

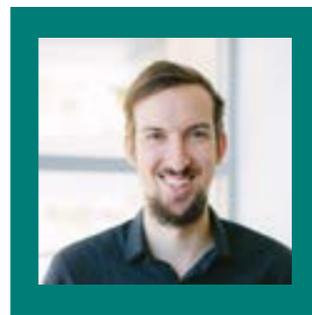


# Taming a Multipurpose Hall

## The Pros of Point Source

A line array is not the solution to everything, as point-source innovator and consistently inventive loudspeaker manufacturer Danley Sound Labs knows. With a range of 'new old tech' solutions, impressive phase coherence and a dedicated following in the USA, Danley are now making inroads into their traditional markets in worship and speech reinforcement in Australia.

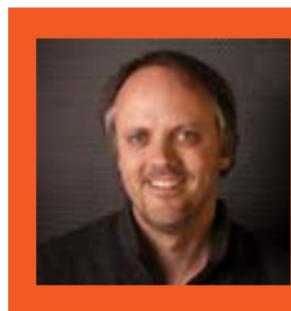
Pacific Hills Christian School in Dural, New South Wales, is a non-denominational Prep to Year 12 school of over 1300 students. While boasting a 472 seat capacity Performing Arts Centre built in 2011, the school often fills its much larger Multi Purpose Centre with the entire student body. The venue also hosts many events for external clients throughout the year and the school's major musical production every two years. The small announcement PA originally installed in the MPC in 1996 was not up to the task of addressing the entire campus in the reverberant space, let alone amplifying a musical, so **AV Manager Phil McDougall** campaigned for budget to get the MPC what it needed.



Phil McDougall

"I was looking for a system that suited the multiple uses of the MPC and tamed the really horrible acoustic space," explained Phil. "The main floor is a polished timber sports court. Consequently, there's a lengthy reverb time in the space. Once you put any energy into the room, you lose intelligibility. I investigated many options to solve the problems, including line arrays, but from experience, I didn't feel a line source solution was suited to the room. The MPC also has a gallery section with a glass balustrade at its front, so there's a decent area of reflective surface directing energy straight back at the stage. So we decided to look at point source systems."

### Focusing Energy



Steve Anderson of Danley Sound Australia came on-site to trial some of their products in the space. "We did a demo with some Danley boxes and they really worked well," reported Steve. "It's because of the pattern control; we concentrated on

putting sound on the people and not on the walls." With design proposals for different point source options, the tender process awarded the contract to local integrator, Challenge Projects' with the Danley bid. Phil and the Pacific Hills team were already familiar with Danley, running their PA in the Performing Arts Centre, but the MPC was a very different environment to cover.

"We designed something properly for the room," continued Steve. "I drew a 3D model of the venue in SketchUp then dragged it into 'Direct'. This is a Danley application similar to EASE, but with the capacity to model well below 100Hz. Our design used two Danley SH96s as the main left-right that cover the bulk of the room. The two front corners missed by that are covered by two SM60MHs as outfills - they're an SM60F without the low end drivers. There's an SH95 as centre fill, three SM96s as delays for the balcony, and two flown TH118 subwoofers mounted in a cardioid configuration that cancels to the front of the stage. If you turn off the rear sub, the sub level on stage goes up 15 dB!"



"We designed something properly for the room"

## FIR Filtering

With models of different loudspeaker designs overlapping in coverage, getting phase correction right can be a major challenge for consistency and intelligibility. Steve solved this problem by using the processing in the Powersoft X8 amplifier that runs the system, which is capable of importing FIR coefficients. "While Danley's tight pattern control holds down to around 700-800Hz, below this the SH96 mains and SM60MH outfill speakers begin to overlap in coverage" expanded Steve. "If the phase response differs by more than 120 degrees, they're going to start to destructively interfere. These two boxes have different phase responses, and when you walked from one to the other, frequency response anomalies were heard."

"With software called 'FIR Designer' from Eclipse Audio (<http://eclipseaudio.com.au/wp/fir-designer/>), I was able to create a phase correction curve separately and independently from a magnitude correction curve. It then gave me coefficients in a spreadsheet that I could import to the amplifier. When I measured the results, it was flat phase from 200 Hz all the way to 20kHz, and the frequency response anomalies were gone. You can do FIR filters in a bunch of boxes now, from Crown, BSS, Symetrix, Rane, and lots of other manufacturers. You just need a way of creating them."

## Heavy Metal



Carey Leghorn at Challenge Projects was tasked with making Steve's design a reality. "The Pacific Hills MPC is a standard basketball court with a stage on one side and a tiered gallery area on the opposite side," he said. "It's reflective polished timber flooring brings all the nasty

acoustic things that go along with a multipurpose venue. The quantity of Danley boxes and the pattern control has meant we can keep as much energy off of the reflective surfaces as possible."

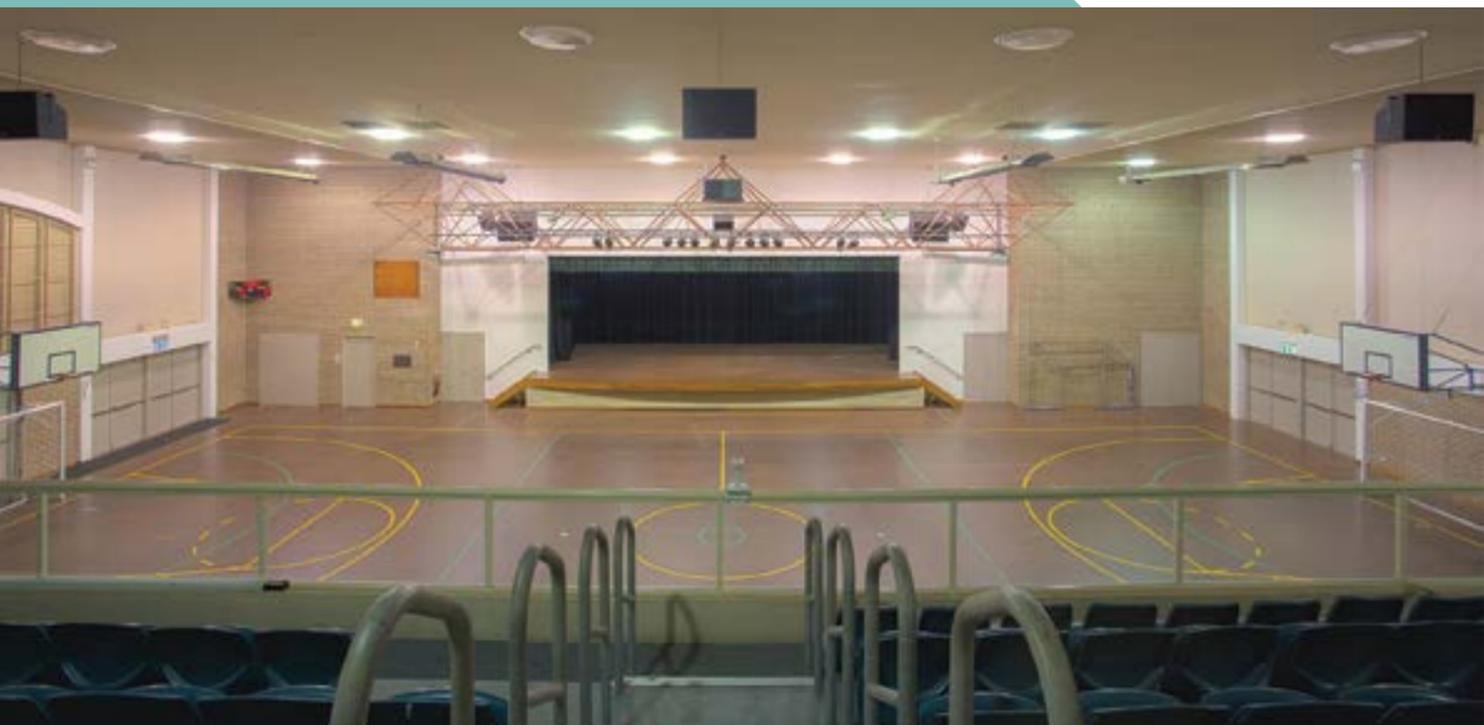
Working around an architect designed metal pipe grid slated for removal in the near future, Challenge created their own rigging solutions. "We had to do a lot of cantilevered metal work to get the rigging points to where they needed to go," continued Carey. "From a rigging point of view, we had hefty Danley boxes that had to get around the grid but not be attached to it. We do all our own custom bracketry, and we designed the brackets for Pacific Hills to give full X/Y focusability. When they stage their musical every two years, they build a thrust stage, so the PA has to be able to move forward four metres, so we installed alternative mounting bracketry and Speakon connectors."



## Under Control

Phil McDougall now has a new acoustic reality before him in the MPC. "The sound is really consistent across the room," he observed. "Whether it's in front of the mains on the floor or up in the gallery on the delay line, there's just consistency across the board. I find the whole system very musical, particularly in the subwoofers. The subs have a lot of grunt, but they give more than just the thud of the kick drum. You get the musical tones as you get to the crossover region. I really like that in a system."

Steve Anderson is very happy with what's been achieved in a difficult environment. "At the end, with only moderate smoothing, I was plus or minus 1 1/2 to 2dB in most places except the very extremes," he concluded. "I've not been able to do that before in this kind of environment. It was a combination of Danley's pattern control and FIR filtering. I could have achieved a similar result with normal filters doing boosts and cuts, and some all-pass filters, but the ability to manipulate the phase to get them to line up made it so much easier and quicker." Phil concurs; "The room has always had challenges and the Danleys work with those difficulties. The management certainly appreciated the detail the bidders went into with the modelling. I believe the system sits as well in place as it did on paper. It more than lives up to expectations."



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