show. All responsible laserists know to use spotters to avoid aircraft and, where required by law, how to file outdoor laser light show plans in advance with aviation authorities.

ILDA'S "LASERSHOW SAFETY - BASIC PRINCIPLES"

In 2014, there were some increased concerns about unsafe practices at a few shows. In response, ILDA developed a detailed set of 11 basic safety principles. We now require every ILDA Member to read, understand, and acknowledge them.

These principles, available at ilda.com/safety-basics.htm, are useful not only for our Members but for producers, clients, and laser equipment owners to also read and understand.

WHY USE AN ILDA MEMBER FOR SHOWS

ILDA is a leader in improving laser light show safety. While we do not supervise shows, we do recommend the use of ILDA Members who subscribe to the 11 basic safety principles. Plus, in case of any problem with a Member, whether over safety, business, or any other issue, we also have an Ethics Committee that can help solve violations of ILDA's safety principles, ILDA's Code of Ethics, and/or ILDA's Code of Business Practice.

More information about safety and ethics is available at ilda.com and at our special website lasershowssafety.info.

It is vital for the protection of the audience and the industry that laser shows are done legally and safely. If you are a producer, etc. and are not sure whether your laser provider is doing legal and safe shows, contact ILDA for more information and advice.



ILDA AWARDS: MEMORIES OF THE FIRST TEN YEARS

by Tim Walsh, Laser Spectacles Inc.



On August 15, 1986, a group of laserists came together under the provisional acronym LEP (Laser Entertainment Professionals) at a hotel in Lake Tahoe. At this meeting, a new organization was born: the International Laser Display Association, or ILDA.

At the next year's meeting in San Francisco, there was an informal viewing session to see various videotapes of laser shows. Afterwards, the decision was made to formalize some kind of ILDA Awards. John Goss of LaserMedia became the first Awards Chairman. The wheels were set in motion along with first committee members Steve Heminover (Aura Technologies), Aron Bacs (individual), and Andrea Cummings (Image Engineering.) Most viewing of lasers at this conference was in hotel rooms, which was fun in itself!





1988 - Atlanta, Georgia: The first Awards competition and ceremony, hosted by Stone Mountain Lasers. At Aron Bacs' urging, Steve Heminover stepped up to be Master of Ceremony for the ILDA Awards. At his girlfriend's urging, he wore a tuxedo. He looked so fine that ILDA President Joanne McCullough announced that from now on the ILDA Awards were to be "formal."

1989 - Seattle, Washington: The Awards this year, hosted by Floyd Rollefstad of Laser Fantasy International, was in a small dark room. Steve Heminover recalls that the Awards were 95% video projection, with one piece in laser: "Like finding water in a desert," he said. This was the first year of ILDA's highest honor, the Career Achievement Award, It went to the unanimous choice, Ivan Dryer, who invented the modern commercial laser show with Laserium. Another highlight was when LFI took attendees on out to the Grand Coulee Dam to see their newest and biggest show yet.

1990 - Bradenton, Florida: The Awards were overshadowed by the first LaseOff - a real laser party! Members who had brought equipment shared how they used the equipment with other members, and the beer was great! Also notable at this conference were the spectacular sunsets and the great Bishop Planetarium shows by our host, John O'Hare.

1991 - Los Angeles, California: The Awards were given a special twist by Steve Heminover in his role dressed as Captain Riker from *Star Trek: The Next Generation*. Host Ivan Dryer of Laser Images (Laserium) announced that Steve was called away at the last minute, but they were able to get Riker on short notice to present the ILDA Awards!

1992 - New York City, New York: We met in Manhattan thanks to host Dick Sandhaus of Science Faction Corp. This Awards showed some winners in laser as well as video. It was the first use of switch boxes to quickly change inputs to the lasers. Also, the new PCAOM modulator was introduced and discussed. It revolutionized shows by allowing precise color control within a laser graphic or effect.

1993 - Orlando, Florida: This was my first conference to bring a truckload of equipment to and provide lasers for the Awards, a commitment that I had made under ILDA President Steve Heminover's "Vision 21" initiative the year before. It was also the first conference where we used the de-facto standard of single laser producing white light, PCAOM modulation, and Cambridge 6800 scanners. Lightspeed Design brought a specially modified ADAT to play back their winning entries. The other inputs to the projector were Pangolin LD400, and Laser Images Choreographics. CNN came out to videotape the laser fun at the Awards and stayed afterwards to video the LaseOff until 2 AM. The hosts were Doug and Joanne McCullough of Audio Visual Imagineering.

1994 - Lincoln, Nebraska: Hosted by Jack Dunn of the Mueller Planetarium, once again we had a white light laser, PCAOM, and Cambridge scanners. My goal as the new Awards Chairman was to have more beams, so beam shows we had - notably "Vogue" by Laserpromotions B. V. Ton Timmerman brought his fiber attachment and a rear projection scrim, and we set up and targeted 16 mirrors for the show. I also brought out my cattle racks covered with mirrors and effects and rocked the house with "Drumbeams" MIDI-controlled mirror targeting.

1995 - Miami, Florida: My best personal memory of the 1995 Awards, hosted by Tom Harman of LaserNet, was that I set up a diffraction grating based beam sculpture over the diners during our dinner. This was the Awards that Lasersonics brought a bunch of (new) laser pointers too, and everyone bought one, it seemed; red beams were flying all over the place!

1996 - Burlington, Canada: This was our first conference outside of the U.S., so Team Canada was formed to usher in a new era for ILDA. This was also our first conference with audience scanning utilized when desired for the Awards and LaseOff!

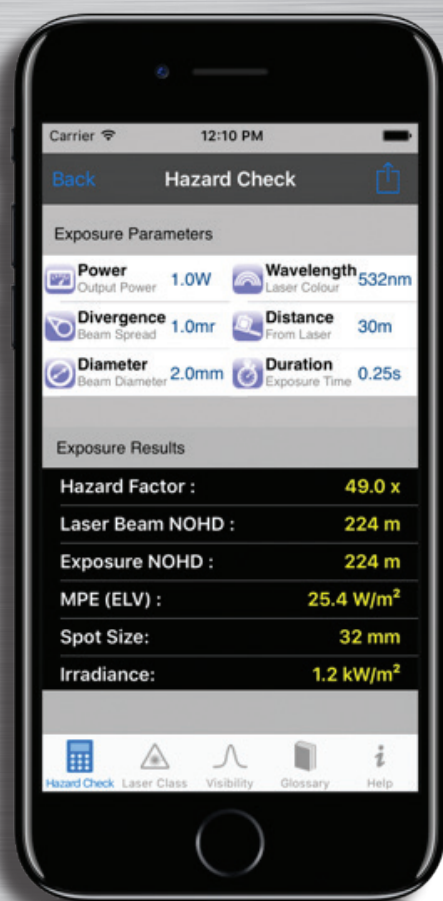
1997 - Lincoln, Nebraska: We went back to the Mueller Planetarium partially because the Nebraska beef tasted so good. At this conference, Melissa Chisholm stepped up and took over the setup from me. I could attend the meetings! The show ran very smoothly, and we had tons of material from members on ADAT to look at.

1998 - Amsterdam, Netherlands: ILDA finally crossed the Atlantic Ocean. Host ABC Laser Events welcomed many attendees from all over the world. We had wonderful audience scanning and a great many fabulous laser shows, still based on ADAT tape technology.

In preparing for this article I found videotapes with 1990s-era Award winners. We'll digitize these, upload them to ILDA's "ildalasershow" YouTube channel, and have an even better archive of how laser art and technology has improved over the years.

Whether on YouTube or in person at the ILDA Awards Banquet during our Annual Conference, ILDA's Awards remain an excellent way to see the world's best laser shows.





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AND CONVENIENTLY
ACCESS IMPORTANT
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INFORMATION, CHECK
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AND PREDICT
EXPOSURE POTENTIAL.



Laser safety expert James Stewart has just released new versions of the successful Laser Show Safety app, which first debuted in 2011. The latest versions have been rebuilt from the ground up to take advantage of the latest developments in mobile device technology. Having previously only been available to Apple users, the new releases now cater for owners of Android devices for the first time and is available in both the Apple App Store and through Google Play.

The app is appropriately named "Laser Show Safety." It is considered essential for any person working with laser show technology who wants to quickly and conveniently access important laser safety information, check hazard distances, and predict exposure potential.

Stewart explains that the original app was developed to provide himself with the convenience of performing what would otherwise be time-consuming calculations in the field, with just a few taps on a screen. The app was released, and after seeing how useful others have found it too, he wanted to add to its capabilities and make that convenience available to wider group with the release of an Android version as well.

The features in Laser Show Safety have been considerably expanded beyond the original laser exposure and hazard distance calculations to cover other areas of interest such as aircraft dazzle distances and skin MPE consideration. A new Toolbox feature adds features such as scan angle and beam divergence calculators, while the two-way irradiance to power converter is useful for comparing field measurements to the exposure limits. It is also now possible to print off a laser safety warning sign from within the app, while another new features includes a risk assessment wizard. The results and input parameters of any calculations can be emailed from the app, as was previously the case, but for added convenience, results can now be copied into other apps on the device. The calculations can be configured for both ANSI and IEC orientation, providing worldwide compatibility.

The range of reference information contained in Laser Show Safety has been expanded also to include details of safety features required by laser products, a revised and more in depth glossary, and a full explanation of each calculation's input parameters and the results that are produced.

Based in the United Kingdom, James Stewart combines his physics, engineering, and safety background with being a qualified laser safety expert that provides laser safety training, product assessment, audience scanning measurement, and installation safety checks.





On February 14, 2017, after 18 months of reconstruction, the Planetarium Hamburg reopened its doors again. Prominent people like Hamburg's first mayor Olaf Scholz and the Senator of Culture Dr. Carsten Brosda were invited to marvel at the inside of the planetarium. "We the people of Hamburg don't like to act up, but we like to have theaters. This beautiful old water tower is our biggest sky opera," stated Scholz. With a budget of almost 10 million Euros, the star theater has been completely modernized and equipped with the latest technology.

The centerpiece the laser and multimedia technology – was provided and installed by LOBO in record time just a few weeks before the reopening.

With one of the biggest and most modern show laser systems on the planet, LOBO is creating magical moments and an unforgettable 360-degree experience under the star dome. For one, this high-tech laser system consists of the optically pumped ultra-bright sparks® laser series – the brightest laser system on the planet.

With the laser modules in the basic colors, red, green, cyan, and blue, over 16 million colors can be generated by means of intelligent color mixing. Those modules are mounted in the sparks® PowerDeck and connected with the laser projectors inside the star dome via fiber optics.

The sparks® PowerDeck is a very special novelty – a laser light server that provides enough slots for up to eight optically pumped ultra bright sparks® laser modules. The common typical problem of dust contamination on the optics does not occur with the PowerDeck. This is because LOBO separated the air stream inside the PowerDeck (necessary for cooling the lasers) from the optical components. An additional benefit of the PowerDeck is the individual and easy extensibility. The PowerDeck works trouble-free from a room next door, leaving the sensitive dome acoustics void of distracting background noises. The special situation at the Planetarium Hamburg is that the size of the intended PowerDeck hosting room was quite small for the usual horizontal positioning of the device. Therefore, the ambitious LOBO engineers designed a frame that allowed a vertical positioning of the PowerDeck.

The sophisticated LOBO TriDome® system generates spectacular, high-precision and genuine 360-degree-real full-dome projections. This TriDome® system does not merely create less disturbing picture transitions, it also provides a highly increased show experience. The system consists of three laser projectors which are mounted at an angle of 120° with respect to each other at the horizon of the dome. With the application of a sophisticated, real time geometric correction and a new kind of digital projectors, this method is presently the only technical solution which offers the

necessary precision for seamlessly overlaying pictures of the star projectors as well as the All Dome video projection systems. In addition to that, the same projectors are in the position to generate impressive three-dimensional beam spectacles which transport the spectators into a world created by laser light.

"By means of the TriDome technology, coordinate systems become precise, i.e. matching to celestial bodies in form of a network of parallels and meridians displayed onto the dome. It is an ideal media for the training of astronavigation and for an educationally correct explanation of important motions of our earth in the universe. Scenes always dreamed of can be realized now – such as the view from the earth's core through a 'transparent earth.' The outlines of the continents and cities assigned to the corresponding zenith stars is projected absolutely matching with the stars of the Zeiss planetarium projectors and other full-dome projections. Everyone can imagine the enchanting scenes that can be created with laser graphics following the star constellations precisely, the supporting lines, and the stories of different constellations without appearing blurred or diffuse. This could be animated for children, theater performances, and for scientific simulations," said Thomas W. Kraupe, Consultant, Astrophysicist, and Director of Planetarium Hamburg.



This photo, of a different LaserNet production, shows similar beams and fireworks entertaining a large nighttime audience.

Editor's note: ILDA Member LaserNet submitted this account of their significant installation at a major Florida theme park. Due to the park's policy on publicity, The Laserist cannot mention the name of the park or the attraction, or include any photos taken in the park. However, the article does give insight into some of the many factors that go into creating a high-profile laser attraction.

We at LaserNet are proud to have developed and installed lasers for an end-of-the-day spectacular production that included fireworks, flames, fountains, and — of course — laser beams. The show was designed to help keep patrons in the theme park until closing time, starting in the summer of 2017 and continuing in subsequent summers.

The majority of the special effects are located on an island in the center of a lake. The primary audience was directly across from the center SFX island. The audience viewing area also extends 180 degrees around the lake on various walkways. We determined that it would require seven high-powered lasers to ensure that the entire audience was covered by laser beams. All lasers are located on the SFX island, behind a 3' high wall that hides the pyro and laser equipment. Due to the harsh summer environment, each laser is housed in an air-conditioned, all-weather housing. A slot was cut in the wall to allow beams to project out and over the heads of the audience.

Due to the proximity of the area's primary airport and the thick canopy of trees that surrounded the performance area, it was decided that all lasers would be terminated into the tree line or onto available structures within the area. We worked with the park's safety team to ensure all

lasers projections remained inside the park property. This was checked daily and was a success.

We originally demonstrated our 25W RGB lasers for the show, but the park had a very tight budget. It was at this moment that our "Made in America" 15-Watt lasers were born. Rather than lose the sale, we dialed down the lasers to 15W's and discovered that the brightness level was very acceptable for the show producers, and the lower price fit perfectly into their budgetary restrictions. Designed and built in-house, the 15W RGB ScannerPro features the latest in laser technology, with built-in FB4 network Pangolin control, LaserNet's solid state diodes, internal shutter, electronic scanner fail-safe, remote safety interlock, etc. This interfaced through our own SMPTE time code 1U rack-mount unit to the rest of the show SFX.

Another unique aspect to the installation is the distance from the projectors to the control booth. Fiber optics were utilized to connect the two positions as the main laser computer was located on the Island. Off-the-shelf interface devices were used to accomplish the task.

To complete the laser installation, we positioned six high output fog machines around the lake to provide additional atmosphere in the air to highlight the beams. Each unit is controlled by DMX to provide individual control. The operators can turn on the units that have the best effect, depending on wind direction that night.

The summer 2017 run was scheduled to run through mid-August but was held over through Labor Day due to popular demand.

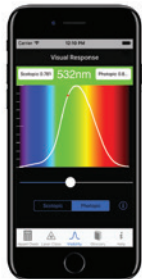
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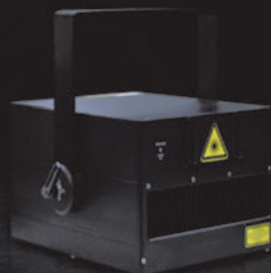
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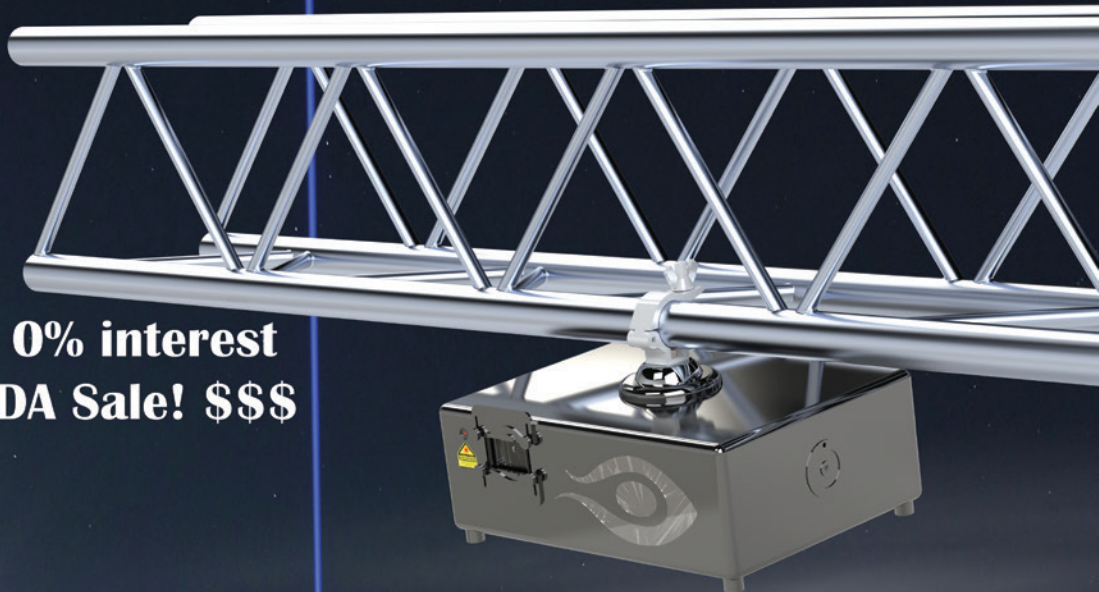
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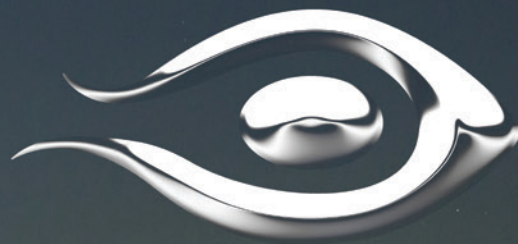
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