

AUDIO REFIT FOR MISSISSAUGA

BY ALAN HARDIMAN
PHOTOS BY ROY TIMM

Put 165 loudspeakers and 30 micro-phones into a well 70' in diameter and four storeys high, top it off with a domed ceiling, and then make it all work. While this might sound like some sort of twisted penance meted out by the demons from audio hell, in reality it was the central challenge facing Novita Techne Ltd. and Westbury National Show Systems Ltd. in refitting the City of Mississauga, ON's council chambers with a new, state-of-the-art conferencing and A/V system.

The structure itself was a given. Mississauga's City Hall was completed in 1987 by Toronto firm Jones and Kirkland Architects, who had beat out 245 other submissions in an international design competition for this iconic building. One of the central features is its council chambers, a large round room designed in a neo-classical style – including a domed ceiling. It might easily be mistaken, however, for a large, squat silo.

In 2006, the City of Mississauga decided to upgrade the 20-year-old A/V system in the Council Chambers as part of an overall building renovation. And while they were at it, the retrofit afforded an opportunity to build in significant additional capability, including a new digital conference system capable of allowing participants to address council, hear each other talk, and vote; a comprehensive visual projection system; and a full-featured A/V streaming system for broadcast, web cast, and archival purposes.

The city engaged Novita's A/V multimedia consulting division to design and specify appropriate systems. Novita's team, consisting of Project Lead and Senior A/V Designer Christian Bechard, Partner-in-Charge David Jolliffe, and Senior Designer Jim Boutilier, tackled the project, working closely with the City of Mississauga's A/V systems specialist, Tony Biagi, to ensure the systems were well suited to the city's requirements.

Westbury National Show Systems won the bid for the contract. Project Manager for Westbury, Doug Wildeboer, and Westbury's installation



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team have since successfully completed the installation of the new systems, which were fully commissioned in January of 2007.

In the renovated chambers, the mayor and 12 councilors sit at a horseshoe-shaped desk on a dais at the front of the room. Facing them is a long straight desk that can accommodate eight staff members as required. Directly below and in front of the mayor's seat is the clerk's desk, with four seats. At the rear of the room, eight rows of pews provide seating for some 200 observers, raked up bleacher-style at about a 30-degree angle. Just above and behind this public seating area, but still out in the open, sits the A/V cockpit, the nerve centre of the operation. An enclosed rack room is behind the cockpit.

Digital Conference System

The business of City Council is facilitated by a DCS 6000 Digital Conference System from Danish Interpretation Systems (DIS). Twelve DM 6560F delegate stations for the councilors and one CM 6560F chairman station (with delegate-off button) for the mayor are flush mounted into 8" x 3" cutouts in the curved desk at each position. Delegate stations are similarly provided for the eight positions at the staff desk and four positions at the clerk's desk.

These stations are fully digital microcomputer-controlled conference units, each with a loudspeaker, a "push-to-talk/request" button, and a gooseneck microphone equipped with a powerful red LED "active/non-active" light indication formed as a ring around the microphone.

The units support a three button voting facility – Yes, Abstain, and No – and a chipcard reader for identifying the user to the system. The loudspeaker is automatically switched off when the microphone is

View from Lighting Gallery.
INSET: ICONYX IC16/8 array recessed between pillars.

activated. The system also supports simultaneous interpretation, but this is not implemented in the Mississauga installation.

The A/V technician functions as system administrator and controls all aspects of the DIS system. With the included software package, the clerk can select multiple user modes including an “automatic” mode, which allows up to eight participants to speak at once, and a “manual” mode requiring the councilors to request to speak, and stay in cue until it is their turn.

The chipcard is about the size of a credit card, and features a programmable chip that can be coded with a serial number assigned to a delegate with associated permissions that are called up from the DIS system’s database and enabled. The database can be modified as people come and go, and is managed by the system administrator. The permissions, along with the selection of automatic or manual mode, determine such things as whether the microphone turns on immediately at the touch of the Talk button (in the case of the chairman), or goes into a queue or “request-to-speak” list, turning on only when it’s that delegate’s turn to speak. The permissions also determine whether a delegate may vote, and generally allow the chairman to moderate a discussion and maintain a sense of order to the proceedings.

The system administrator has several sets of cards for the different kinds of meetings that are held in the facility, and each set of cards can be customized with the names and titles of the participants, their voting rights, and other permissions.

“When you tell someone what they can have control over – that they can moderate the discussion in terms of the order of who talks next, shift the order of talkers, or display voting results – they’re impressed,” says Wildeboer. “The system is very intuitive to users. We are very impressed with the DIS system’s capabilities. Its GUIs can be easily customized and configured to the client’s needs and procedures. The users have been impressed with how easy it is to use.”

Sound Reinforcement System

A sound reinforcement system was required to amplify spoken word and program audio from stereo sources, such as a DVD player. Due to the echo and sound focusing problems presented by the domed ceiling within the Council Chambers, Novita specified the Renkus Heinz ICONYX digitally steerable array systems to direct the sound towards the audience but not into the ceiling. Westbury programmed the digital processors within the speakers to properly aim the beams and prevent potential feedback. The ICONYX systems are visually unobtrusive, their white paint enabling them almost to disappear when mounted between the white columns of the chambers.

The modular ICONYX system can combine up to four IC-8 enclosures and is unique in that each of the eight 4" drivers in a single enclosure receives an individually filtered and delayed signal, enabling the array to produce a specified vertical beam and steering angle. The control software, Beamware, also permits adjustment of the apparent acoustic centres without physically moving the array itself in order to improve localization of the sound source.

“The ICONYX software lets you map the position of the speaker in the room, the position and slope of the seating areas, and the distance from the speaker to the last seat,” Wildeboer explains. “You can define all those parameters and specify how many beams you want to emanate from the ICONYX line array, the level and down angle of each beam, and the acoustic centre of that beam within the column. It’s really quite astounding to be able to control that. So if you have multiple seating areas, such as a ground floor and a balcony, you can create beams that go specifically to those areas and not the areas in between, which

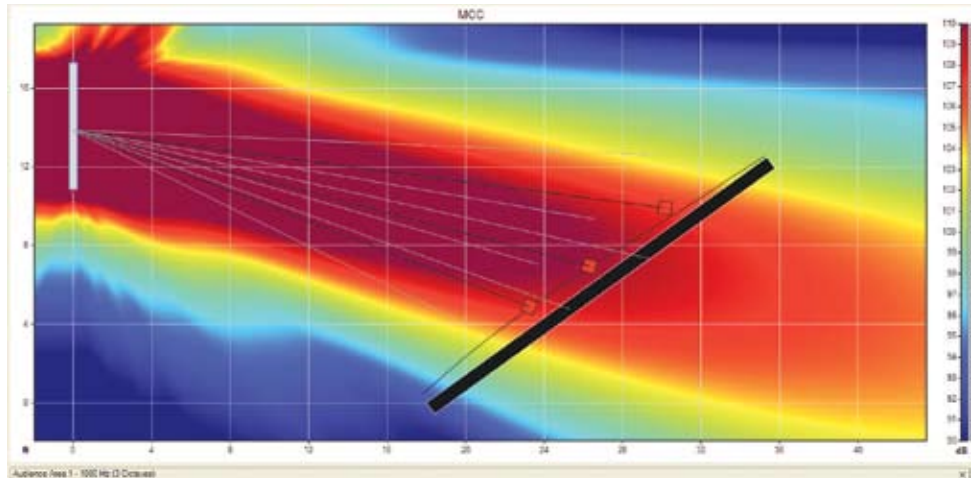
is unique and quite unlike a standard loudspeaker. The software will show you the resulting frequency response and SPL as well.

“We got in there with the JBL Smaart system to adjust the delays and EQ curves and so forth. The existing pew-back loudspeakers were replaced with 104 Renkus Heinz SSL 4-2 coaxial 4" transducers which, fortunately, are the exact same drivers as in the IC-8s and a sonic match to the main system. For the people in the pews, the system now gives the sense that the sound is coming from the front of the room and not from the loudspeaker on the back of the pew in front of them. It doesn’t seem at all like the sound is coming from down at their shins, even though that’s the location of the pew-back loudspeaker. The system keeps the sound image coming from the front, but the pew-back loudspeakers give you the intelligibility necessary to keep it clear,” Wildeboer notes.

Novita’s Senior A/V Designer Christian Bechard says, “The Council Chambers’ ceiling is dome-shaped, and as a result the room has a serious flutter echo problem – repeated echoes that are experienced in rapid succession. We had worked with ICONYX in several other venues and had been impressed with their steerability, in other words, their ability to aim the audio exactly where you want it. In this case we needed to be able to avoid getting sound energy up into the ceiling, so we chose the ICONYX to steer the sound directly to the audience without any splashing into the ceiling.” An additional attribute of the line arrays is that the delay used to steer the beam significantly reduces feedback from open mics directly in front of them.

A pair of Tannoy 110SR active subwoofers was specified to add warmth to the sound reinforcement system. They were built into the staff table millwork, but to avoid unwanted vibrations the subwoofer enclosures were isolated from the table millwork.

In addition to the DIS microphones in the digital conference system, the sound system includes three Shure MX-412 podium microphones for the public lecterns along with two Shure SLX Wireless microphones to afford freedom of movement for people making presentations. A microphone on a mobile podium is used for non-council functions and can be plugged into the system at any one of several wall plates located around the chambers. Line level media feeds are also available via wall plates located near the A/V cockpit and along the staff table millwork. A ClearOne AP 400 telephone



hybrid is used to broadcast the meetings out to a conference bridge number for people to listen to the proceedings.

A Phonic Ear StarSound 400 Infrared Assistive Listening System was included to help those with hearing difficulties, as required by the Ontario Building Code. Induction loops were included with each receiver for use with hearing aids.

ABOVE: Beamware Configuration File for MCC showing application of three separate 10-degree beams aimed to create consistent SPL in gallery seating with minimal energy directed towards walls and domed ceiling.

LEFT: A/V Cockpit equipment in pullout rack rails.

RIGHT (TOP): View from A/V cockpit.
RIGHT (BOTTOM): Paul Forbes, Westbury National Systems; Doug Wildeboer, Head Integrator; Bill Coons, Director, Contact Distribution; Gary Plavin, President, Projection Design USA; Tony Biagi, City of Mississauga A/V Systems Specialist.

Obstacles

No project of this magnitude is completed without one or more fundamental obstacles. In this case, the major obstacle lay in the nature of the base building itself. "We were very limited when it came to installing new conduits," says Bechard. "The entire floor sits on a concrete pedestal. At many of our A/V equipment locations, the electricians had three or four feet of concrete to core through to be able to get a conduit through to the other side. There was concrete everywhere, we thought the public podium was a raised wooden platform, but once they broke it apart, we could see that it was also completely made of concrete, too. As a result we had to make do with far fewer conduits than we originally planned for and had to get really creative with regard to our signal distribution."

Wildeboer adds, "There's only so many places the electricians could core holes through the floor in order to get conduit up into the millwork. With the parking garage directly below the council chambers, there's a large amount of structural concrete supporting this place. The room has a circle of structural columns just inside the walls, and concrete risers for the pews, so trying to work around the available paths was challenging for the electricians. In order to keep costs down, we did a lot of wiring with a twisted pair Cat 5E cable. We worked very closely with facility designer Alan Dalquen of Bullock Associates to design the millwork that would contain the assorted A/V equipment. The councilors' desks, podium, and A/V cockpit were carefully designed to neatly fit and conceal the many A/V components and associated wiring. But the original completion date for the new installation was about 30 days after we came onto the project! They wanted to be turned on and using the system within 30 days," Wildeboer recalls.

"The timeline was way too short for a project of this magnitude," Biagi explains. "Because it was a renovation project, there were a lot of surprises when walls were being ripped out. Had it been new construction, I would have gone with rear projection, for example, instead of cross projection. The conduits that were needed couldn't be accommodated as everyone initially thought. So if the conduit can't be put in, then the millwork has to wait, and if the millwork's not in then we have to wait, and you get a trickle down effect. The original deadline was Inaugural Council, which was Dec. 4, 2006. For that deadline, the system was up to its bare minimum, which was mics on. And that's all they needed for that initial deadline, so we were lucky!"

Recommendations And Wrap-Up

This project is unique in the integration of its many facets. "It's more than the sum of its parts, which is a bunch of great gear – it's making all that great gear work harmoniously together with a simple user interface. That's where customization comes in," Wildeboer says. "Because of the building's unique architecture, a single clap from the podium in the centre of the room is repeatedly echoed back.* This challenging environment is what drove the use of every design trick available: steerable Renkus Heinz line arrays to focus the acoustic energy where needed, matching Renkus Heinz pew-back loudspeakers to help add vocal clarity where needed without placing excess acoustic energy into the room, DIS delegate stations each with its own loudspeaker to ensure that the councilors and public can hear the other participants. The careful use of level, delay, and EQ has provided an intelligible system in a very difficult room. And the cautious use of the subwoofers enables the room to be used for full-range audio when playing back video programs and music."

"We worked closely with the clients, who told us how they like to control the room and how meetings are run and what are the things that



make it work for them. Tony Biagi had very clear ideas of how he wanted it to work, and we were able to work closely with him and hit the mark in the end. He worked very closely with Novita in the early stages to communicate what he was looking for, and Novita did a great job integrating that into a design and equipment list, which works well with the difficult acoustics of the room, and providing the video backbone," Wildeboer says.

What can other consultants and contractors learn from this experience? "Learn to ask the right questions of your client," Biagi suggests – and being on the client side of this project, he should know. "An educated client is one of the best things to have. Push that education on them in terms of knowing what they should be asking – for example, dial-in ability or full matrix ability? Ask the questions for your client. Don't just walk in and say, 'What do you want?' Try to push them to the edge, don't limit them. Get them future-ready."

Bechard notes that "the most important thing when designing a system is to keep the end user in mind. It is our firm belief that if we really listen to the users, the systems will meet their needs and skill levels, and they will be happy. When we have a user as technically inclined as Tony Biagi, the design process becomes very collaborative, and the systems can be more complex. Regardless of how complex the system becomes, it must still be easy to use, and we felt strongly that Doug and Westbury went out of their way to make a very complex system as user-friendly as possible. For this project we were very happy with the results and felt comfortable that the city of Mississauga ended up with the options and the control over the system it needed."

The last word goes to the client. "It's absolutely incredible," Biagi says. "I've seen some other government facilities in regions and cities, but I think we have the best council chambers in Canada right here in Mississauga." ●

*For a live audio sample,
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