

L-ACOUSTICS SOUND SOLUTIONS

SPORTS FACILITIES

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## INTRODUCTION

When the founder of L-Acoustics, Dr. Christian Heil, invented the V-DOSC system – the very first line source system featuring the exclusive WST technology in 1992 – it revolutionized the professional audio industry.

Since 1984, a large body of theoretical research and experience is behind every system that L-Acoustics develops. Today, L-Acoustics sound systems are considered the #1 choice for energizing international events ranging from the Hollywood Bowl to the Olympics ceremonies, the FIFA World Cup and countless facilities worldwide.

As sports and entertainment business continue to converge, sports facilities are increasingly required to provide a level of excellence in sound reproduction equal to a live concert-like experience, by fans and advertisers alike. This sports facilities brochure presents a select number of sports facility challenges and solutions tackled by owners, consultants, engineers and contractors with L-Acoustics systems. From the early stages of design through to system commissioning, every sound system sports facility project presents its own unique set of objectives, challenges and constraints. With L-Acoustics, we always find the solution.

We look forward to delivering The Best Sound to your fans in fields, courts, and ice rinks across the planet!



Cédric Montrezor  
Director of Application, Install

**Photo Credits Cover**  
Top left: auf schalke stadium games germany/Joachim Birner  
Bottom left: Spaladium Arena, Croatia - Photo credit: Dicroic  
Bottom right: Shirlaine Forrest/Getty Images Entertainment/Getty Images





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*“L-Acoustics K2 is my preferred system for sports projects like the European Games because it allows for consistent horizontal pattern control, which is really important. It's the most consistent system I know of and the form factor of the cabinets also really suits this kind of arrangement.”*

Scott Willsallen, Sound Designer for the European Games Opening and Closing Ceremonies

# A PARTNER

## DELIVERING A CONCERT SOUND EXPERIENCE TO EVERY FAN

With a good sound system, everyone enjoys the show. L-Acoustics' number one goal is to create an unprecedented sonic experience for spectators, with easily reconfigurable and widely accepted sound systems. Combining breathtakingly high-impact sound reinforcement with stunningly pristine intelligibility, our systems deliver a truly immersive experience for sports fans as well as enhanced results for advertising partners. Our high-quality systems allow sports facilities to become truly multi-purpose venues, with the potential to create or enhance additional revenue streams.

How is this achievement possible? L-Acoustics has been designing reference line array systems for more than 20 years. Our exclusive technologies, providing enhanced directivity control, allow L-Acoustics to:

- provide consistent Sound Pressure Level, and sonic experience, to every audience member
- enhance the intelligibility of the system, ideal for spoken word messages
- provide enhanced zoning capabilities, optimizing acoustics and offering energy savings and flexibility in your system set-up.

L-Acoustics speakers focus all of their sonic energy on a particular segment of the audience. This allows an exceptionally coherent sonic signature in very long throw applications, beyond the limits of other systems.

▲ European Games 2015, Baku - Azerbaijan





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*“What I like most about L-Acoustics Soundvision is its accuracy in predicting actual performance of the sound system. We have not had a single instance where the predicted performance and measured performance were even moderately different, and this allows me to accurately design installation projects both for new construction and for building redesigns. It is obvious that L-Acoustics has mastered the science of prediction, and the fact that they have been so consistent over the years is a testament to their manufacturing precision.”*

*Deward Timothy, Poll Sound*

# SOUNDVISION

## 3D SOUND DESIGN

Soundvision supports sound designers to create acoustical and mechanical simulations of their L-Acoustics sound systems. The first 3D sound design program capable of operating in real time, Soundvision allows designers to draw audience zones manually, import them from CAD files or upload them from the L-Acoustics online database of the world's most renowned venues. Placing loudspeakers in the simulation is rapidly done, and Soundvision automatically calculates impact coverage and SPL mapping, including subs. System time alignment of multiple loudspeakers or arrays can be visualized using delay mode. Soundvision provides mechanical data with detailed set-up information for installers and riggers.

Advanced features include cardioid array modeling tools, contour EQ modeling tools and a response curve display tool that features adjustable target curve and post-processing options.



*L-Acoustics can provide electro-acoustic modules to offer compatibility with third party acoustical software.*





# IMPROVING INTELLIGIBILITY

FREEMAN COLISEUM IN TEXAS, USA      9,800 (Basketball) - 11,700 (Boxing) seats

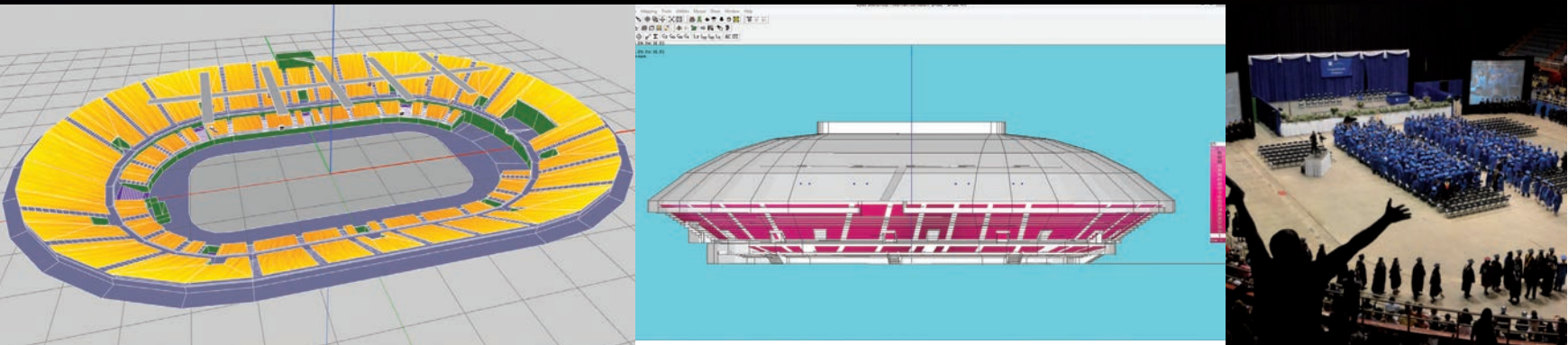
The sound system of San Antonio’s Freeman Coliseum is frequently called upon to provide speech reinforcement for graduation ceremonies, corporate functions and other similar events. As part of a multi-year initiative to update the venue, Bexar County and the facility’s management team decided to replace the old system to improve intelligibility.

The decision was made to replace the sound system entirely. The improved sound could be heard and measured with an onsite evaluation. It was also the most cost-effective solution. An L-Acoustics WST constant curvature line source was chosen for its high control of directivity preventing the spill of acoustic energy onto reflective surfaces.

“I was told that an L-Acoustics solution would sound at least ten times better than what we had been using. Once the team had performed the installation, I had to admit that they were right. The sound is absolutely spectacular.”

Derrick Howard, Executive Director Freeman Coliseum

After system commissioning, the intelligibility of the hall measured (according to the Speech Transmission Index value) reached between 0.70 to 0.82 per cluster, with an overall value of around 0.60, greatly improving the overall intelligibility of the system. These measurements were identical to those predicted by the acoustical simulation software.



| EQUIPMENT LIST |            |         |         |
|----------------|------------|---------|---------|
| 40 x ARCS WiFo | 16 x SB18i | 6 x LA8 | 2 x LA4 |





# OPTIMIZING COVERAGE

REWIRPOWERSTADION IN BOCHUM, GERMANY

29,448 seats

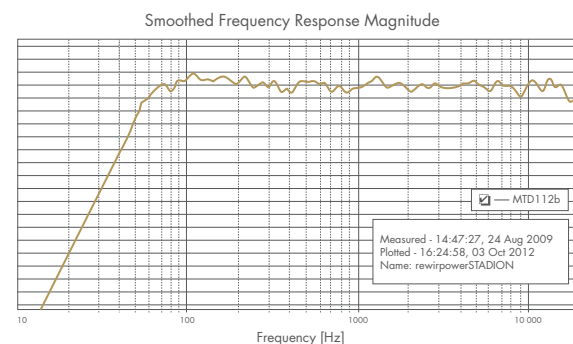
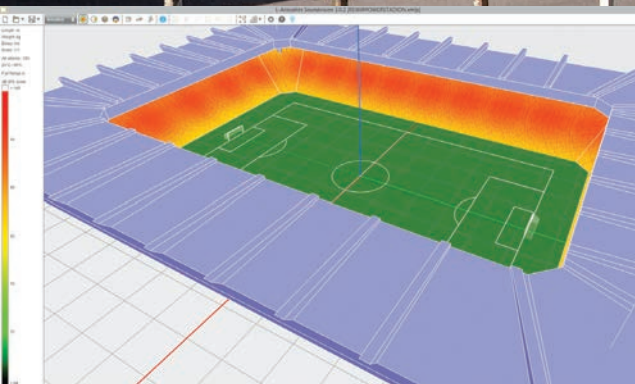
Prior to its renovation for the 2006 Soccer World Cup, rewirpowerSTADION was equipped with a 100V traditional sound system which delivered an uneven audience coverage and reduced bandwidth. As a result, the impact of music and advertising announcements on spectators were limited, and many spectators were “left out” of the show in zones where sound coverage was poor.

The sound system (designed by the consultant) was based on a distributed L-Acoustics coaxial system. This solution was technically validated by the client during a shootout session. A total of 40 MTD112b and 22 MTD115b were deployed to ensure the complete coverage of the audience in both the upper and lower tiers, respectively.

“The L-Acoustics system of distributed coaxial enclosures covers the stadium with breathtaking sound and even SPL”

Guido Kacher, [www.soniek.com](http://www.soniek.com), Bamberg

The new system measurements showed that a smooth SPL coverage within +/- 3dB was achieved throughout the audience and a bandwidth of 80 Hz to 16 KHz, at an exceptional price/performance ratio.

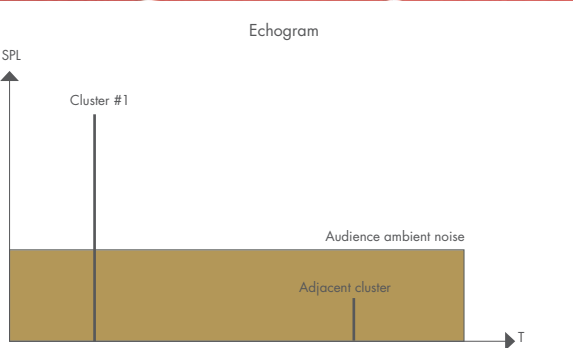


## EQUIPMENT LIST

40 x MTD112b

22 x MTD115b





# REDUCING ECHOES

## NAGAI STADIUM IN OSAKA, JAPAN

50,000 seats

A new PA system was required to reproduce music programs at the Nagai Stadium with an extended frequency range and a high SPL. The consultant had to find a balance between preserving the musicality of the system and maintaining the intelligibility necessary for announcements. Echoes created by the selected multi-cluster approach had to be minimized.

The distributed design was deployed with ARCS constant curvature enclosures arranged in horizontal arrays (due to the fact that widely distributed vertical arrays tend to generate echoes). This WST system features a razor sharp directivity in the horizontal plane, thus creating audience sectors acoustically distinct from each other.

“The L-Acoustics system delivers outstanding performance in terms of intelligibility, SPL and coverage.”

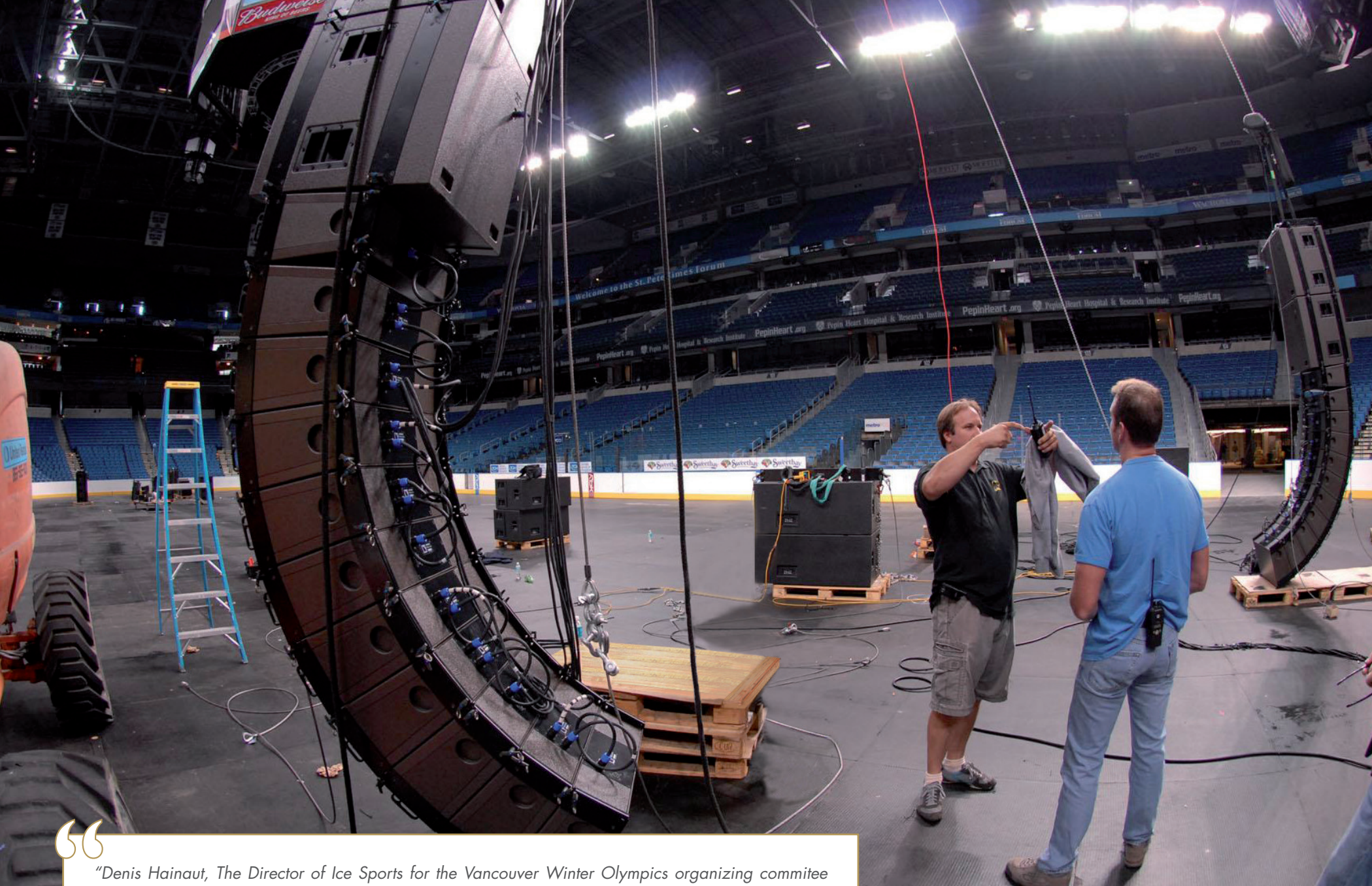
Yoshiteru Mimura, ARCHITO Co, Japan

At a throw distance of 50m, the ARCS system distributed in arrays of 3-4 enclosures yields a consistent, cost effective coverage with early and late interferences reduced to minimum. The system combines intelligibility, musicality and clarity.

### EQUIPMENT LIST

|              |            |           |               |
|--------------|------------|-----------|---------------|
| 24 x dV-DOSC | 8 x dV-SUB | 52 x ARCS | 19 x MTD 115b |
|--------------|------------|-----------|---------------|





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*“Denis Hainaut, The Director of Ice Sports for the Vancouver Winter Olympics organizing committee listened for a while, looked at me and said, ‘I’ve never heard anything sound so good in an arena.’”*

John Riley, Chief Audio Technician, Canucks Sports and Entertainment, Canada

# CERTIFIED PARTNERS

## A NETWORK OF CERTIFIED SYSTEM INTEGRATORS

L-Acoustics carefully selects certified system integrators. Our System Integrator Charter outlines three key commitments:

- tailored services from specification to post-integration stage
- adoption of recommended technical standards to ensure the consistency and predictability of performance and operational safety of the sound system
- in-house trained personnel on multiple aspects of integration of L-Acoustics sound systems.

L-Acoustics certifies its system integrators with official training seminars. Technical and engineering personnel are trained on theory, sound design, system set-up and rigging procedures for all systems.

## STANDING BEHIND EACH PROJECT

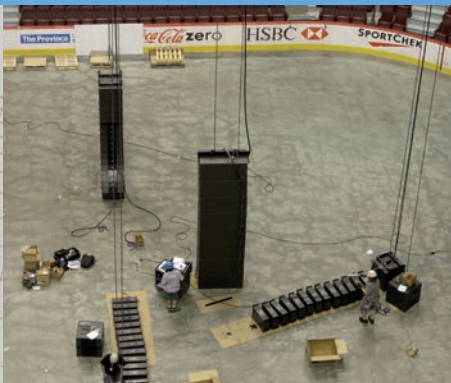
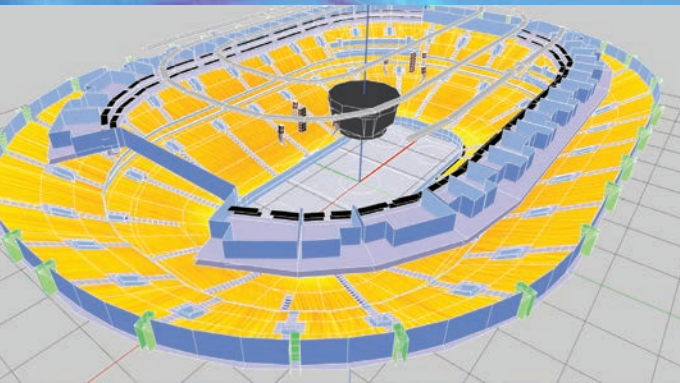
L-Acoustics stands behind the integrators and the consultants for every single installation project, from project analysis, system specification, engineering, integration, commissioning and maintenance services ensuring that the system will work at its best. L-Acoustics clients’ benefit from dedicated manufacturer support. Sports facilities can expect the highest quality of service, whether the project is design built by an integrator or specified by a consultant and awarded through a bidding process.

## STREAMLINED INTEGRATION

With 30 years of designing touring systems, L-Acoustics manufactures turnkey sound systems with an integrated rigging approach. No custom rigging is required to install an L-Acoustics sound system, which dramatically reduces design and installation time. L-Acoustics amplified controllers provide an EQ station, control and monitoring, DSP processing, and limiters all in one package, providing a full plug and play system for straightforward integration.

▲ The installation of the sound system at Amalie Arena could be completed in three days to meet busy sports facility calendars, with amazing results.





# MEETING SHORT DEADLINES

ROGERS ARENA IN VANCOUVER, CANADA

18,890 seats

The installation at Rogers Arena needed to be set up within an extremely tight deadline, just prior to the start of Vancouver’s NHL season home opener. It also had to be agile enough to cover a planned architectural expansion to host the forthcoming 2010 Winter Olympics Ice Hockey games.

Soundvision allowed the system rigging to be implemented and fully documented ahead of time. At the same time the system was zoned to provide coverage for the new press box seating and Olympic expansion zones.

*“The scheduling for the sound upgrade was complicated by a ten day Janet Jackson tour event. We had a very small window to install the system, and it went like clockwork.”*

John Riley, Chief Audio Technician,  
Canucks Sports and Entertainment, Canada

System tuning and alignment using the advanced preset library was incredibly fast using LA8 controlled amplifiers and LA Network Manager software. The System (rigging, cabling, amp racks) was installed over a three day period. System commissioning on day four was completed in time for the NHL Season opener, and the results were amazing. The new system provided a high level of impact suitable for sports as well as multi-use events.

## EQUIPMENT LIST

|              |             |           |          |
|--------------|-------------|-----------|----------|
| 78 x dV-DOSC | 12 x dV-SUB | 16 x SB28 | 23 x LA8 |
|--------------|-------------|-----------|----------|





# SCOREBOARD REMOTE COVERAGE

SPALADIUM ARENA IN SPLIT, CROATIA

12,000 seats

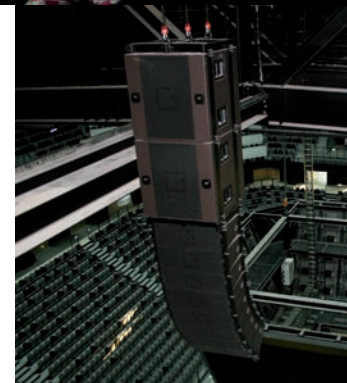
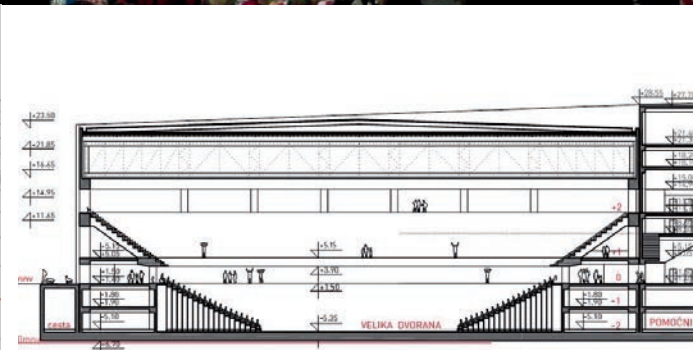
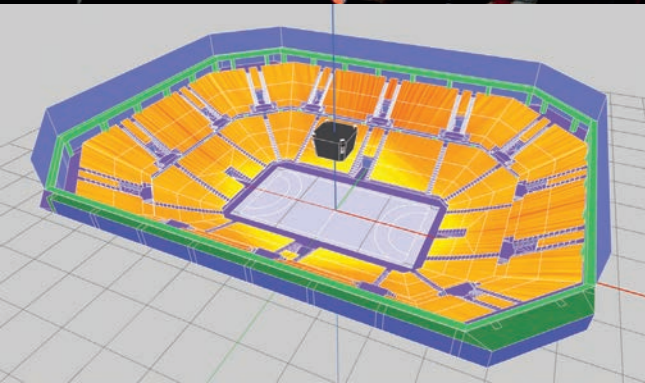
Opened in time for the 2009 Handball World Championships, the Spaladium Arena had to meet a tight installation budget. The sound system needed to be located in a single location in order to optimize the building infrastructure in terms of signal distribution, mechanical rigging and electrical power. The design called for a compact, lightweight central, long-throw scoreboard sound system with high SPL and intelligibility.

The sound system is based on four cardinal arrays (E-W-N-S) of 9 dV-DOSC and 2 dV-SUBS (delivering LF frequency extension) flown around the scoreboard. An additional array of 9 dV-DOSC enclosures is rigged underneath the LED cube, covering the playing field. The amplified controllers are located in the grill, just above the PA. The weight does not exceed 400 kg per cluster.

“The audience and field are 100% covered and speech intelligibility is excellent. At all measuring points, the PEAK SPL was 111 dB, within 1 dB. I believe we have designed the best arena sound system in Croatia.”

Slaven Tahirbegovic, Dicroic, Croatia

The long throw capability of the L-Acoustics WST variable curvature system allows the sound system to deliver a peak SPL of 111 dB on average across the entire audience for a bandwidth of 50 to 20 KHz. This is perfectly executed, with the audience areas and areas of play covered 100%, and excellent speech intelligibility in both areas.



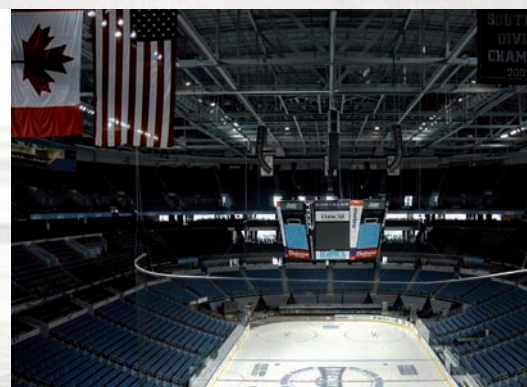
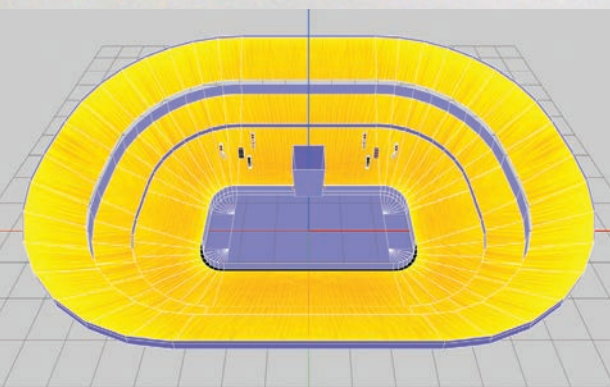
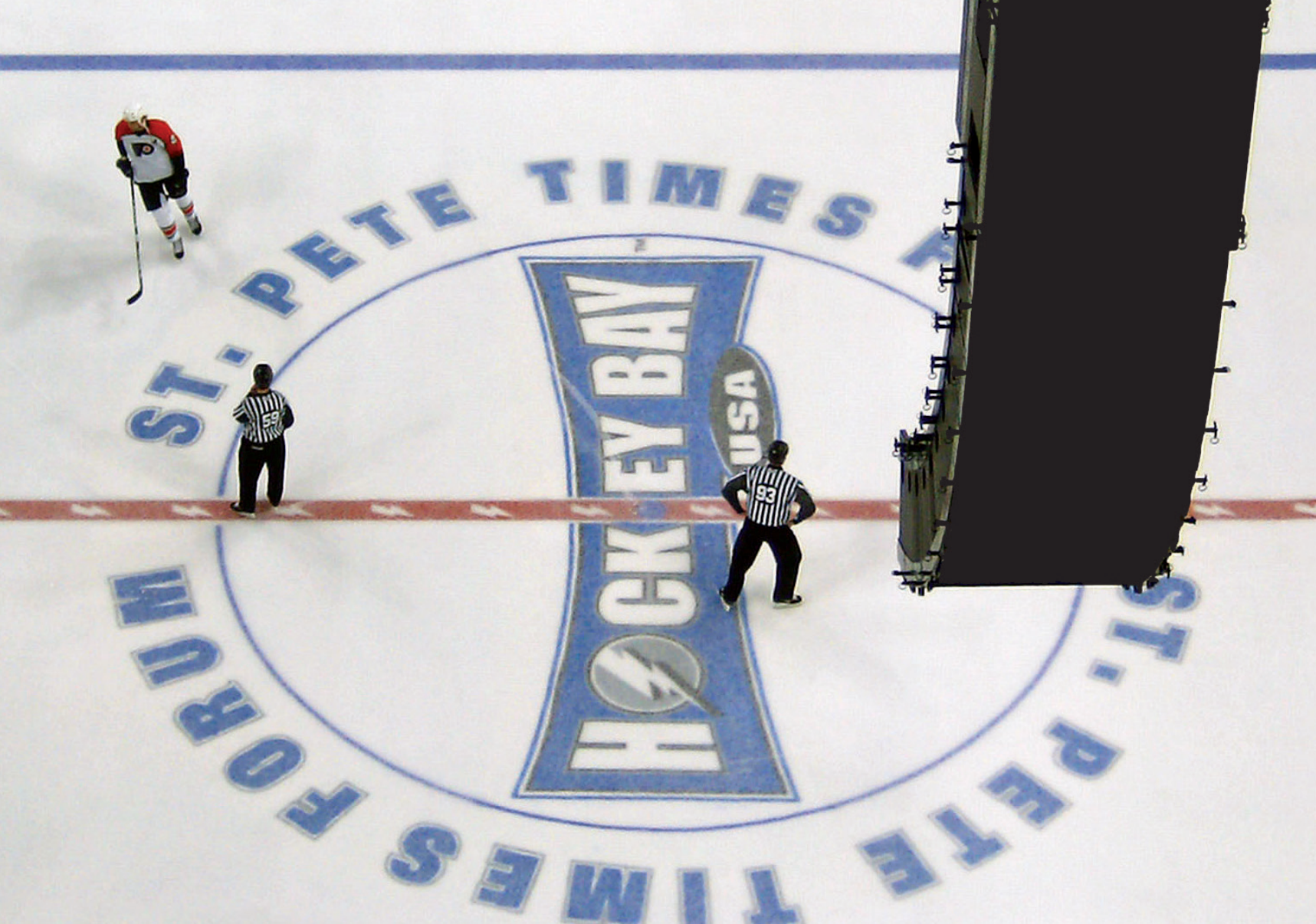
## EQUIPMENT LIST

45 x dV-DOSC

8 x dV-SUB

10 x LA8





# SPECTATOR IMMERSION

AMALIE ARENA IN FLORIDA, USA

20,000 seats

To engage spectators more closely in the action of the games on the ice rink at Amalie Arena, reproducing the sound of the stick hitting the puck. It had to overcome the difficulty of the relationship between the placement of microphones on the glass which needs to pick up the sounds of the game but not the PA system.

DV-DOSC and ARCS deployment ensured accurate coverage from the glass up to the top tier seating, and razor sharp vertical control to fulfill the design objective. ARCS were used under the scoreboard to supply high impact sound to the players on the ice surface. DV-SUB was added to the 6 main arrays with 2 x 4 SB218 additional subwoofers for enhanced low frequency extension and impact.

*"I pointed out the difference in the pattern control between L-Acoustics and other manufacturers. Keeping the audio out of the broadcast and ice rink mics on the glass was essential to achieve gain before-feedback."*

Charlie Lawson, formerly Director of Audio, AVI-SPL, USA

The system was implemented following the Soundvision model. It produced extremely even coverage and the performance upgrade overall was dramatic. No delays were required, and the system was completely turnkey.

## EQUIPMENT LIST

66 x dV-DOSC

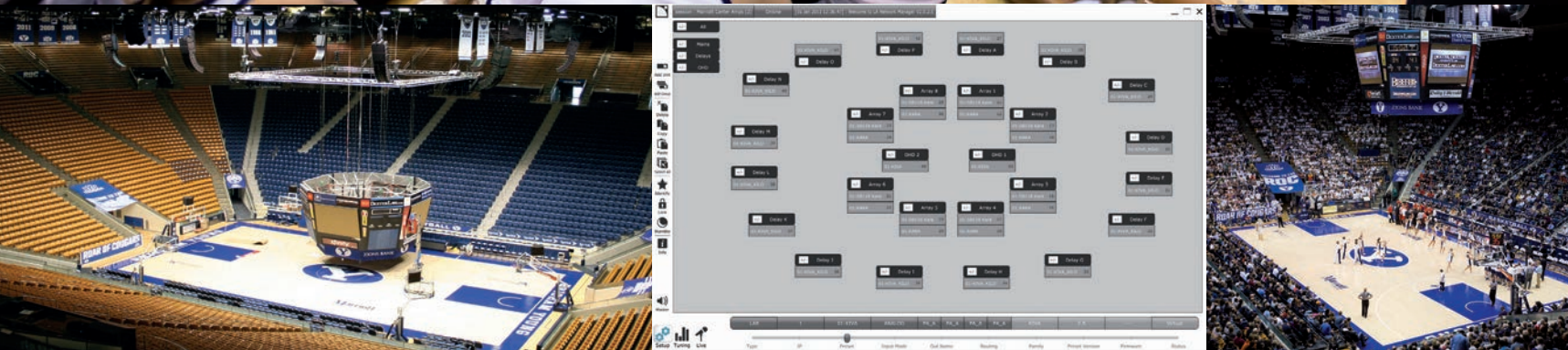
12 x dV-SUB

8 x SB218

4 x ARCS

36 x LA48a





# MULTI-USE FACILITY

BYU MARRIOTT CENTER IN UTAH, USA

20,900 seats

The BYU Marriott Center is a multi-use facility hosting NCAA Division 1 Basketball, convocations and devotional services and fine arts department productions. The sound system had to be fully configurable both mechanically and in terms of DSP control over a network connection.

The system design provided 32 Kara elements for the flexible arrays, and 32 Karai elements for the fixed arrays. Up to 32 elements can be arrayed for proscenium stage setup in 180 degree coverage, or split into smaller arrays as needed.



*"The marriott center hosts something different every day, so we needed a very versatile system that could handle all those different types of events."*

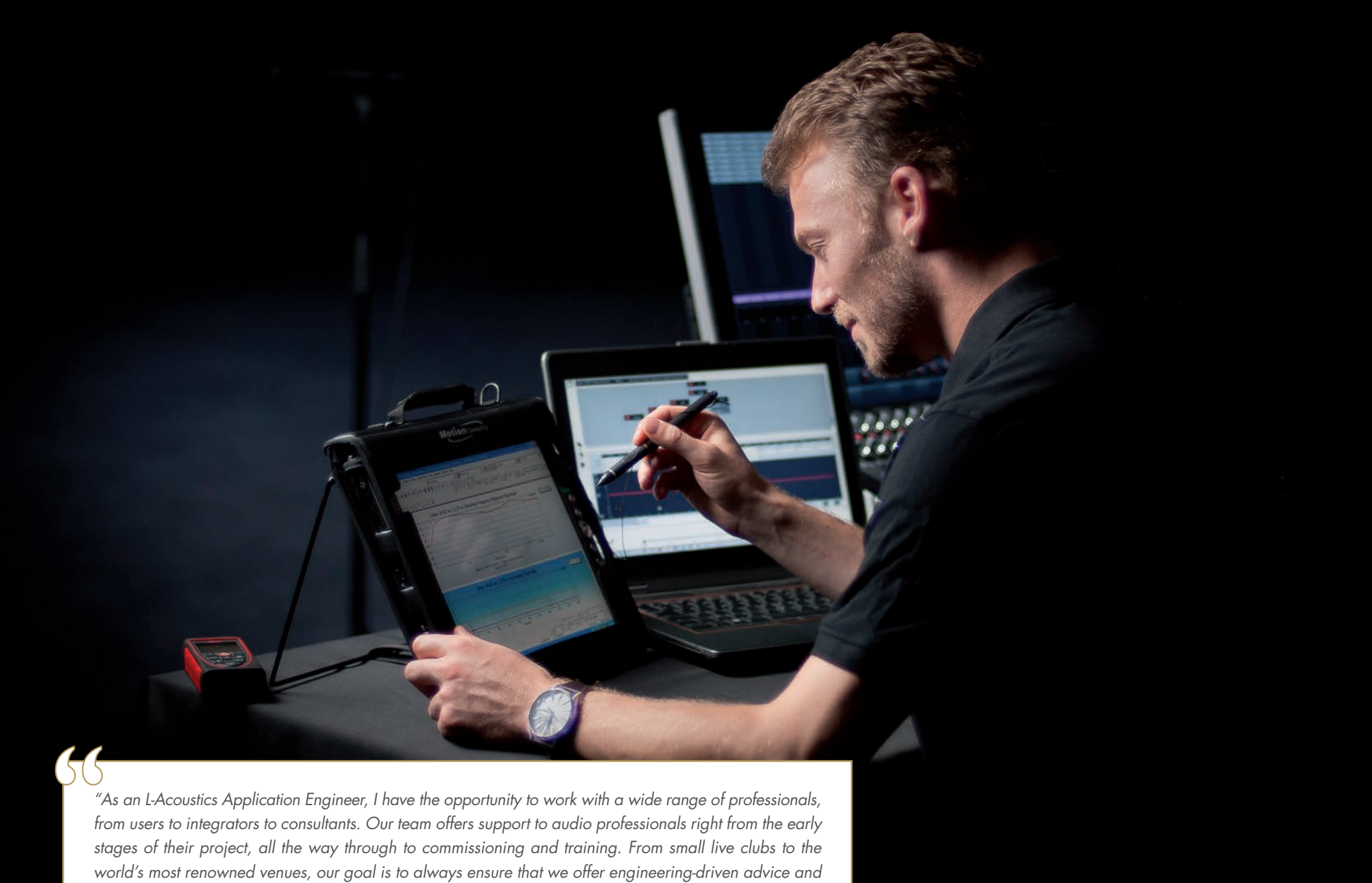
Brad Streeter, Multimedia Engineer & Installation Project Manager, BYU

The system is extremely accurate. Using the Kara and Karai offers a complete flexible multi-use system which is completely configurable. The entire top tier can be zoned on/off using the Kiva system and additional Kiva arrays in waterfall configuration offering complete, effective floor coverage.

## EQUIPMENT LIST

|           |            |           |           |          |
|-----------|------------|-----------|-----------|----------|
| 32 x Kara | 32 x Karai | 90 x Kiva | 18 x Kilo | 8 x SB18 |
| 8 x SB18i | 16 x LA8   | 16 x LA4  |           |          |





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“As an L-Acoustics Application Engineer, I have the opportunity to work with a wide range of professionals, from users to integrators to consultants. Our team offers support to audio professionals right from the early stages of their project, all the way through to commissioning and training. From small live clubs to the world’s most renowned venues, our goal is to always ensure that we offer engineering-driven advice and expertise to attain the optimum sound solution for each individual project.”

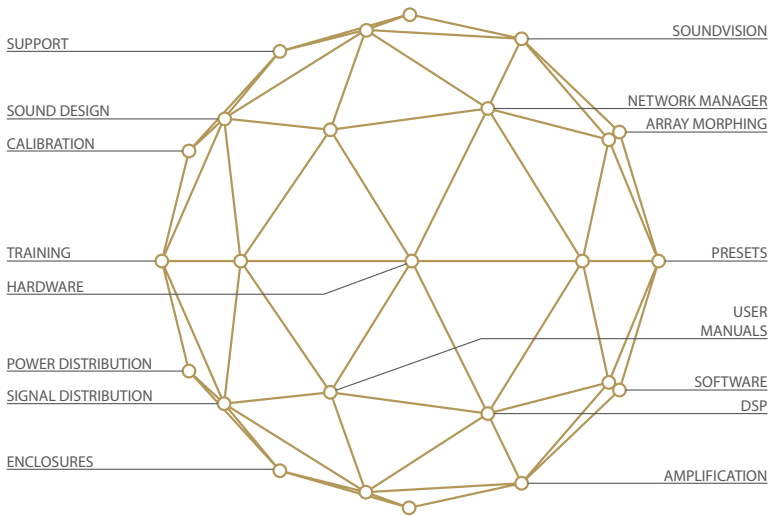
Julien Laval, Application Engineer Install at L-Acoustics

# SERVICES

## EDUCATION AND SUPPORT

L-Acoustics’ total system approach to sound goes beyond hardware and software. We offer training, show assistance, design support and on-site tuning and calibration for rental providers and system integrators. Our in-house engineers and certified consultants have been carefully selected for their skills and professional experience in the audio industry.

From basic technical and operational knowledge of L-Acoustics systems, through to providing full certification as a System Engineer, our clients will always get the best out of their L-Acoustics systems.





# REFERENCES

|                          |                        |                                |                        |
|--------------------------|------------------------|--------------------------------|------------------------|
| Grande Halle             | Albertville, France    | Olympiahalle                   | Munich, Germany        |
| Amalie Arena             | Tampa - FL             | Ostseestadion                  | Rostock, Germany       |
| BYU Marriott Center      | Provo - UT             | Piscine du Stade Louis II      | Monte-Carlo, Monaco    |
| Chicago State University | Chicago - IL           | Poprad Aquapark                | Poprad, Slovakia       |
| Esbjerg Gymnasium        | Esbjerg, Denmark       | Prima Skonto Sport Hall        | Riga, Estonia          |
| EWS Arena                | Göppingen, Germany     | Rewirpowerstadion              | Bochum, Germany        |
| FC bayern Lounge         | Munich, Germany        | Rogers Arena                   | Vancouver, Canada      |
| Freeman Coliseum         | San Antonio, TX        | Roller Skate Hall              | Basel, Switzerland     |
| Grand Canyon University  | Phoenix, AZ            | Spaladium Arena                | Split, Croatia         |
| Halle des Sports         | Niort, France          | Sports Arena                   | Växjö, Sweden          |
| Hellerup Gymnasium       | Hellerup, Denmark      | Sport Club Pohoda              | Podoha, Czech Republic |
| Ice Hockey Hall          | Kondupoga, Russia      | Sports Hall Landhaus           | Teufen, Switzerland    |
| Jobing.com Arena         | Glendale - AZ          | Sports Palace                  | Minsk, Belarus         |
| Kantonsschule Gymnasium  | St Gallen, Switzerland | Sport Venue of Kemerovo        | Kemerovo, Russia       |
| KB Indoor Sports Stadium | Copenhagen, Denmark    | Telenor Arena                  | Oslo, Norway           |
| Kemerovo Sports Venue    | Kemerovo, Russia       | Tikkurila Arena                | Vantaa, Finland        |
| Minsk-Arena Project      | Minsk, Belarus         | Toyota Center                  | Houston, TX            |
| Meriadeck Ice Rink       | Bordeaux, France       | Vikingskipet Olympic Stadium   | Hamar, Norway          |
| Nagai Stadium            | Osaka, Japan           | Volleyball Sports Center Iskra | Odintsovo, Russia      |
| Nakayama Race Course     | Nakayama, Japan        | Žatika Arena                   | Porec, Croatia         |

## Photo Credits

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