

Given a blank canvas and an unlimited budget Danish systems integrator Stouenbourg was encouraged to design the auditorium of dreams for KPMG Denmark to go into the company's new offices in the city of Frederiksberg. Chris Fitzsimmons reports on the results.

Dream theatre



When international accounting and consulting firm KPMG Denmark set out to design and build a new national headquarters it sought a building that reflected the company's values of quality, courage and vision.

Engaging architects 3xN to help realise the project resulted in the creation of a unique office facility, intended to be striking and yet remain completely functional as a venue for interdisciplinary co-operation and knowledge exchange. The 33,000 square metre site in the city of Frederiksberg is made up of unusual shapes, skewed angles and bewildering lines.

At the heart of building, amongst meeting rooms and offices lies an auditorium designed to seat an audience of 450. That sounds simple enough until you factor in 3xN's asymmetric design and the fact that it also needed to be a space that could be divided in two isolated theatres if necessary.

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AV systems house Stouenbourg were the successful bidder in an unusual tender process, to design and supply AV systems for the auditorium, as project manager Anders Jørgensen explained:

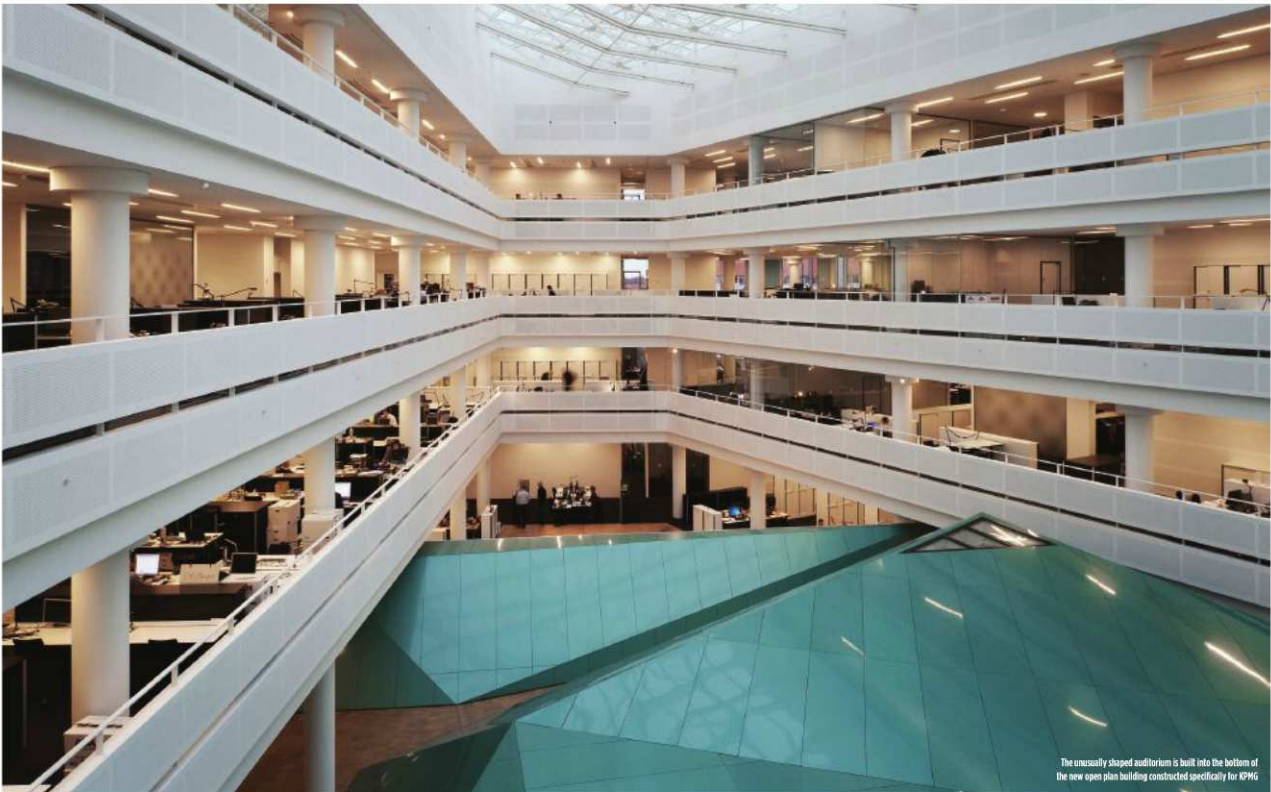
“We were one of three companies contacted in Denmark and asked to design the best auditorium suitable for them. Initially we were given no budget constraints so we created a dream world for them where everything was possible, with the latest technology we could possibly imagine.

“After that of course the budget kicked in, and we

had to return to reality and change a lot of things. However, the great thing about this approach was that we were able to convince them of the need for a decent sound system.

“We were invited to attend a couple of meetings, at which we presented a catalogue of options to them. It had everything in it from a Meyer Sound constellation system, to 3D projection and even more mundane items like podiums that could be set up and torn down in 10 minutes.”

This Chinese menu approach allowed KPMG to see



The unusually shaped auditorium is built into the bottom of the new open plan building constructed specifically for KPMG

everything that was possible with modern AV technologies, and raised the company's expectations of what was achievable before the budget kicked in. It afforded the integrator the opportunity to show off some ideal world scenarios, before things were toned down, rather than simply starting with a solution tailored to a specific budget.

Bo Boje Larsen, chief executive at 3xN outlined the requirements of the space: "The AV in the auditorium had to work surprisingly well and be surprisingly invisible."

With this unsurprising brief in mind, Anders Jørgensen outlined his company's solution to the problem, and talked InAVate through the journey from fantasy to reality.

"One of the first things we changed was the 3D projection system – in reality you don't use 3D for powerpoint presentations. It doesn't make sense. And you don't need a Meyer Sound constellation system when you aren't putting on live musical performances with instruments in the room. But, what we kept was the concept of a great sound system, and having the best suitable projectors on the market in terms of cost and performance.

"The Sanyo projector we settled upon has 2k resolution, and really high brightness for the space. It's

actually quite a short throw distance for the brightness, as the auditorium is wide and shallow.

"We also kept the idea that we needed good quality microphones and good viewing angles for the audience. We convinced the architect to be specific on the height of the staging, to make sure it was correct relative to the screen positioning. The screen height was fixed already by the architect, so we specified a staging height of 48cm.

"There is a dual projection set up here for two reasons. Firstly it obviously allows the room to be divided into two using the sliding wall. But, secondly when the auditorium is used as a single space it provides much better viewing angles for the audience."

"Usually when you do work on auditoriums no one is interested in the sound, but everyone is a critic when the result is heard. Everyone understands the need for good pictures, and a decent screen with good gain. In this case we really put a lot of effort into ensuring that this didn't happen. That's one of the biggest achievements of this project – convincing the client to invest in the audio too."

To achieve the goal of a great sounding auditorium, Stouenbourg set itself some stringent performance targets. Firstly an SPL different from front to back of just 2dB was specified. In the end the system delivered

just 0.8 dB of drop off.

The second requirement was for a speech intelligibility index of 0.6 or better. In the end the average in the room is 0.7.

The final goal was to find a solution that was capable of delivering high output levels for both program sound and speech reinforcement, whilst remaining almost invisible.

"What we've ended up with is a very evenly distributed sound, with high intelligibility and level output. Our solution was to use Meyer Sound MM-4XP units arranged in six delay lines down the auditorium, and behind each projection screen we installed a left-centre-right configuration of UP-Junior cabinets."

The MM-4XP speakers are employed just like one would expect ceiling speakers to be in a less costly system, but with the added benefit of much improved directivity where required.

"We chose them because they are a four-inch driver unit which is easily concealed. The thing about a standard ceiling speaker is that its pointed down, that's it. You can't move it a little left or right and get control over its directivity cone.

Tech-Spec

Audio

DPA 4066, 4098H microphones
Meyer Sound MM-4XP, UP-Junior loudspeakers, MPS488 controllers
Sennheiser 100-series wireless equipment, SKM-100 microphone
Yamaha DME-64N processor, MY8-ADDA, MY16-AT cards



Lighting and audio services are all concealed in the lines sculpted into the ceiling of the auditorium.

“With the MM-4 we get control over that. The speakers mounted closest to the partition wall are pointed slightly inwards, and when the wall is pulled across the middle of the room we avoid the side reflections from it.”

There are some other advantages to the chosen speakers. Since it’s a 48V class 2 wiring system, Stouenbourg didn’t need fire department approval for the wiring scheme in the ceiling. They are also powered so there was no need for additional amplification in the rack.

The directivity of the system also meant that there was no need for any kind of feedback elimination in the processing: “I can stand with one of the DPA 4066 headband microphones just in front of the horn of the UP Junior on the stage, crank the level right up and we get no feedback,” claims Jørgensen. “That delivers 98dB into the pickup field of the microphone.”

Jørgensen also attributes this lack of feedback to the highly phase-correct nature of the system, which was tuned with the assistance of Meyer Sound specialists.

Audio processing equipment in the rack room is limited therefore to a Yamaha DME64 DSP unit, which takes inputs from MY8 XLR panels, and routes them to the appropriate loudspeaker lines depending on the configuration of the auditoriums.

The inputs include the wireless microphone system, line level audio from in-room floor plates, and audio from the Blu-Ray and other source equipment in the rack.

Central video switching is performed by a TV One C2-8110 universal presentation switcher. This 8x2 matrix can happily take any mixture of analogue and digital inputs at various resolutions before scaling them and splitting them out to the pair of Sanyo HF10000 projectors via direct HDMI links.

Quite apart from their 2048x1080 resolution the Sanyo units feature dual bulb technology, allowing them to seamlessly switch to a backup should one of them fail.

Locating the projectors discretely behind glass windows at the rear of the auditorium instead of in the ceiling had the added bonus of keeping the cable runs right down. This removed the need for signal extension and kept the projection

quality as high as possible.

Since the space can be divided in two, a variety of podium positions are possible. Stouenbourg installed input tanks at several locations around the room, situating custom built plates from SMRT behind panels in the walls, in the floor and beneath the stage itself.

These include XLR, 3.5mm, VGA, DVI and HDMI connectors for as much flexibility as possible. There’s also a local LAN for the auditorium, allowing content into the rack via yet another route.

Overall control of the space is delivered by Crestron. An AV2 controller managed everything from source selection, to the lighting and HVAC. It even controls the powered doors at the back of the auditorium via relay outputs. A GUI for the DME64 and TV One unit are provided on several TPS-15LW wall mounted panels and TCMP V-12 panels with podium mounts. The Crestron devices are also part of KPMG’s building-wide RoomView system.

There was a long discussion about how automated division of the room should be. The original intention was that the space’s control systems would automatically detect the closure of the partition wall and switch the presentation and audio processing systems over to two-room mode.

Eventually caution prevailed, and it was decided that

the switch would be made by an input on the control panel, preventing accidental activation mid-presentation!

Architecturally the room was a challenging fit. The only available speaker and lighting installation locations were the black channels that criss-cross the ceiling in an irregular pattern, making acoustic modelling far from routine. However, 3XN was extremely sympathetic to the acoustic requirements in other ways. The walls, partition and permanent, as well as the ceiling are heavily acoustically treated. This has resulted in an RT of under a second throughout the room, perfect conditions for a speech-led presentation space. Again considering the shape and layout of the auditorium, a remarkable achievement.

“As an auditorium space I would rate it only four out of five,” concludes Anders Jørgensen. “That’s purely because of the height of the ceiling. I would normally want something that’s a metre or so higher so that the projection screen could be higher up the wall. However, as long as the presenter remains more than 40cm from the back wall there is no problem with shadowing on the screen.

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Tech-Spec

Video

- Crestron AV2 controller, TPMC V-12, TPS-15LW touch panels
- Sanyo HF10000 projectors
- TV One C2-8110 presentation switcher
- Yamaha BD-S900 Blu-Ray