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The Cavern

Simon Spears

Introduction:

The system we are looking at in this issue is called "The Cavern." It was designed and installed by the Plymouth and London UK-based integration company The Pyramid Group. As always, I asked them to send me additional documentation regarding the project so that I could get a better feel for the scope and complexity of the design and installation. I have to say that the documentation supplied was amongst the best I have ever seen, so top marks for that.

The site of this extraordinary cinema is within a basement area that housed a previously installed private cinema for 12 people. This space had been left unused, as the family had grown, and the installed technology and systems became redundant.

With me for the interview was owner Nic Black and audio engineer and system designer Simon Honywill, not available was Gordon Fraser, the video technician and calibration expert.

Interview

Simon Spears, *Widescreen Review*: Hi Nic, there are a couple of things that I wanted to follow up on in order to provide the readers of the magazine the most comprehensive look at the installation. One is a sharing of best practices—how you approach the project and what you saw as the major challenges and how you overcame them. The other topic is the management of the client expectations and the processes implemented to ensure they were exceeded.

Nic Black, The Pyramid Group: It's a good place to start as these are critical aspects.

***WSR* Spears:** Because that's a huge challenge, right? Particularly if you're working through an agent who can act as a filter between you and the final client. How did you first come in contact with the client, and then what happened prior to getting started with the mechanics of the project?

The Cavern

Black: The clients first approached us in August 2018 in order to discuss the opportunity of refreshing the existing space. Having undertaken an initial site visit, it was clear there was the intention to create a bespoke and high-quality cinema suited to the family's modern viewing needs, using the very latest technology and maximizing the available budget. High on the quality agenda was the audio performance, which was always going to be a challenge due to the nature of the basement space and very limited 2.3m ceiling height. During the initial consultation, we spent time discussing the family's needs in terms of viewing habits, content and the frequency of use, and from there the notion of a high-specification cinema, with a variety of media sources, would be the desired outcome. Music listening was not high on the agenda, however, the client appreciated that musicality and excellent acoustics are key to the audio experience of any cinema system. Over time this cinema design developed such that we were able to present the client a variety of cinema interior styles, as well as price-point considerations regarding technologies and the trade-offs of the various quality points and performance outcomes.

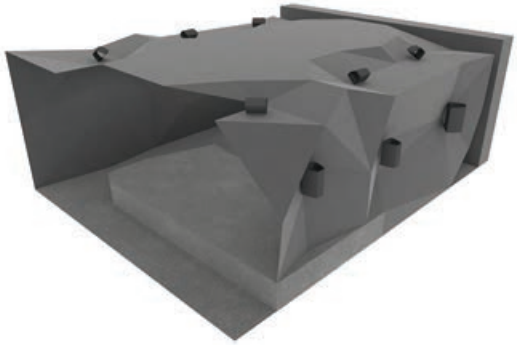
Let me just explain our roles here. Ultimately, I'm client facing. Typically it's me that's going to get involved in designing and coming up with concepts and everything else. But Simon and I obviously work very closely at the very start of each project to make sure that whatever notions we might have in terms of system design get integrated correctly. Simon, from sound design perspective, is intrinsic to any system design. Simon is the audio consultant and I do everything else.

We first came across the client when he got in touch with us as a result of us having an advert in *Home Cinema Choice,* a magazine here in the UK. The client's representative is an avid cover-to-cover reader of *Home Cinema Choice*, a complete enthusiast. He spends a lot of time studying AV systems. For him this was an opportunity to build a dream cinema on behalf of his client. He took the process very, very, very, very seriously. The relationship with the representative was extremely close and even a little strained at times. To begin with, he was very, very open—when I first went to meet him there was this existing basement space that hadn't been used for years and years, and when we started chatting it became clear the he had some knowledge and opinions, which can be a bit of a challenge when you've got somebody who knows about products and what we were planning on doing with them. So, there was a lot of questions about why I wouldn't use this product or why wouldn't I go in a particular direction, which is fine of course as part of the process. What I ended up doing was saying, ultimately, the way we want to approach this is twofold. Yes, we need to agree our target budget area. There's no point in us going much further until I know kind of what the appetite is and that will, obviously, dictate certain levels of kit and approach. But also to try and look at it independently rather than just picking products off of a catalogue—I don't know how it works in the U.S. or the rest of the world, but what is a very prevalent approach in the UK is that the majority of our peers in the industry go to their favorite distributor and select whatever package that distributor offers them and delivers that as a solution. I'm sure many people do very good jobs, but we don't really kind of take that view. We're very much looking at the best product within the budget for the specific application and then we'll source in a successful way. Once the client understood that we're striving for a holistic approach that we looked at the whole design, he really came onboard quickly. We don't sell to him, we're talking about solutions, we're talking about the best ways to get the overall net effect. So that's always the start of projects, and in this case the guy was very, very open to it. And that's how we started.

***WSR* Spears:** I agree that there is a tendency for a lot of the top integrators to simply go with whatever is in their bucket of solutions and the products that they're used to selling. It's sometimes not a question of finding the right solution for the problem, it's what have we got in our portfolio of products that give us the best result with what we've got? Not going beyond that.

Simon Honywill, The Pyramid Group: I think that in a way it's almost too easy to just go along with the client or client's representative. Having some knowledge of what is needed and some of the products required is helpful, but it does not mean that they know

Rendering of acoustical interior design.



Rendering of acoustical interior design.

Finished room

everything. The client comes to us for our expert knowledge and experience.

Black: We're going to probably sound like grumpy old men here, but in all honesty, I'm not being disparaging about people in the industry, it's just not how we operate. Everybody does things for their own reasons. And that's based on their skill set, isn't it, based on their experience as much as anything else.

Honywill: Yes, but I think the key thing is that, between us, our professional experience goes way, way beyond the whole arena of home theatre. I think that we're bringing a lot of that other professional experience to bear in the decisions that we make when we approach a project.

***WSR* Spears:** I like that and interestingly, the last project we covered was a Canadian installation. The designer/integrator's expertise was in professional studio installations, and I would say something like 70 percent of the budget went into making the room right and only 30 percent into the products that were used.

Black: That's interesting.

Honywill: Well that makes loads of sense. You can spend £300, or £3,000 or £30,000 on a loudspeaker system, and I can almost guarantee you that apart from aesthetics and esoteric stuff, you're probably, eight, nine times out of ten, you're going to get as good a result in the right room.

We have developed an effective method of incorporating the necessary amount of absorption to tightly control low frequencies in small spaces, using established methods of acoustic treatment found in other areas of acoustics, such as recording studios and noise management. These methods involve incorporating absorption into the actual construction of the room rather than considering it as a post-construction fix. The nature of the room design offers plenty of space for the inclusion of appropriate absorption into the construction process—and in the case of the Cavern project, the facia panels of the tetrahedra that make up the wall and part of the ceiling are finished in acoustic fabric over foam, and the 3D form of the panels serves as an effective acoustic diffuser, helpful in reducing standing waves. The combination of absorption and the lack of parallel surfaces makes for a highly controlled acoustic environment, rendering a very short RT60 (0.22 secs), ideal for the effective reproduction of accurate dialogue and powerful, dynamic transients.

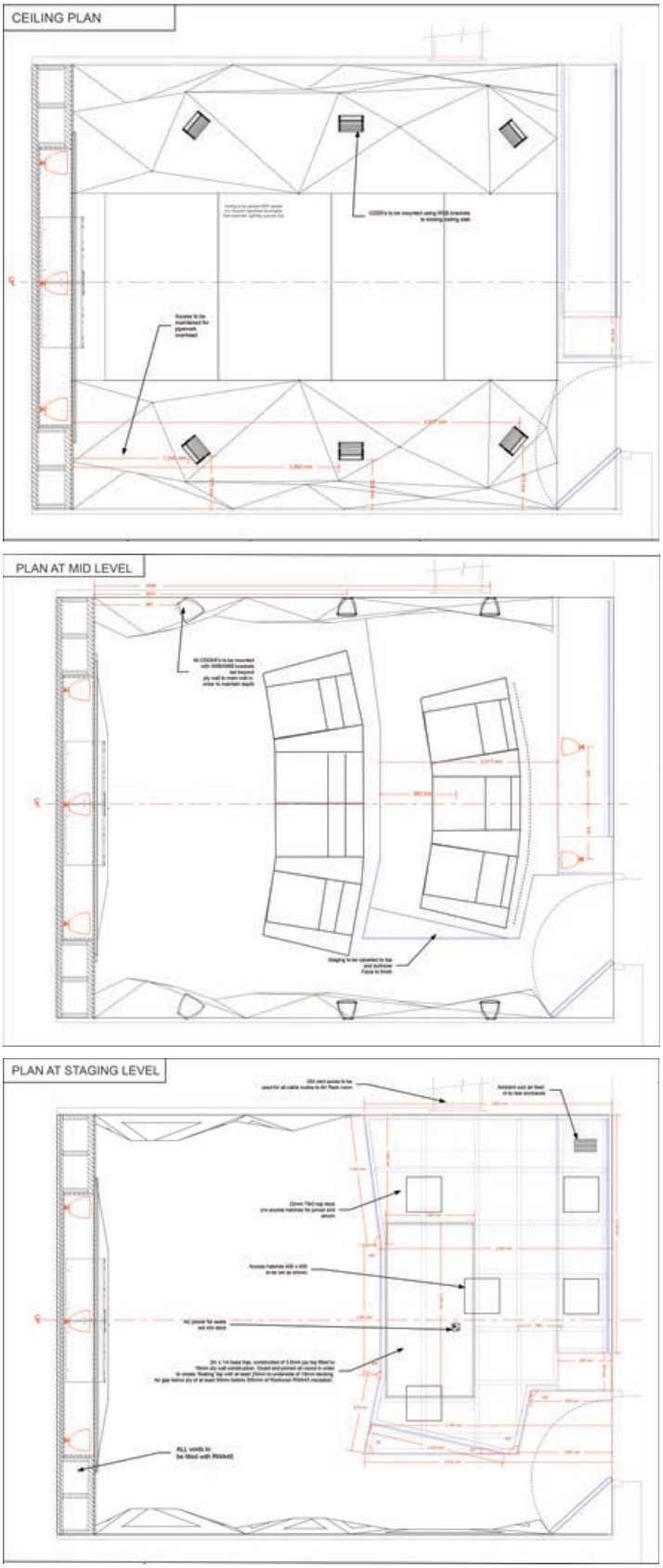
The Cavern is a unique construction that ensures an enveloping experience within a space that is surprisingly roomy, feeling immersive but not oppressive.

***WSR* Spears:** I do see that as an emerging trend in all the projects I've covered. People who really understood about acoustics and looked at the room as the major problem first, their projects tended to be the ones that came out well at the end.

Honywill: Yes, absolutely.

Black: Interestingly, I recently took some clients to listen to a system at a well-respected distributor of a very high-end loudspeaker product in the UK. Anyway, we did the demo with the clients a few weeks ago, and this chap was insistent that the best way to get the optimum results is not to treat the room at all. I guess, we as an industry are clearly entirely wrong and acoustic treatments actually damage the sound. Maybe we've been getting it wrong all of this time, you know, but anyway...

Honywill: This particular thread is critical to the success of the projects that we've done because we've looked at the acoustics and come up with a couple of highly unique approaches to some problems that work really well and integrate into the design of the



Plans showing loudspeaker locations, seating arrangement and location of the bass trap.

Loudspeaker Manifest

POSITION	No	Model	Sensitivity(1) dBSPL	Max dBSPL	Distance to listening position mm	Offset from Centre	SPL dBC
Left	1	Martin Audio CDD8	94 dB	123 dB	2982	1366	107.5
Centre	1	Martin Audio CDD8	94 dB	123 dB	2722	0	108.3
Right	1	Martin Audio CDD8	94 dB	123 dB	3284	1366	106.8
Wide Left	1	Martin Audio CDD8	94 dB	123 dB	2558	2248	108.8
Wide Right	1	Martin Audio CDD8	94 dB	123 dB	3041	2248	107.4
Surround Left	2	Martin Audio CDD6	91 dB	119 dB	2008	2306	108.6(3)
Surround Right	2	Martin Audio CDD6	91 dB	119 dB	2609	2306	106.7(3)
Rear surround Left	1	Martin Audio CDD6	91 dB	119 dB	2324	970	105.5
Rear surround Right	1	Martin Audio CDD6	91 dB	119 dB	2562	970	104.6
Top Front Left	1	Martin Audio CDD5	90 dB	116 dB	2051	1460	103.8
Top Front Right	1	Martin Audio CDD5	90 dB	116 dB	2444	1460	102.3
Top Middle Left	1	Martin Audio CDD5	90 dB	116 dB	1579	1503	106.0
Top Middle Right	1	Martin Audio CDD5	90 dB	116 dB	2076	1503	103.7
Top Rear Left	1	Martin Audio CDD5	90 dB	116 dB	2578	1631	102
Top Rear Right	1	Martin Audio CDD5	90 dB	116 dB	2936	1631	100.7
LFE/Sub	2	Martin Audio SX210	103 dB (2)	133 dB	3132	0	123.1
Rear Sub	1	Artcoustic 4 x 10	Unknown				

(1) Measured in open (4pi) space at 2 metres with 2.83V input, using band limited pink noise, then referred to 1 metre
(2) Measured in half (2pi) space at 2 metres with 2.83V input, using band limited pink noise, then referred to 1 metre
(3) Surround left and right consists of two loudspeakers on the same surround channel summing as an incoherent source – the dBSPL measured at the listening point is the result of both loudspeakers being on at once

LFE/Sub

The system is equipped with a coupled pair of Martin Audio X210 sub bass loudspeakers below the screen. The decision to use a 10" based system was taken to enable maximum transient impact and smooth integration with the 8" drivers in the LCR. Coupling the cabinets together and placing them on the floor effectively increases the output by up to 6dB, and the larger combined driver area affords extended low frequency extension.
In addition to the X210's , a single Artcoustic 4 x 10 sub, left over from the client's previous installation, was deployed at the rear of the room and time aligned in such a way as to temper low frequency standing waves and increase the impact of the LFE.
The signal management for the two models of sub was achieved by splitting the LFE output and passing it through an assignable crossover.

Pre-calibration calculations

The LCR speakers are Martin Audio CDD8: maximum SPL 117dB at 1m

With a single loudspeaker the calculator used renders 108dBC at the sweet spot

room in a way that nobody would know any different. And I think that that's kind of one of the winners.

Black: I really think it's a case of simple principles, isn't it? We know that the room and the acoustics are critical, absolutely. We completely agree. The way we approach it is to seek to understand the balance between absorption and reflection and getting the balance right. Simon will create a 3D prediction of what the room is going to do so we understand what the potential RTs are going to be. We understand where the potential problems are going to be as best as you can tell at that stage. We then mitigate these by use of certain materials and certain ways, and we've got a particular way of doing bass traps, as Simon mentioned, which has proven to be really, really successful. We're not trying to be clever about this, it's just using basic principles and just delivering them in a...well almost a DYI fashion. We build our own acoustic treatment because we need this amount of absorption and this amount of coverage, and so on. We engineer it and we make sure that we get what we need as opposed to going to the off-the-shelf option that a lot of people go for.

Honywill: Going back to the Cavern, the room design, which was really a function of the loudspeaker system and the acoustic treatment requirements and the fact that we wanted to do a funky space, we didn't want just another shoebox. That room design gave us the opportunity—because of all the limited space involved—to design the three-dimensional shapes that we created. That gave us the opportunity to do all kinds of things with the acoustic treatment we wouldn't perhaps normally do.

***WSR* Spears:** Right. And it is a very striking design, the tetrahedra approach. I've seen it before. Mikodam, a Turkish company that does acoustics on a commercial, not residential level, including auditoriums, they have a similar tetrahedra design with diffusion and absorption panels. That's a commercially available product, but you build your own.

Black: Yeah, it was complicated. It was quite tight. I think getting to, just going back a step again, the early discussions we were talking about the more off-the-shelf approach because the client understood certain brands, so he was going, oh, I quite like the idea of using this brand. Obviously, you work with the client and say, okay that's fine, let's have a look at what that looks like. So we were doing various layouts based on different types of traditional loudspeakers either in-wall or on-wall, shallow-depth on-wall loudspeak-

ers, and it's that that we've done a number of times in the past, which is a little bit of the background frustration of ours based on, frankly, performance and the ability of the loudspeakers and the limitations by form factor of these types of loudspeakers. So, we've always been wondering whether there would come along an opportunity for the use of the Martin Audio CDD loudspeakers. The challenge came with the form factor of the loudspeakers, which is markedly different from the ubiquitous in-wall or shallow depth characteristics of so many well-known home theatre brands. A traditional trapezoidal enclosure means increased loudspeaker depth, and whilst the room was wide enough to accommodate these along the sides, the 2.3-meter ceiling height proved more of a challenge. Our unique 3D faceted "cave-like" design accommodated this level change whilst at the same time created a unique and exciting environment that is different from the all-too-often-employed home cinema designs in the marketplace today.

The arrangement is a 9.3.6 Dolby Atmos configuration. The LCRs and LR wides are CDD8's, the bed channels are CDD6's (double sides were employed to spread the side image between the two rows of seats) and the overheads are CDD5's. The latter being an excellent solution, as they can be oriented to suit the mounting angles required for the focus and the drivers spun to suit dispersion requirements.

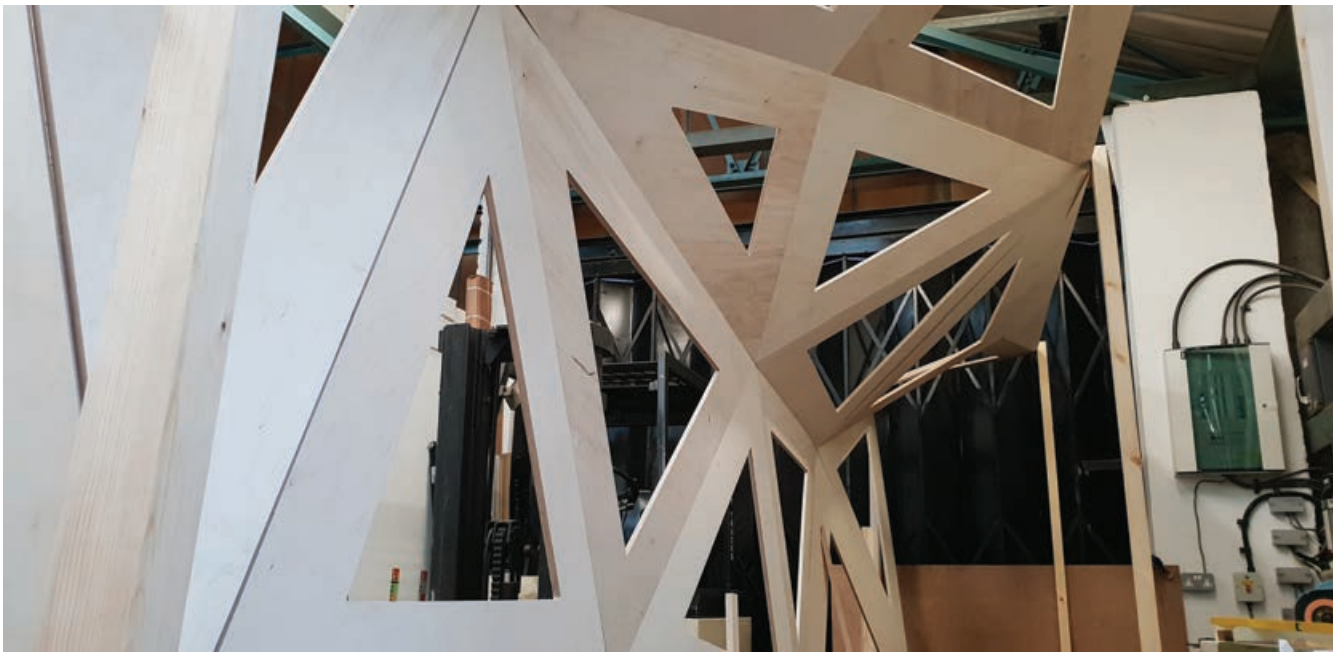
The system is equipped with a coupled pair of Martin Audio X210 sub bass loudspeakers below the screen. In addition to the X210's, a single Artcoustic 4-inch x 10-inch subwoofer, left over from the client's previous installation, was deployed at the rear of the room and time aligned in such a way as to temper low-frequency standing waves and increase the impact of the LFE. All crossover and delay timings were set using a separate in-line DSP unit.

All loudspeakers are invisible to the user, hidden behind acoustically transparent materials within the 3D CAD design, laser-cut wall matrix construction.

Coupled with the extremely good room acoustics we achieved with the unique spacial room design, the results are an incredible combination of well-controlled energy and dispersion, tight bass, and well-defined vocals that sit perfectly within the soundstage and combine to immerse the viewer wherever they may be sitting. The Trinnov's 3D mapping facility allows a perfectly balanced rendering across all channels, and at the same time allowing a custom set of seat-specific presets that the client can choose depending on what type of focus and viewer arrangement is required—front middle, whole room, rear middle, and so on.

This opportunity to use the CDDs only came after we had the client here in our own cinema. It's only a small space, it's a little two-seater, but it's very well done. It's really, really nice. The acoustics are perfect. It's got a Trinnov Altitude[16]. It sounds fantastic. The moment we sat the client in there and gave him a benchmark he was blown away and went, oh, wow, I had no idea that actually this could be as good as this. And from there the trust levels opened up and we started to say, well hang on, okay, so rather than going down this traditional, almost expected route of loudspeaker choice, we'd like to use something that's going to be a little off the wall almost, but there are clear reasons why. The traditional live PA box design is what it is for a reason. There were reasons for this choice, of course.

Honywill: Well, I find that, in my entire career, it's been all about focusing the energy where you need it to go. Show me any kind of home cinema loudspeaker that isn't horn loaded that will do that and I'll show you the moon. I mean, they don't exist, and it just seems crazy to me that this...there's so much bull talked about what loudspeakers do this and that and the other, and yet when you look at it, what they really do is they're splashing energy in all the places you don't need it. And that loudspeaker range, the CDDs are ridiculously good, they're absurdly almost hideously good for the money. With the right processing behind them, they outperform so many other loudspeakers, and with all the advan-



Offsite preassembly of walls and ceiling treatment.

tages of coaxial design, but they're directional as well, and it makes so much sense, but they're not a flat box.

Black: It's the perfect combination. We were able to demonstrate that we could use a box that would give us all of that, all of the tangible benefits—it's musical, it's powerful, it's hugely dynamic, it's focusable. We know what we're dealing with, we know what we're going to get. There's a nice range of packages form-factor-wise—5-inch, 6-inch, 8-inch, 10-inch, 12-inch drivers—lots to choose from. And yet, critically, the price point is good because I think from memory, say the 6-inch version, which we used for the bed channels was coming in somewhere in the region of I think, let's say for example, 30 percent of the retail price lower than a middle-of-the-road on-wall product. But my point is that you're getting what we would consider to be a really, really good loudspeaker, with all the benefits, but at a price-point that's not scary, in other words, gives us some room to use that budget elsewhere. And that's really where we got to.

We'll skimp everywhere on the budget if we can get an Altitude in the middle of it!

And one of your questions was about the timescale, and I think by the point we made this decision, we'd been talking from probably mid-August, and then we pressed the button somewhere round about the end of November. So, it took some weeks to get to that point, but when we did get to that point, we were ready to go.

And that was the starting point, they were the building blocks. And literally from there, as Simon said a minute ago, once we'd placed the CDD's where we wanted them to go, not forgetting we're in a basement with a 2.3-meter-high ceiling and we needed to get a stage riser in, we were literally down to the millimeter in terms of planning. We didn't get any true kind of proper overhead loudspeaker positioning in a Dolby Atmos sense. Due to the low ceiling height available, we had to push the overheads towards the walls, and as a result this, technically, took these away from Dolby Atmos guidelines. Simon and I have a view, which is that whilst we seek to adhere to a chosen immersive format where we can, but where there are compromises in the room that mean we have to deviate, then of course the Trinnov's 3D remapping facility allows us to maximize the immersive effect presented. We enjoy having a little freedom to deviate from a fixed format, and as such we are designing more akin to DTS:X Pro with current projects, as it feels like a more successful approach that marries the Dolby Atmos and Auro-3D approaches. Regardless of which direction we choose for the loudspeaker layouts, the Trinnov ensures we get the best out of the room. Once we'd positioned everything correctly, and there were various situations, particularly around the bass traps as you were coming through the main door, we then watched the sketch-up models. I think we were at ten versions before we finally got to the point where I could be confident that I had the physical headroom that I had the right positioning, even down to doing site mockups for the step up onto the rear riser just to account for the natural uplift that you typically have just for head height, and so on. So, there's a lot of that detail design that went into getting to the final point where we could go, okay, we can define our high and low points in terms of the design and then from there we extract that out. So the process then from the sketch, we obviously exported that into CAD. Each of the individual panels were laser cut, uniquely identified, I think there are 57 individual panels. And then the process was a bit of offsite pre-construction because of the physical constraints of the room and the space. So we did all of that in our workshop, built up as much as we could of the walls, and then they were transported to site in as big a piece as we could get physically through doors, and then that was assembled and brought together. And once that was assembled in a framework, in a lattice work, then we were able to fill in and join the edges and do lots of custom cuts, sub bass covers, and attend to other details. But it literally started, the whole design started from the highs and lows in the form factor of the Martin Audio loudspeakers.

***WSR* Spears:** Did you have an agreement with the client that detailed the work and the payment schedule? Was a certain amount of payment upfront once they agreed to go with you? I ask because you obviously did two or three months' worth of design work before going on-site, and that doesn't come free.

Black: Yes, is the answer. I think once we got to a final point where we could demonstrate the budget wrapped around the loudspeaker concept, then obviously from there we had a bill of materials, we could put some meaningful budgets together and payment schedules to suit. There were estimates around the physical room build and actually, to be honest, this was probably the biggest contention on the budgets because the client could understand and recognize all the technical aspects, and the physical hardware, but I don't think he had any notion quite what the room design would actually cost. Prior to that process, I took a small design fee just to obviously cover that initial design work. That got to the full design, where we said, right, okay, we're happy with it, the hardware kit. Then what we had to do was do the 3D render. We did some initial renders before we went to sketch up. It was just hand sketches first and then outline 3D design, which the client's rep sent it to the client. They loved the idea of it, and then he broke the news that it was going to cost an extra £30,000 to do it. And they said, yeah, go for it, we love it. So that was that.

***WSR* Spears:** They might have well spent more than £30,000 on their curtains in the rest of the house. For some people, the interior design cost can be almost immaterial. They might think, why would I spend £25,000 on an AV processor, but spending £30,000 on interior design is sometimes much easier.

Black: I totally agree.

Honywill: Another factor, I think, which is something that I kind of have a pet bug bear about is the fact that people have unfounded brand loyalty to things that they possibly have no concept really of what it's really about. It's just that they've heard about it and it's branded in such a way, it's cleverly branded, let's face it.

Black: But that's consumers in every respect, I suppose.

***WSR* Spears:** Okay, a couple of things I've picked up on and wanted to ask you. Our readers are analytical, so they'll say, oh, you've got 17 loudspeakers and only 16 channels of amplification. Explain that.

Black: It's quite simple. The double sides, the way we did it was that you've got your LCRs and your front wides, so that's five. You've got a double set of CDD 6's for your left-mid, right-mid, so that's obviously seven, and then your two rear switches, nine, and then you've got six overhead, which is 15. So there are actually 15 amplifier channels, and then the 16th output from the Trinnov Altitude was then subsequently split into a mini DSP. And the mini DSP then handled the LFE. So the LFE was the double 10, two double 10 Martin subs under the screen. And then there was some Legacy kit left over from the previous install, which we used, which was a 4-inch x 10-inch old Artcoustics subwoofer. We placed that at the back for LFE and fill in. That was, as I say, all fed off the mini DSP.

***WSR* Spears:** Okay that makes perfect sense. I figured it probably was the side channels in mono because that makes sense. And I notice you set a goal of just reaching 102 dB, which given the loudspeakers you're using and the amplification you had, you could have easily done up to 109, 110, 115 perhaps. Why 102?

Black: Mostly because that's what CEDIA wanted to see on their application for the awards. The actual level counts were something ridiculous in the case of the wides and the LCRs, around 120 dB.

Honywill: 123 potentially.

***WSR* Spears:** You probably would have run out of amplifier power; you had 300 Watts per channel.

Honywill: At the listening position we were up at 108dB.

***WSR* Spears:** So that's a CEDIA thing. I think they're redoing benchmarking now, a little bit more scientifically, for home theatre design. It's going to be interesting to see what the new recommendations come out looking like, but I suspect the reference levels will get up to closer to 107, 108, and then peaking at even higher levels. But they will also tell people, in order to achieve that you've got to look at the efficiency of the loudspeaker, the power of the amplifier, and the main's power amperage that you've got connected to the room.

Black: That's good news, by the way. I'm glad to hear that.

Honywill: Yes that is good news. The other angle of it is, it's all very well having something that meets a bunch of tech specs, but what does it actually sound like? That's not something that currently features in there...I know, it's highly subjective but, you know.

***WSR* Spears:** Well, it is, and we at the magazine, our approach has always been, we're trying to replicate, in terms of just music, you're trying to either replicate a live performance, the level of dynamics, the impact that you can get, so there's a certain SPL requirement. Or you're trying to replicate what was listened to in the recording studio and the level of dynamics. In the movie world, I think you're trying to replicate the best real movie experience. If you go to the real top movie places around the world, they're hitting 108, 109 dB, some of the big IMAX's. It's incredible the amount of sound-pressure level that's generated. So if you're trying to replicate that experience in your home, well, don't you have to reach that SPL level in that part of it?

Honywill: And people, they might kind of think, ooh, I don't want it too loud. But when they hear it and they feel the furniture moving or their trousers slightly moving, or whatever, they love it, they absolutely love it.

Black: It's quite an interesting point, isn't it? Because we have this technical discussion with every project. For me, I only ever try to talk about the experience and quite often say to the clients, when you're sat in the space, you be sat there with a big smile on your face or wide-eyed at the experience, or in shock almost in terms of the quality. Forget all about the technology, our job is to make you basically go "Wow" at the end of the day in your own private space. And again, in my experience, it's about building that confidence, demonstrating what is good, what's maybe not so good, and then let them make their own mind when they experience the end result. But it always boils down to, does it actually sound amazing? And that's really what it should be all about.

***WSR* Spears:** Yes, that's the Wow factor and the suspension of disbelief that comes with something that's done so well that you forget about the equipment, about the room, and you're just immersed in the movie.

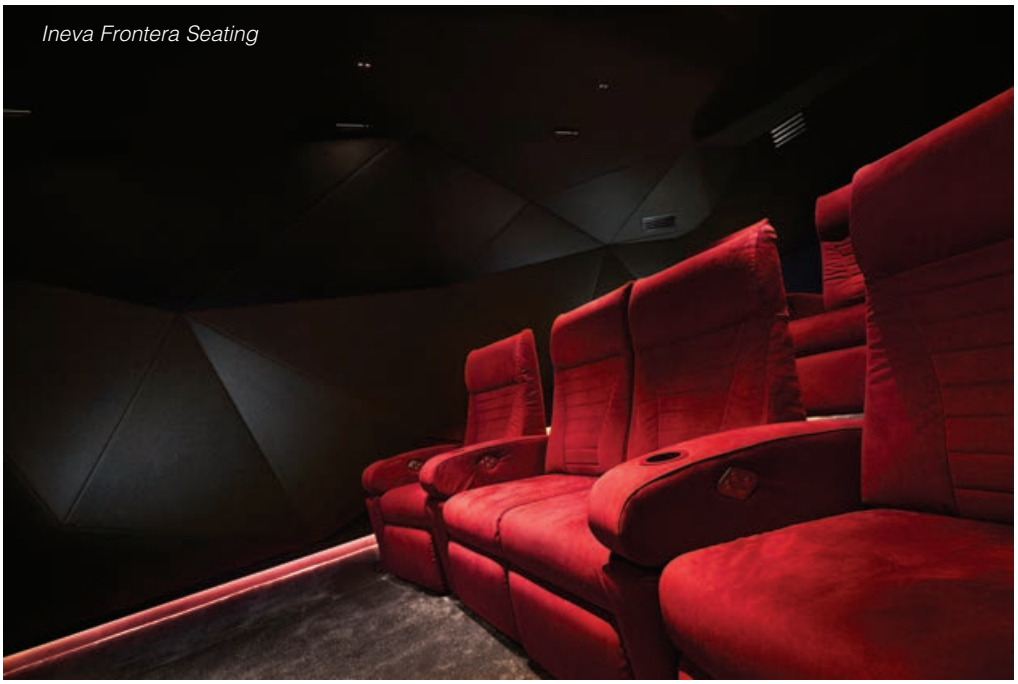
Black: Absolutely. And that's success. When you get that kind of response, if somebody's lost in a room and lost in a moment that's a big tick for me. That's success as far as, I think, we can measure that.

***WSR* Spears:** What video projector and processing did you use?

Black: We opted for a mid-level projection unit, having had great success with the excellent JVC X7900, which is in our opinion is a good choice at its price point for consistency of manufacture, excellent e-shift5 technology and great color/contrast performance. The JVC N5 unit hadn't landed in the UK at the point of install or we would have chosen this as the latest iteration, however, the outcome is excellent, and the X7900 performs incredibly well post calibration.

In conjunction with this, we opted to utilize the Lumagen Luminance Pro range of video processors within this system in order to maximize video performance, as well as ensure screen ratio format re-sizing, and color format presets were managed correctly and consistently across all sources and ratios. In addition, we were able to present Custom Button access on the Control 4 GUI such that the user can select either manual or automatic ratio presets as either 16:9 native or all source ratios re-sized to 2.35:1. 3D viewing is achieved using a pair of Sony active glasses linked directly to the projector.

***WSR* Spears:** What sources were available?



Ineva Frontera Seating

iPad mini running C4 app

***WSR* Spears:** Seating and control?

Black: Much discussion went into seating, as you would expect in a high-end bespoke cinema, finally settling on a custom choice Frontera from Ineva Seating in a raspberry-colored, alcantara-style fabric. In addition to recliners, the client wished to have additional lumbar support controls added. Again, with the Trinnov Altitude, employing the focused presets available meant we were able to create per seat/per row optimization, as the client wished to have a range of seating options depending on the particular family member using the cinema. This is incredibly effective, and coupled with a simple custom button list on the C4 GUI, the family can optimize their experience very easily.

Black: Video sources consisted of a Kaleidescape, Strato 4K player, the client's own DUNE HD media player, Blu-ray playback via Panasonic DP-UB9000, as well as Apple 4K TV, Chromecast, Sky Q and localized HDMI auxiliary connection for game decks, etc.

Routing was undertaken via the Trinnov Altitude due to the increased number of sources versus the Lumagen's limited four, and although the latter would have been our preference in terms of routing, the Trinnov simplified the task of dealing multiple sources with varying qualities of signal such that the Lumagen set all sources to the best output in terms of color space, HDR management, ratio settings and 3D content calibrations.

***WSR* Spears:** And the projection screen?

Black: The client was unsurprisingly keen to maximize the screen size and immersion effect. The constraints of a basement with 2.3-meter total height meant that we were limited to a degree in terms of height. The first consideration was to do with end-user content preference, and the considered outcome held "Hollywood blockbuster family" titles as the main content to be viewed, alongside streamed media from Netflix or Prime, and then Sky 4K TV sources.

We settled on a 2.35:1 ratio at 3.35-meter wide Contempo model from DT Screens. This screen has a micro bezel format, which we prefer when used with black/dark grey screen wall finishes with black rear shadow gap detail. Screen material was ATpop Acoustically Transparent Pop, which is a knitted image surface supporting reference acoustic and visual performance.

The viewing angles within the room design, including screen height relative to the second-row viewing sightlines were critical. Due to the low ceiling, and after much discussion and debate with the client, we settled on a second-row staging height of 400mm AFFL. This height was agreed as the tradeoff between comfortable screen viewing angles and head clearance when stepping up onto the platform.

The immersive experience is excellent and fully envelops the viewer within the content.

Utilizing Control 4 within the design was a conscious decision as a result of the initial consultation process, and the client agreed that the consistent C4 GUI architecture would be the best offering for the family to use. An iPad Mini running Control 4's app was housed within an iPort case mounted conveniently above the in-room DVD cupboard.

Alongside this we installed a single seven-button C4 keypad that provided direct access to lighting scenes plus a C4 SR260 remote in order to allow direct user access as an alternative control to the iPad.

***WSR* Spears:** Were you involved in the handover of the product? I mean, were you able to talk to the client the day of or the day after they first experienced the finished room?

Black: We've only ever met the client rep who, was very analytical about everything, and that's good. We did the calibration over a couple of days, and we went away for a couple of weeks, three weeks, came back again and did another day on it. So we took our time over it properly. But he wouldn't let the client anywhere near the room until he was 100 percent confident that it was as good as we could possibly get it, which it was, but he just wanted to be assured it was perfect. Because of his level of hobbyist interest as well, he would go and read up on things, and you would turn up onsite to do a specific job and you'd get cornered by him asking you all sorts of random technical questions. Actually, I had to turn him away at one point. We were calibrating the first time, do you remember? And he would quietly enter into the room and sit at the back in a very kind of ghost specter-like kind of way. You'd turn around and go, wooh, you're there?! In truth, he was just so keen to understand what we were doing, how we were doing it, so that was good in one respect, but it was a real pain in the ass in another respect. Ha ha! And I did actually ask him to leave one day, I did say, go away, just go away and leave us to it and we'll let you know when it's done. He took it well!

Once we finally got through that and everyone was happy, the client's family did a movie night, and the feedback was quite simply that they were absolutely stunned, so much so that they had gone in to watch one movie, they stayed to watch a second movie that first night. I guess that's as much as we can wish for.

***WSR* Spears:** That's a great testament. I did want to mention HVAC and lighting issues. I did see on some of the images the vents at the back and so on. Did you have to work on sound or anything, suppression from the vents or the AC?

Black: We allowed for it within the design, and we went for an air exchange system. It produced no noise, as the fan coil unit was outside the room and had really very low fan movement physically. Obviously, we worked on making sure that the ducts were isolated, every part of the path physically into the room itself. And, no, there was absolutely no perception of sound whatsoever from the air-cooling system. We worked with the engineers and designed it's routing, making sure that the intake and outlet vents were in the places that we needed them to be. Lighting is probably my least favorite part of this room. Because I'm the uptight lighting designer, you see, so I'm never going to be happy with the lighting.

***WSR* Spears:** Well, I saw it was fairly basic as a lighting design, but in a theatre, the lights are on, the lights are off, and there's somewhere in between, so you need maybe some guidance lights down steps and things, but I notice it didn't come up much in the documentation so I thought I'd ask.

Black: Do you know what? I struggled with it a bit if I'm honest. One of the original concepts, actually, was to put linear LED strips in a randomized kind of set of lengths, put them in and around and on the intersections of the actual panels, so that was the original concept. But to be frank, everything was so complicated already, I just frankly didn't need to make it any more difficult than it already was. So there was a conscious decision during the production process to pull back on this—thankfully, I hadn't really oversold that to the client—that was my design concept ultimately I suppose. But, no, I kind of pulled back from it. It was a really difficult one because the height of the room meant that I was really limited with a way in which I could light the highs and lows of the walls, so I just chose to put a color LGBW LED strip along the base of the skirt just to lift the whole thing, and I relied on a bit of wall washing just to try and cast some shadowing across each of those individual sets of triangles. The pictures, frankly, don't do it justice because it appears a little bit glary, which it isn't. It's a little bit more controlled than the pictures maybe suggest. I think that given my time again on that project I would certainly approach it differently, but there was a lot of invention happening on the hoof, shall we say. It is what it is.

***WSR* Spears:** The rack did''t need any additional ventilation? It looks from the pictures as though it's a fairly open area.

Black: It's a basement of a manor house. It's like stone walls that are six-foot thick, it was very cool...

***WSR* Spears:** Cellar temperature. Okay, I saw APC being used as some UPS and a bit of protection. Did you use any power filtering or anything heavier duty than that?

Black: No, we didn't.

***WSR* Spears:** Okay. And there was plenty of juice coming out of the wall in terms of power for the amplifiers?

Black: Yes, very much so, yeah.

***WSR* Spears:** Alright, anything else that was a challenge that had to be overcome?

Black: The whole thing was really quite enjoyable for me personally, it was rewarding, not just because we won the CEDIA award, but actually one of the first things the client said to me was, and actually it's the first time ever that an actual end user has said to me, CEDIA awards, what do you have to do to win a CEDIA award?

I subsequently told the UK CEDIA guys that this client had an aspiration to win a CEDIA award, which obviously they were very pleased to hear. And then the net result is mission accomplished, we won that award. But I found it really interesting that right off the bat the client was very clear that he had aspirations to do something quite interesting and different and successful and not of the norm, which is right up our rue, as they say in Scotland.

Honywill: Yeah, we had a series of conversations previously about, how do you reinvent the wheel, how can we make a home cinema something that's more interesting than just a plush shoebox?

***WSR* Spears:** A shoebox, ha ha.

Honywill: That's what they are, isn't it? I personally get very

Equipment rack

excited about architecture, as does Nic, but interesting architecture, where somebody's been thinking outside of the box. It suddenly brings a whole different aspect to the thing because you are walking into a room that makes you think, wow, before you've even experienced the technical aspect of it, and that's kind of really exciting. So, the next one we're going to do is going to be all in green oak and it's going to be an overlaid with a sliding roof.

Ha ha

***WSR* Spears:** So, do you have any interesting projects coming up next?

Black: We have got a couple, yeah. One that the chap's just delayed into the spring of next year. That will be a fun one. It's quite a small space, but again, taking a very kind of interesting technical approach. We've also got one that we're working on, just a small media room cinema for a client that's part of a smart home build, but he's building a bookcase to disguise the entrance to his room, which is great. They're fun, pull the book and the doors open automatically. By chance, the other one that we're doing is similar, which will also be really fun. He's got an anti-room, which he was really excited about doing something funky in. So we've had various conversations, everything from he wanted to theme this whole corridor and anti-room with a secret door, a bit like kind of Diagon Alley style entrance passage, you know, kind of press the right brick and the door opens. That morphed then into another version—he looks at a character off of *The Addams Family*, the bald headed one, what was the name of the character?

Honywill: Uncle Fester.

Black: Yeah, he looks like Uncle Fester, this guy. So you can picture this quite happily. He wanted to turn it into a library but not using the book trick to open the secret door, but by having a chess board next to his big high-back James Bond villain-type chair, with his velvet morning coat on, stroking the cat, all of that. We would set up a sequence of chess piece moves to be able to then unlock the door. I think the current version is to have it as a wine cellar type of feel, and then you have to choose the right bottle and turn it in the right sequence to get the door to open, so that's currently where we are. That's kind of fun.

***WSR* Spears:** Brilliant. I mean, it's nice to have that kind of money where those things are just things you want that you can afford. He actually should have the hand coming out of the box and hitting the squares on the...

Black: We should do that as a gimmick. If you guess the right sequence and turn the bottle around, something bats him over the head or something.

Thank you for doing this. I appreciate your time.

***WSR* Spears:** Yeah, and you, and well done on that job, brilliant.

Thank you, cheers, all the best. **WSR**