

As mainstream churches continue to struggle with a decline in regular Sunday attendance, The Meeting House in Oakville, ON is experiencing just the opposite. Referring to themselves as “a church for people who aren’t into church,” The Meeting House is part of a family of churches known as the Brethren in Christ, an offshoot of the traditionalist Mennonite denomination.

To keep up with its growing numbers, The Meeting House recently completed a whole-sale renovation of its facilities, adding 37,000 sq. ft. to its fan-shaped worship space – also known as “the theatre” – together with additional seating, bringing the total capacity close to 1,600 and making it the largest performance auditorium in the town of Oakville.

Typically, such extensive renovations call for a significant upgrade to the performance sound system in order to provide the necessary coverage demanded by such a substantial increase in capacity, and the present case was no exception.

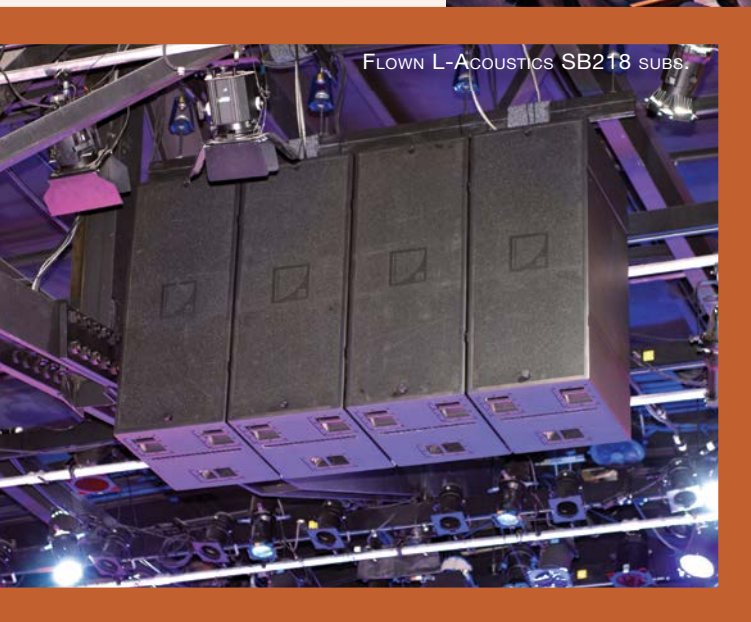
The project proceeded within two complementary guidelines: first, the work was staged such that weekly

A Major Audio Upgrade For Expanded Facilities At

The Meeting House

By Alan Hardiman

Photos by Evan Tozer, RP Dynamics



services could continue with minimal interruption; and second, in keeping with the church’s traditional emphasis on simplicity, the technology was chosen and configured for operation in as straightforward a manner as possible, without necessarily providing for com-

patibility for every conceivable format in use today and in the foreseeable future.

“Our roots are in the Anabaptist tradition, so our background goes back to the horse and buggy and the rejection of technology, and there is an emphasis on simplicity,”

explains weekend service support pastor Jared Taylor. “But our denomination has evolved to where we see technology as a tool, and we’re not afraid to make use of that where it’s appropriate. But in the back of our minds, it’s always there – we are trying to be simple.

“We want to make the best use of our financial resources, so we want to buy the right thing the first time. We don’t want to buy something so inexpensive that we then have to replace it or that we can’t accomplish a goal that we’ve decided is important. So if there’s a simpler way to do something, we’ll tend to move in that direction. For example, our HD system is set up from end to end as 720p, from the cameras to the projectors. We didn’t put in any conversion or scaling in the front or back end of that; we just said, ‘Everything’s going to be 720p and that’s the end of it.’ In some other installations

you see racks full of expensive broadcast converters to support every possible format you might need. But we drew a line and said we’re just going to make it work with one format. That’s how the simplicity value plays out,” he says.

The upgraded sound system comprises an Avid Profile front-of-house digital console and the first Canadian installation of a Kling & Freitag large format line array, featuring a Sequenza 10 dual line array with eight elements per side, powered by 16 channels of Lab. gruppen FP 10000Q amplifiers; four Kling & Freitag Passio front fills and two Passio side fills, powered by QSC PLX 1804 amplifiers; and four L-Acoustics SB218 subs with L-Acoustics LA48a amplifiers that were reclaimed from the original system.

A second signal chain fed via an analog stage split provides a recording feed to a Pro



Tools 11 system in an adjacent room, so that the service can be captured, edited, and distributed to 14 satellite congregations around Ontario that meet in local cinemas or schools. Every site downloads the material via FTP for preview during the week. "That's considered our 'primary' for Sunday morning. We also send a USB drive as a backup either by mail or by car, depending on distance to the remote site," Taylor explains.

It was determined early on in the design process that for the new system, preference would be placed on passive elements. (The original L-Acoustics dV-DOSC dual line array was a passive loudspeaker system.) An active loudspeaker system would have entailed the installation of new conduit in the ceiling, an undesirable approach considering the need for weekly services to continue uninterrupted during construction. This being

said, all proponents had the opportunity to propose active systems, assuming they included the cost of all associated electrical systems and infrastructure in their proposals.

"Adding conduit to accommodate a distributed system would have involved a significant amount of work over the installed fixed seating," notes consultant Gregory Rushton of Mulvey & Banani International Inc., who developed the project specifications and RFP documents. "One would have to do a lot of zoom boom lift work, and in addition to the greater expense for conduit, this would be more time consuming. The church hall had to stand ready for rehearsals mid-week and services every Sunday. The solution was to reuse the existing ceiling conduit for the left-right speaker-level signals and extend some channeling within the stage to provide access for cables on the other side without

the tripping hazard," he says.

In addition, the line arrays were not motorized, saving additional costs associated with structural support of live loads as well as motors and infrastructure. Given the dead hang fly method, they are not easily accessible for servicing. "From a maintenance point of view, there is one less component to service in the air," Rushton says.

The specification called for an overall system frequency response of 40 Hz to 18 kHz with a maximum direct SPL of 110dBA, and for intelligibility, an average speech transmission index (STI) of 0.50 or greater over the listening area; a conservative specification considered "fair" according to IEC 60268-16.

"The EASE model predicted an average STI of 0.602, which is considered to be in the 'good' range," Rushton says. Measurements taken from 24 positions throughout the seating area by Mike Sones of the design-integration firm RP Dynamics yielded an average STI of 0.71, a result exceeding both the spec and the EASE prediction.

To meet these criteria, each of the left and right line arrays is comprised of four Kling & Freitag Sequenza 10N (Narrow) cabinets with 77-degree horizontal coverage rigged atop four Sequenza 10W (Wide) cabinets with 100-degree horizontal coverage.

Using Kling & Freitag's proprietary CON:SEQUENZA+ acoustic simulation software, Sones was able to calculate precise positioning and splay angles for the line arrays. "In a one-octave band centred on 4 kHz, we were able to achieve ± 1 dB at 95 per cent of the seats. It's very consistent throughout the room, and it sounds good. There's very little EQ in the system, just some very minor shaping in the Kling & Freitag DSP in the rack ahead of the amplifiers," Sones says.

"The two main purposes for the system are music that people are singing along with, and speech," notes Taylor. "The levels aren't blistering, but the music is modern rock, so we need to keep up with that, and we like to mix in two-channel stereo; moreover, this being the largest seated facility in Oakville, it is a high demand rental space, and quite a few concerts come through here. That was another consideration. We wanted to

make sure that the new system would be appropriate for the requirements of events that come into the building, many of which call for a stereo mix.

"The line arrays are hung further apart than the previous system. In our new seating configuration, we have a lower fan-shaped bowl in the front and an upper bowl in the rear, and that makes it a bit of a challenging space; we didn't have two fans before. So the wide boxes provide coverage for the lower seating and the narrow boxes serve the further seats at the rear, which are some of the best seats in the house. The sound actually gets better toward the back. Being able to combine the wide and narrow elements was a great opportunity for us," he says. It also meant that a separate delayed loudspeaker system to provide coverage for the rear seats was unnecessary.

Prior to selecting Kling & Freitag, a number of systems were considered, and their EASE models were submitted and compared side by side. "Kling & Freitag stood out in that they are able to push high frequencies all the way to the back of the room. Once you got past 10 kHz, the other systems all started to trail off with distance. For us in a worship context, it's important to feel that you are close to what's going on. The farther back you go, the farther you are from what's happening on the stage, and one of the best ways to make people feel like they're close to the front is through the perception of high frequencies. It's surprising how far Kling & Freitag is able to push even 16 kHz," Taylor says.

In addition to the improved coverage, the Kling & Freitag system is hung farther forward, providing about 12dB more gain before feedback on the stage than the original system, which was one of the key goals identified in the RFP. "The previous hang had the line arrays significantly back from the lip of the stage, so that greatly affected their gain before feedback. It didn't quite throw as far, and there were no front fills before, which affected the experience of those in the first few rows," Rushton explains.

"The side fills are about 30 ft. ahead of the line arrays, and are delayed appropriately. They provide coverage for two little

The Meeting House



FOH MIX POSITION, WITH AVID PROFILE CONSOLE.

pods of 15 to 20 seats on either side that the line arrays don't cover directly. The front fills provide coverage for the first few rows, and for those seats, a very short delay helps to lower the image down toward the stage," he adds.

Acoustics

The congregation theatre was expanded into an adjacent 37,000 sq. ft. warehouse space that had previously been leased to a third party. When the lease was not renewed, The Meeting House seized the opportunity to incorporate this generous space into a renovated and enlarged congregation theatre, with permanent raked seating on two levels arrayed in a generous fan shape back from the stage, affording optimal sight lines to the stage and IMAG projection screens.

Fan-shaped rooms can be notoriously difficult acoustically, however, since a concave rear wall tends to focus sound reflections back to the stage. Acoustician Dr. Al Lightstone of Valcoustics Canada provided Pearce McCluskey Architects with a zigzag design for the back wall that diffuses reflections away from the stage.

The rear wall is a double wall with an interior cavity lined with sound absorbing bats. "It's made up of two separate wythes," Lightstone explains. "In part, that is for maintaining sound isolation from the congregation theatre to the other spaces in the building. It also

allowed us to maintain the curve of the outer wall in the hallway while faceting the inner wythe with short linear segments that present different angles to the impinging sound, and thereby provide diffusion rather than focusing.

"The room is not perfectly symmetrical, which is good for acoustics; however, there were some specific reflection areas that we worried about. There was one corner that was acting as a retro-reflection area, and we made recommendations about how they could treat that and also reduce reverberation to make it even better than what it was," he says.

There was no firm target Reverberation Time (RT60) for the expanded theatre, but because a larger space naturally tends to have a longer RT60, Lightstone recommended sufficient additional absorption to ensure that the RT60 didn't grow longer than it was in the original smaller theatre, which the client had been quite happy with. "I just wanted to make it a little bit better," he says.

FOH

The specification called for a reduced FOH technical footprint, made possible by a transition to a digital console. The original analog Allen & Heath ML5000 desk with sidecar was considered to be overly long, as were some of the digital consoles under review. The final choice of console had a lot to do with real estate.

The church's technical team is staffed by volunteers, so the length of the learning curve on the new console was also an issue. The project team narrowed the choice down to three Avid VENUE consoles – the Profile, D-Show, and SC48 – and the Yamaha CL series.

"We tried a Yamaha CL console for a week. Our volunteers are fairly advanced, and loved certain features of the CL – it feels very easy to learn right away with its touch screen. Then Avid brought in all of their desks and left them all with us for another entire week. We were able to run a two-day conference plus a weekend on those desks. We had some experience with them before during a rental for an arena show, so we were already familiar with them. It's hard to compete with the quick shortcuts that are built into the VENUE desk that make it much quicker to navigate," Taylor says.

"Our technical producer, Steve Kanaris, who leads the technical production team and does post-production, had gone to school at Trebas in Montreal, so he was already very familiar with Pro Tools software. Plus we had identified Pro Tools as the way we wanted to proceed for video post-production, which let us standardize on Avid as the audio software of choice for everything we do. But the D-Show felt too big. It had more faders and the space between the faders is quite large compared with the Profile, which made the D-Show, at almost 8 ft. long,



almost three times the size of the Profile, as was our old analog desk. We wanted a smaller footprint so the operator could keep the chair in one place. The 32-channel Profile allows us to run quite a few corporate-style events with a single operator in the booth, so the Profile was a natural choice," Taylor explains.

In addition to the pastors' mics, console inputs include a complete drum kit mic set with double mics on kick and snare, bass guitar DI, synth, piano, electric guitar, acoustic guitar, up to three vocalists, and both ceiling-mounted and sound booth-mounted stereo pairs, mostly for recording purposes. Monitoring is handled via Sennheiser in-ear monitors.

Stage inputs are derived from the analog mic splitter and routed via a short multi-conductor cable to the Avid VENUE Stage Rack, which contains the microphone preamplifiers and is situated beside the amplifier rack just behind the stage. The Stage Rack connects to the VENUE FOH Rack beside the Profile console surface at the FOH position via Avid's digital snake. A second set of inputs is derived from the analog mic splitter to



The Meeting House Audio Equipment List

LOUDSPEAKER SYSTEM

- 8 x Kling & Freitag Sequenza 10N line array elements
- 8 x Kling & Freitag Sequenza 10W line array elements
- 4 x Lab.gruppen FP10000Q amplifiers
- 3 x Kling & Freitag System-Rack CD 44 DSPs
- 4 x L-Acoustics SB218 sub woofers
- 2 x L-Acoustics LA48a amplifiers
- 4 x Kling & Freitag Passio front fills
- 2 x Kling & Freitag Passio side fills
- 2 x QSC PLX 1804 amplifiers

CONSOLE

- Avid Profile digital console, v. 3.1.1
- Venue Link via FWx (32 channels)
- Pro Tools 11.1.2

DRUM MICROPHONES

- Audix D6 (kick in)
- Sennheiser MD421 (kick out)
- Shure SM57 (snare top & bottom)
- Shure SM95 (hi-hat)
- Sennheiser MD421 (toms)
- Shure PG81 (overheads)

WIRELESS MICROPHONES

- Shure ULXD40
- Shure ULXD1
- Shure UR4D
- Shure ULXS4
- Shure ULXD2 handheld
- Shure KSM9 handheld
- Shure Beta 87 handheld
- DPA d:fine head worn
- Sennheiser MKE2 lavalier, fitted to head mount
- DPA 4066

GUITAR MICROPHONES

- Sennheiser e906

AUDIENCE MICROPHONES

- Shure PG81

ROOM MICROPHONES

- AKG SE300B + CK91 capsule

WIRED MICROPHONES

- Shure Beta 58
- Shure SM57

DIS

- L.R. Baggs Para Acoustic
- Radial J48
- Radial JDI
- Radial JDI Stereo

IN-EAR MONITORS

- Sennheiser 300 Series G3

WIRED COM

- Clear-Com

feed the recording chain.

The project called for the reuse of as much equipment as possible in the theatre and other areas of The Meeting House, such as the areas serving the children's and youth ministries. RP Dynamics' senior account manager Cynthia Wong explains, "We had to go over the inventory carefully, evaluating every piece to ensure that it could be reused, in many cases for a purpose other than that for which it was originally intended. In the case of the L-Acoustics subwoofers, for example, we took them down, brought them back to our shop for initial inspection, and then consulted with L-Acoustics engineers directly to make sure that we could couple all four of them together in a single cluster to enhance performance.

"That general procedure was followed for each and ev-

ery component. We assembled and tested everything here in our shop, including all the new equipment, prior to final installation on site at The Meeting House. This enabled us to complete the final installation in a minimal amount of time," she says.

The original system was removed on a Monday, and the new system was hung, tested, and commissioned in time for the next Sunday's service during a single week last November. "I think it sounds fantastic. The coverage is amazing," Wong says. "It's very musical, and the speech intelligibility is great."

Taylor agrees. "In the world of church production, if we get any comments back from the audience, they are usually negative. But the new system brought on all kinds of positive comments, including

some from our toughest critics. We couldn't be happier with the equipment and the installation. The clarity, the coverage, and the headroom make it a joy to mix and it sounds great all the way to the 'new' back of the room."

Alan Hardiman is Producer & Creative Director at Associated Buzz Creative, a media agency he founded based on 25 years as a sound editor & mixer for TV & film. He also writes extensively about sound & audio. His website is www.abcbuzz.com.

