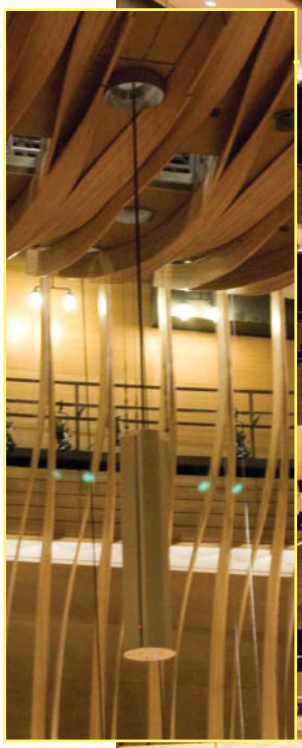
The Royal Conservatory Of Music's Koerner Hall

BY ANDREW KING • PHOTOS BY LANA BUTLER



Named in honour of donors Michael and Sonja Koerner, Koerner Hall is a newly-opened 1,140-seat performance space in Toronto's TELUS Centre For Performance And Learning, home of the Royal Conservatory Of Music. Considering it's housed within the headquarters of what's arguably the most respected musical body in the country, the hall's appeal to musicians is certainly inherent. Add to that its world-class N1 acoustic rating, back-of-house areas for performers, and a $1-million collection of antique musical instruments bestowed on the hall by its namesake donors, and you're left with a space that beckons even the finest performers from around the world.

Considering the calibre of acts that the venue has already begun to attract (opening week performers included the trio of Chick Corea, Stanley Clarke, and Lenny White, as well as Bela Fleck, Keb' Mo', and the duo of Ravi and Anoushka Shankar), not to mention its breathtaking architecture, the centre is likely just as appealing to the general music-appreciating public.

This is *Professional Sound*, though, and we wouldn't be profiling such a space – regardless of its meaning to the masses – were there not a certain appeal to audio enthusiasts as well.

Introduction

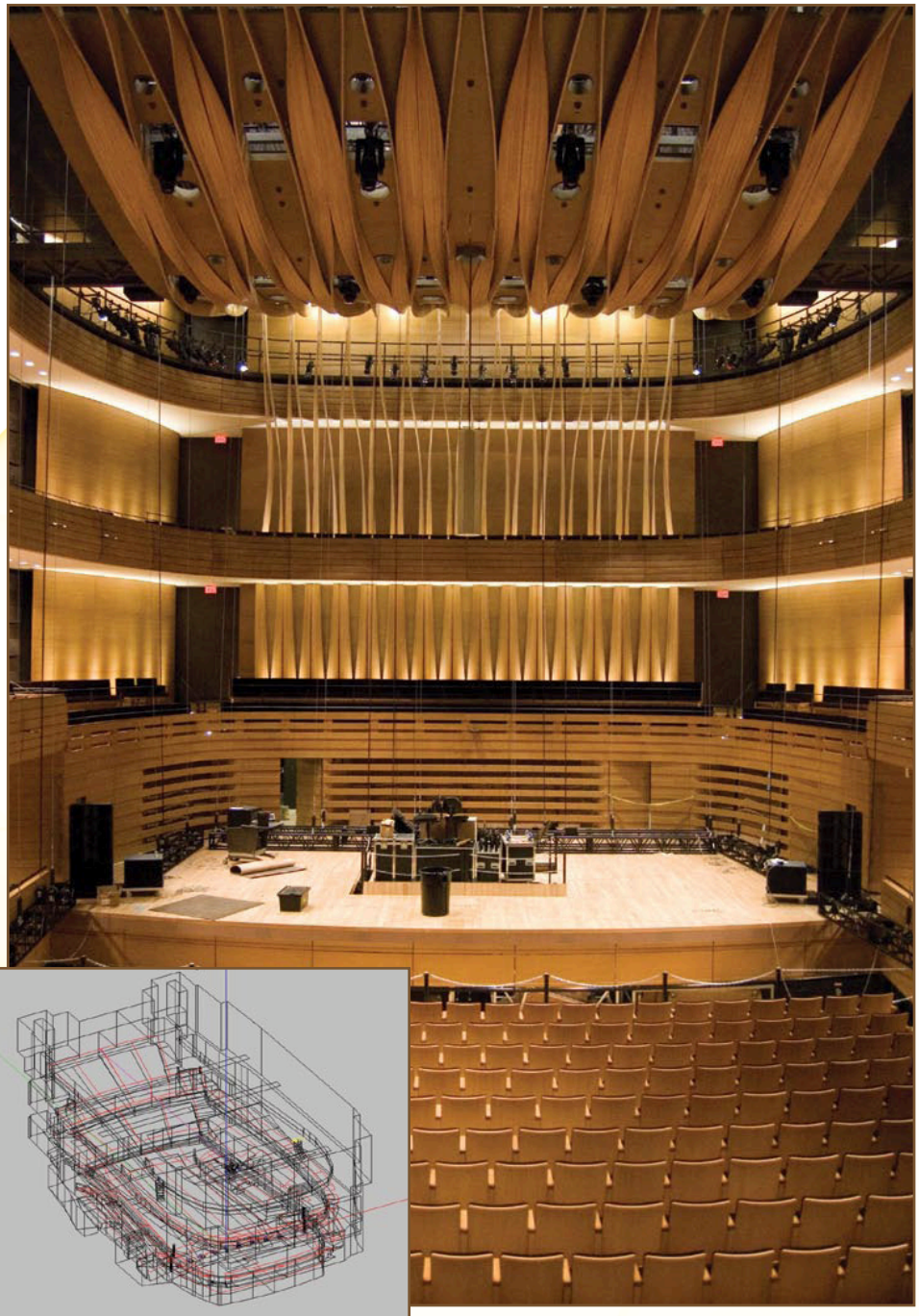
Toronto's Engineering Harmonics (EH) was brought into the Koerner Hall project as a subcontractor under acoustician Bob Essert, Founder of the UK's Sound Space Design and one of the world's most reputable in his field. As such, Engineering Harmonics played a major role in the project, from its inception through to the room's tuning, and finally the design, implementation, and testing of its sound reinforcement solutions.

Phil Giddings, President of Engineering Harmonics, says that his firm was initially contacted about the project in 2003. Giddings and EH's team worked closely with Toronto's KPMB Architects to transform the client's vision into a tangible piece of architectural and electro-acoustical mastery.

"It can be difficult with a client like this as, at the beginning, you're talking to people who have a vision for a building, but not necessarily the technical people who will be running it," says EH Head of Design, Martin Van Dijk of the project's birth. "Our job, of course, is to interpret that vision and those objectives into something that's tangible for the technicians and operators."

That vision was essentially a performance space that sounded as good as it looked, with a sound reinforcement system that works with the room's natural acoustics – not against them – to bring an organic sound from the stage to the seats. Of course, given the hall's architectural artistry, that sound system needed to be totally discrete and unobtrusive.

Despite a few interruptions in the project's development from its inception in 2003 to its opening in late September 2009, the project's renaissance came earlier this year, and it was May 2009 when David VanVeldhuisen and his team from Westbury National Show Systems were able to get the audio installation underway.



LEFT: KOERNER HALL FROM THE STAGE WITH RENKUS-HEINZ VOICE LIFT SYSTEM SUSPENDED IN THE CENTRE.
INSET ABOVE: WIREFRAME IMAGE COURTESY OF ENGINEERING HARMONICS.
ABOVE: (L-R) DAVE RAHN, RENKUS-HEINZ NORTH AMERICAN MANAGER; PHIL GIDDINGS, PRESIDENT OF ENGINEERING HARMONICS; DAVID VANVELDHUISEN, PROJECT MANAGER, WESTBURY NATIONAL SHOW SYSTEMS; JEFF BAMFORD, EH DESIGNER AND EASE ACOUSTICAL MODELER. PHOTO BY BILL COONS.

For The Audience...

Malcolm Harris is Koerner Hall's new Production Manager, joining the project in April 2009. He describes how the space and its sound system will benefit visiting concertgoers and performers alike.

"We had a small baroque ensemble onstage for our first 'test,' and I was really impressed with the clarity (of the voice lift system), both in the top and bottom of the range. The reverb has such a beautiful, smooth decay due to the materials used in the interior finishes.

Koerner Hall is designed primarily for recitals, but will also be used for jazz, pop, and rock concerts. The intimate design puts all seats in close proximity to the stage. The building itself is such a beautiful blend of the old RCM building and the new Koerner Hall, so architecturally, it's a treat even before you sit down. The hall wins over many of our artists from the moment they walk in, and that makes my job a little easier."

Koerner Hall

Exposition

Van Dijk and a former colleague at Engineering Harmonics looked at a number of ways to approach the hall's sound reinforcement system. What's been dubbed the hall's voice lift system is a permanently-installed PA that's interweaved with the hall's architecture to keep aesthetic intrusion to a minimum. For that system, Van Dijk entered into discussions with Renkus-Heinz about its ICONYX steerable DSP columns.

For similar projects in the past, Van Dijk had been using products from another manufacturer, which he describes as similar to the Renkus-Heinz equipment but not as evolved as a performance product. "It was more for paging systems, and lacked the finesse of a typical performance system," he says.

Renkus-Heinz began designing a product suitable for such an install, and once they'd created something that met the needs of Van Dijk and others like him, Engineering Harmonics set up a test bed at Toronto's Roy Thomson Hall.

"I really wanted to understand the technology – what it can do and what it can't, considering the physics behind it," says Van Dijk. "I like to see things in practice to see what you actually end up with in reality." In reality, the results must've been quite appealing, as after a few additional tweaks, Van Dijk determined that he'd found the ideal solution for the client.

With an acoustician like Bob Essert working on the project, says Van Dijk, the initial electro-acoustic models of the space are reliably accurate. "If they're telling you about reflections in certain locations, you'll find that when you actually measure them, that's what you have. This makes it easy to predict how the loudspeaker will behave in those areas."

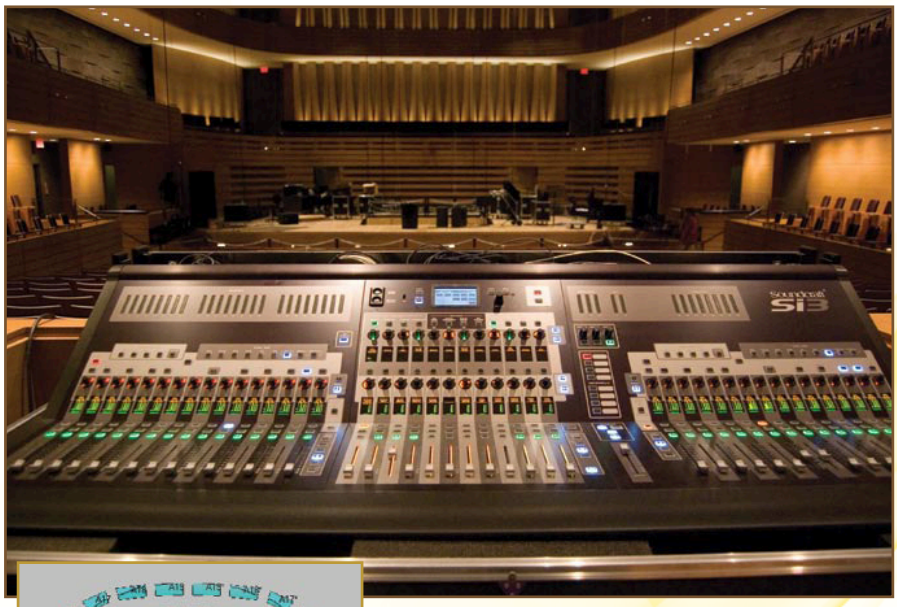
The test at Roy Thomson Hall made it clear that Renkus-Heinz could meet the venue's objectives. "We went ahead with that design based on the product. The company was certainly committed." So committed, in fact, that co-namesake Ralph Heinz joined Van Dijk during the testing, which provided both companies with information about how the product would behave in such environments.

The proposed solution, currently occupying the venue, is a combination of a centre-flown array of three ICONYX IC16R speakers that covers a 360-degree pattern, hidden above the canopy ceiling and flown in when needed. Two ICONYX IC16R speakers concealed in the left and right walls at stage level supplement the overhead enclosures.

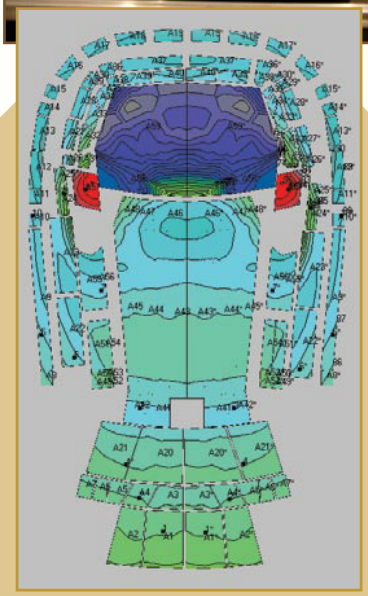
The ICONYX drivers are all individually steerable via Renkus-Heinz' RHAON DSP platform, offering an impeccable amount of control over where sound is being directed – a level of control that's vital in order to properly complement the room's natural acoustics. RHAON also offers active amplifier monitoring, complete with an event log of component performance.

Explains Van Dijk: "We're able to steer some energy to areas that were beneficial with regards to acoustics and reflection in the hall. There's a lot of time alignment and equalization to adjust so that the audience isn't necessarily listening to a loudspeaker system; they're listening to a slightly-lifted sound of increased intelligibility that's coming from the stage."

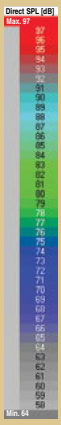
In summation, he says: "The idea is not to overpower, but enhance what's naturally coming from the stage." While this level of directivity usually translates into a large system, the ICONYX arrays virtually look like pencils in the room, offering that directionality in a discrete package.



ABOVE: SOUNDCRAFT SI3 CONSOLE AT MIX POSITION.



Doing It With EASE



This is an EASE model of the Renkus-Heinz voice lift system's performance at 2,000 Hz, courtesy of Engineering Harmonics. There's a reduction in gain of nearly 30dB on the stage vs. the front rows, which allows for good gain-before-feedback onstage. Notice the minimal variation in SPL from the front of the room to the back, as well as the consistent coverage from side-to-side. The SPLs around the hall and around to the back of the stage are consistent - an accomplishment of the system's 360-degree design.

Development

Considering the fact that Koerner Hall is a multi-purpose and multi-functional facility, it boasts several features that add to its chameleon-like ability to welcome performers of a more amplified ilk. The hall features adjustable acoustics with an automated curtain system that allows for quick and repeatable acoustic changes, taking the hall's reverb time down from full to totally dead in minutes.

For non-acoustic acts that do take advantage of amplification and monitoring, the venue is armed with an additional PA, which the project's collaborators call the pop system. "That system," explains Van Dijk, "is deployed for amplified music on the stage, when monitors would be required – more of a typical system for typical scenarios."

The pop system is a JBL solution, comprised of a centre-flown array of eight Vertec VT4887A speakers and two hung Vertec VT4881A subwoofers. Those woofers, says Van Dijk, are yet another unique aspect of Koerner Hall. "We couldn't place the subwoofers where we wanted them for both the pop array and voice lift system," he explains. To compensate, the subs are inverted and hanging in the canopy – a solution Van Dijk feels works quite well.

The centre line array is also hidden above the canopy ceiling and flown when needed. This is supplemented by a left and right ground stack consisting of four VT4887ADP powered boxes and a pair of VT4881ADP powered subs on each side of the stage, which can be assembled and rolled in when needed.

Both the voice and pop systems are rounded out by a stage front fill consisting of seven concealed Renkus-Heinz SGX41 speakers in the front of

the stage, seven concealed SGX41 in the front of the stage lift, and seven additional speakers that can be mounted on the pit railing. These can be utilized for the various configurations of the stage set-up. There is also a set of Renkus-Heinz SGX121s mounted in the catwalk system to provide over-balcony fill, and a set of Tannoy CMS401es mounted in the ceiling of the lowest level to provide under-balcony fill.

A slew of Crown equipment supplies power to the units that require amplification. The audio system is controlled by a BSS Soundweb BLU system, consisting of two BLU-800s, four BLU-160s, four BLU-120s, one BLU-BOB2, and one BLU-10 controller. A Soundcraft Si3 FOH console controls both the voice and pop systems. Additional audio gear includes a number of Sennheiser EM2050 wireless mics as well as the company's infrared hearing assist equipment.

Where the console is housed is another noteworthy aspect of this project, according to Giddings. "It's a very unique arrangement," he says of the mix position's location, "and it's going to be exceptionally functional." Essentially, there's a back-of-house mix position, not too far under the balcony. At the back of the open area, there's a door that goes up a few stairs into a booth, which not only offers the operator easy access to the equipment racks and patching, but also offers a decent space for a recording set-up.

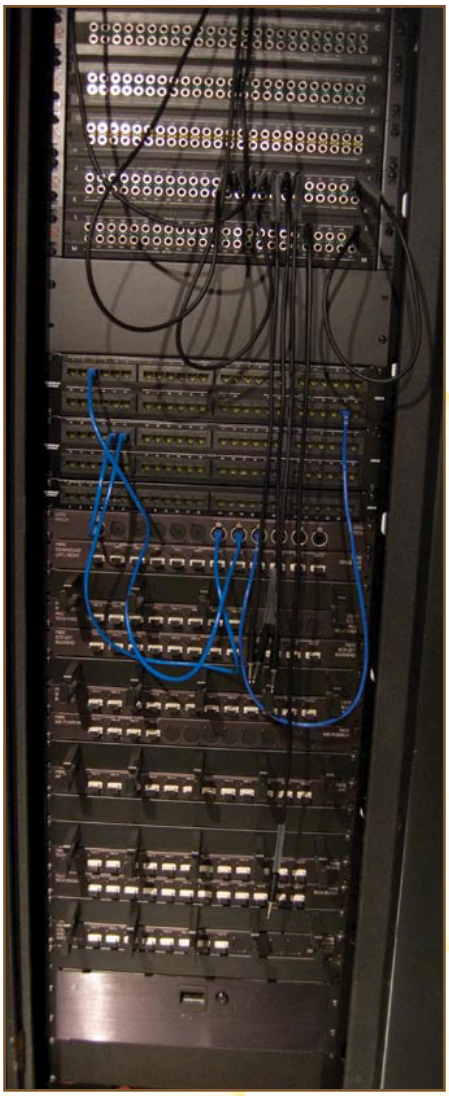
"To me, it's a very great arrangement – and a fixed position," he says with emphasis. "That may not sound like much, but for so many projects, we literally have to do battle to get a good mix position. I think it's a great feature of this auditorium."

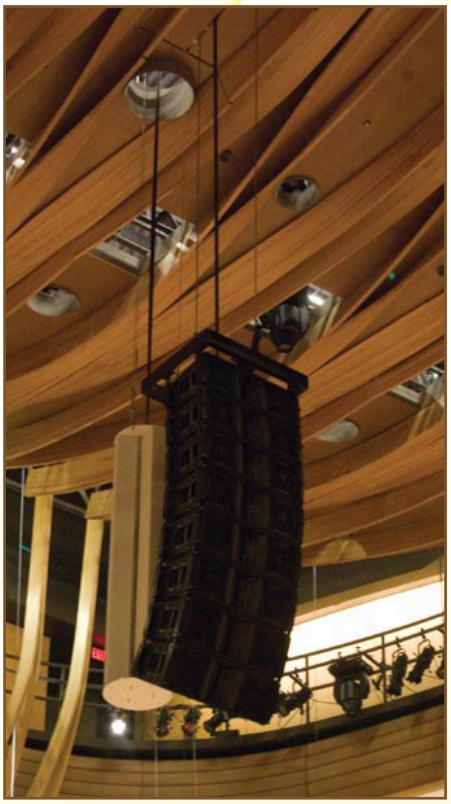
Recapitulation

When it came to the installation of the various components of the rig, VanVeldhuisen says that working around the hall's architecture was a primary concern. "There were some very specific tolerances for how the Renkus-Heinz and JBL systems were installed." The voice lift system is flown above the ceiling and needed to fit through a hole in the canopy ceiling with only a few inches of clearance to spare.

For the JBL array, mechanics needed to open a door in the ceiling. When not in use, the door is closed below it and when it comes down to see action, that door is closed above it, maintaining as much of the halls natural aesthetic as possible.

"In order to have the two systems fly into operating and maintenance positions automatically," VanVeldhuisen explains, "we needed to use tensioned cable reels for the cabling to these systems." The pop system has a large multi-conductor speaker cable, while the voice lift system consists of three separate cable reels: one for power, one for audio signal, and one for network data. Says VanVeldhuisen: "These are all installed, hidden above the canopy ceiling."





TOP: FIBRE-ORIENTED PATCHBAY. IN THE FUTURE, XLR CONNECTORS WILL BE REPLACED BY FIBRE OR CAT-5 CONNECTORS & PORTABLE RACKS WITH PREAMPS THAT MOVE TO WHEREVER THE INPUTS ARE NEEDED & PLUG INTO A FIBRE PORT.
RIGHT: CENTRE CLUSTER OF JBL POP ARRAY, WITH TRAP DOOR ABOVE.

The system also includes hundreds of microphone and line level tie lines from the field brought up on XLR and long-frame patch in the control room. "We also provided distribution for video, data, and fibre patch," says VanVeldhuisen. Despite the project's somewhat turbulent start a few years back, infrastructure was not reduced in scale so lines go point-to-point, all over the hall, and extensive patch systems can be accessed from both the sound control room and a basement level hub, which offers flexibility for recording and broadcast.

From an installation standpoint, VanVeldhuisen says that the toughest challenge of the project was meeting its demanding schedule – especially considering how late in the game his team came aboard. Van Dijk takes note of this, offering: "Westbury's done a great job in delivering a very complex system in a remarkably short amount of time."

Coda

Welcoming the first of what's sure to be an exhaustive list of world-class performers in fall 2009, the hall is now open and operational. Thanks to EH's Lead A/V Designer, Andrew Kozak, there's plenty of open platforms for future development and technological implementation, especially when it comes to the venue's learning facilities.

This phase of the project, though, is for the most part complete, and the various collaborators are quite proud of the work they've done together. Production Manager Malcolm Harris believes Engineering Harmonics to be a world leader in its field, adding: "Martin has encyclopedic knowledge of audio systems and their use, and understands the distinction between the overall system design and the operators' specific issues." When it comes to VanVeldhuisen and Westbury, he says they've been responsive to all of his questions and concerns and very professional.

While the whole project is certainly a fine piece of work, it's the unique voice lift system that Giddings believes to be the standout from a design perspective. "This column configuration that Engineering Harmonics conceptually originated and tested represents a new approach to providing public address in concert venues in a manner that's visually acceptable to venue users and operators, as well as architects and interior designers."

He attests that with the Renkus-Heinz enclosures and the company's RHAON audio control network, "designers are able to optimize a loudspeaker's performance to achieve high intelligibility and exceptional gain before feedback in environments that are primarily designed for unamplified sound." His firm is currently rolling out several projects that take advantage of this solution and the enclosures' unique capabilities, with Koerner Hall being the proud inauguration. In closing, he states: "I believe we've achieved a new level of aesthetic and technical performance with this system." ■

Andrew King is the Editor of Professional Sound.