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auditoria

Annual 2014

Inside:

Multi-talented

Inside Wolf D. Prix's parametric masterpiece, the Dalian International Conference Center

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foreword

Top of the bill in this 2014 edition of *Auditoria* is the simply exquisite Dalian International Conference Center in China's northeast Liaoning Province. I've already seen it likened to 'a silver-spaceship-looking-conference-centre-slash-opera-house', but it nevertheless won the Architizer A+ Jury Award for the best performing arts space this year and also grabbed more column inches than the Summer Davos World Economic Forum event it hosted back in October. You'd be foolish to argue that Dalian – the so-called San Francisco of China – hasn't now got its architectural centrepiece to match the port city's global aspirations. It's a public space that, as one would expect of Wolf D. Prix from the renowned Austrian architectural firm Coop Himmelb(l)au, challenges tradition and convention.

It's certainly a chameleon of a building, able to morph its appearance on the outside as well as its form inside… at will. This multi-use structure (conference centre for 2,500, a full-sized theatre/opera house for 1,600, a flexible exhibition space and a performance stage, with parking in the basement) is arguably more complicated than Beijing's Olympic Stadium, the Bird's Nest. Hence I'm over the moon that Prix took time out of his very hectic schedule to take us on a tour of his latest creation. Widely regarded to be an 'architect's architect', based on my experience of him, the Austrian is devoid of any of the pretentiousness that precludes many of his contemporaries from even picking up the phone.

Undoubtedly Prix is a character. Earlier this year, ahead of the Venice Architecture Biennale, he issued a press release entitled *The Banal*, suggesting that participating architects were "playing" while the profession was "sinking into powerlessness and irrelevance" at the hands of politicians, investors and bureaucrats who "have been deciding on our built environment for a long time now". Ouch. Outspoken, rebellious and bold, his personality shines through in his work. For me, however, whether you look at his Busan Cinema Center (coincidentally our cover story last year), Musée des Confluences or even BMW Welt, his creations always scream high-tech – which, coupled with flexibility, is a constant theme running throughout this edition. And you can find both in abundance at the groundbreaking Zorlu Center Performing Arts Center (p34).

Still bleary-eyed following a return flight from Istanbul, I can assure you that this bustling Turkish city now has a venue (and business model) that will become the benchmark for mega mixed-use projects in the future. It's also got the team in place to ensure it succeeds in not only nurturing local arts and regional talent but attracting new audiences from Turkey's rising middle class.

The US$2.5bn pricetag for the entire Zorlu Center project is of course a far cry from the US$7m spent at Long Beach Arena on the renovated Pacific Ballroom, but if there's ever been a more ingenious way to enhance the flexibility of a venue to maximise its commercial appeal – essentially creating a blank canvas out of a tired-looking 51-year-old performance space – I'd welcome featuring it next year.

Elsewhere in this issue, you'll read how the nature of performance is continuing to change. Creative artists such as Jon Driscoll (p168) are innovating in more ways than ever, using new technologies in evermore imaginative ways and that's having a huge impact on how venues are being designed. How these and other factors will ultimately play out in our theatres, PACs and opera houses in the years ahead, only time will tell. But we'll be back next year to pick up the story. Enjoy the read!

Nick Bradley, Editor-in-chief

Auditoria loves...

...the Lucerne Festival's Ark Nova – a first-of-its-kind portable concert hall designed by Arata Isozaki and Anish Kapoor

With the appearance of a purple jellybean or perhaps an aubergine genetically modified beyond belief, the world's first inflatable mobile concert hall is open for business in Japan. Designed by Japanese architect Arata Isozaki with British artist Anish Kapoor, Ark Nova is a bold statement of the arts' power to transform lives.

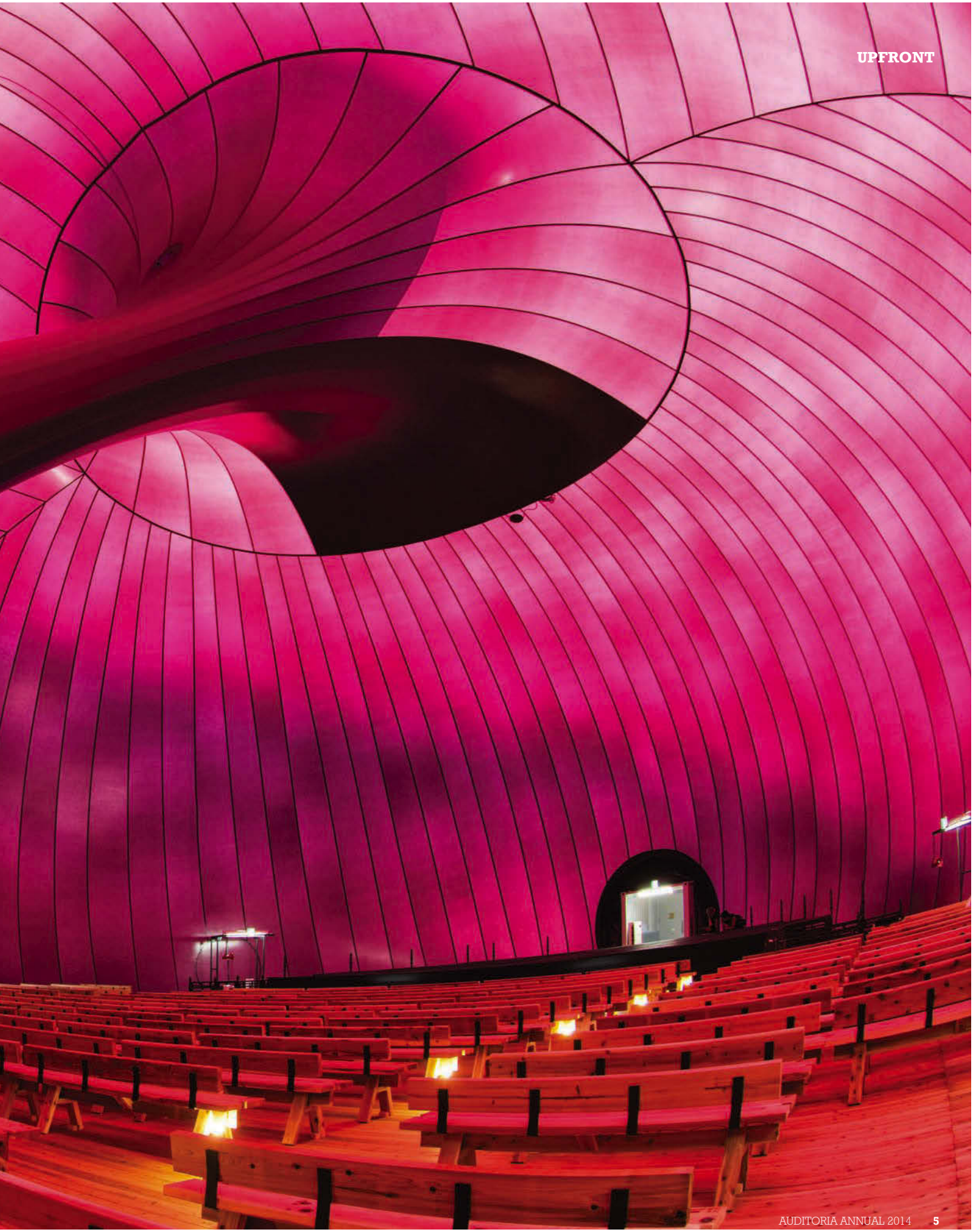
The inflatable hall is currently touring Japan's northeast Tohoku region, devastated by the earthquake and tsunami in 2011. Almost 19,000 people lost their lives in the natural disaster. "Music can give solace and bring the community together and in so doing can help us to see we are not alone," says Anish Kapoor.

About the canny name, the designers explain: "We named the project 'new ark' with the hope that it will become a symbol of recovery after the great earthquake disaster. Ark Nova obviously can't carry people and animals to escape from disaster but we conceived the ark to travel packed with music and arts."

With its uninterrupted interior (30m wide, 36m long and 18m maximum height) Ark Nova can stage orchestral concerts, chamber music, jazz, performing arts and exhibitions. Made from a plastic membrane, the 500-seat hall can be collapsed and packed onto trucks then re-inflated at a new venue. Wood from cedar trees damaged in the earthquake was used for the seating. And the interior seems to glow with warmth, as if peering into the throat of a red orchid.

Ark Nova's first festival in October 2013 was presented by Japan's foremost classical promoter, Kajimoto, and featured workshops by super-maestro Gustavo Dudamel and traditional kabuki theatre and film soundtrack composer Ryuichi Sakamoto. The artistic oomph comes from Switzerland's Lucerne Festival. Lucerne is an elite classical music summer knees-up – tickets cost up to CHF350 (US$387) – but Ark Nova concerts will be free (supported by sponsors including UBS and Nestlé). Ark Nova's artistic promise is true to Japan's 'Yamato-damashii' spirit. ■

Photographs courtesy of Lucerne Festival/Ark Nova 2013

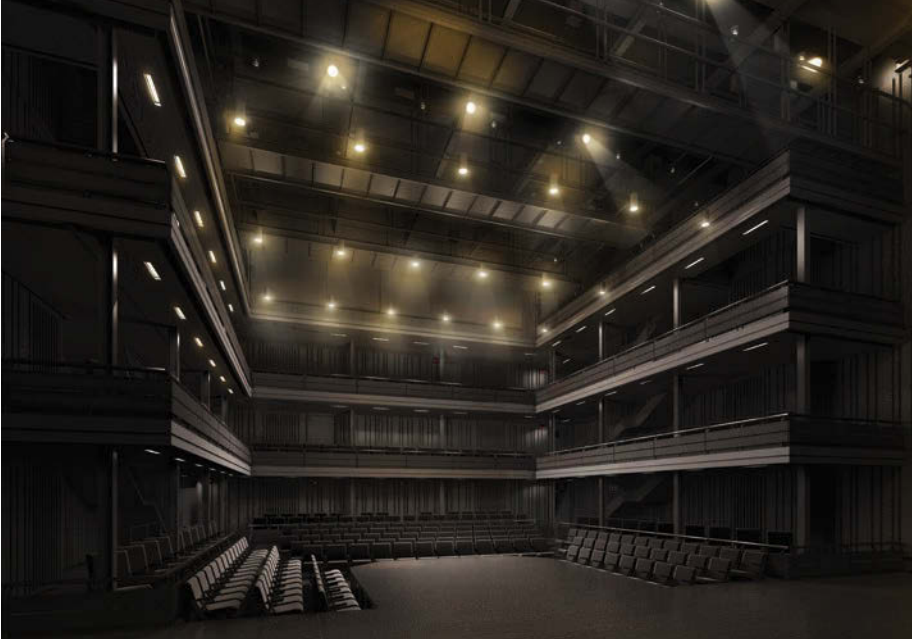


BRIAN LIBBY

The magnificent

Auditoria tours the USA in search of the most exciting and innovative performing arts venues to have recently opened their doors – plus a few that are yet to welcome audiences

UNITED STATES OF PERFORMING ARTS



SFJAZZ Center
San Francisco, California

Photograph courtesy of Mark Cavagnero Associates

Photograph courtesy of SFJAZZ

Although jazz is widely considered to be a quintessentially American art form, the new SFJAZZ Center in San Francisco is breaking new ground as the first freestanding performing arts venue in the USA devoted to the genre (Jazz at Lincoln Center's Rose Hall in New York is part of the Time Warner Center).

Providing a new home to the 30-year-old organisation – which has been scattered in rented venues across Frisco – the SFJAZZ Center will not only provide a state-of-the-art auditorium capable of numerous configurations ranging from 350 to 700 seats, but also boast attendant rehearsal spaces and a sidewalk-level café.

The new space aims to provide not only a physical home for jazz performance and education in San Francisco, but a spiritual home for the entire genre. "We have 700 seats, but we're looking to spread the word beyond that," explains Mount Allen, the organisation's operations director. "We have a small footprint but in our impact we look to be more global."

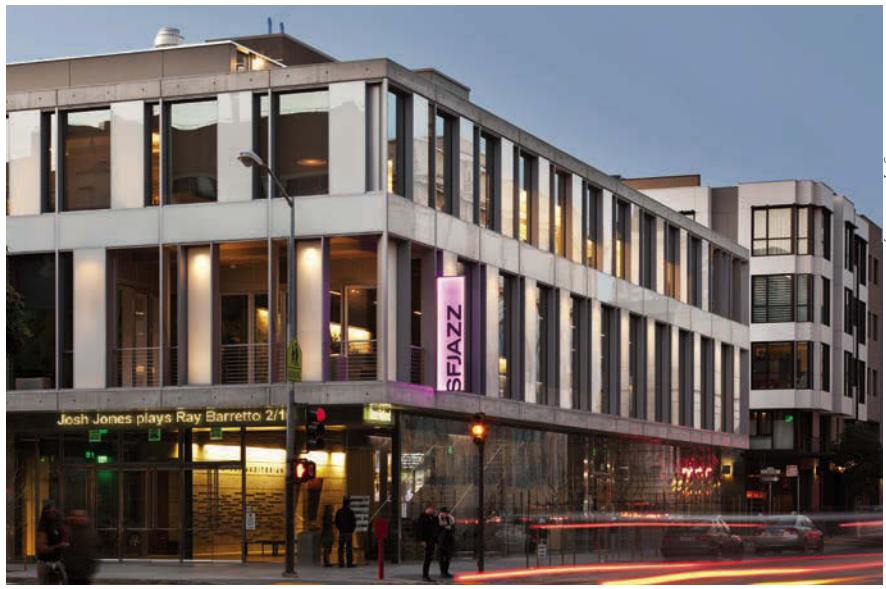
The venue was designed by local firm Mark Cavagnero Associates, a veteran of performing arts spaces. The building is situated along Franklin Street in the city's burgeoning Hayes Valley neighbourhood, near two historic architectural landmarks – the Beaux Arts-style San Francisco Conservatory of Music and the War Memorial Opera House. "It struck me, when out walking, that SFJAZZ should be glassy and transparent," says Mark Cavagnero. "It would be more modest, but stand out and have its own punch. The client liked the idea of doing a glassy contemporary building. The idea was that it would be busy day and night and people passing by would witness the programming."

As well as drawing audiences for scheduled performances, Cavagnero envisaged others attending on a more ad hoc basis. "You could

Inspiration: Architect Mark Cavagnero took his cues from a non-musical typology: a cube-shaped community room along the lines of Frank Lloyd Wright's 1908 Unity Temple in Oak Park, Illinois, USA

Sound check: Auerbach Pollock Friedlander designed the seating, stage and auditorium configuration for the Robert N. Miner Auditorium in collaboration with Mark Cavagnero Associates

Technical feats: Flexible theatrical systems include the piano lift, material lift, overhead rigging support and technical catwalk system, theatrical lighting, room-reduction banners, video projection systems and broadcast infrastructure – all developed by Auerbach Pollock Friedlander



Photograph courtesy of Henrik Kam

(Far left) **Mark Cavagnero**
(Left) **The 35,000ft² venue is configured over three storeys**
(Above) **The transparent façade is designed to draw in passers-by**

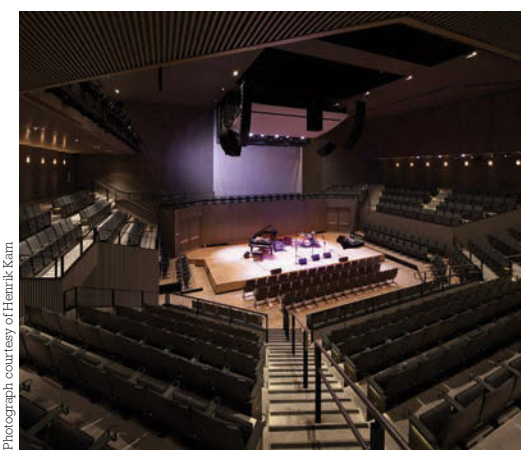
> "Venues like this live and breathe on their sound quality; without it they don't command worldwide recognition"

stop for a coffee in the café on your way home and watch a band practice," he suggests.

Cavagnero's see-through design is therefore fronted by the lobby, café and a performance space. The building is framed with reinforced concrete to allow wide volumes in the public areas and the auditorium, as well as for optimal acoustic properties. Upon visiting a variety of venues in New York for inspiration, the client and architect found it wasn't Carnegie Hall or even small jazz clubs that proved influential, but a series of found spaces in Brooklyn. "Some were smaller than your living room and some were warehouses with curtains and high school bleachers," says Cavagnero. "But the client loved the proximity to the performer in those places. They wanted something intimate that felt very much like a jazz venue and not like a classical music, dance or opera hall."

The auditorium is configured to allow seating on all four sides of the central stage. Allen explains that drumming fans have made the seats behind the band popular, as they can look down on the drummer. "We're quickly becoming known for the acoustic quality of the venue," Allen says. "There are no bad seats visually nor acoustically. Venues like this live and breathe on their sound quality; without it they don't command worldwide recognition."

And Allen would know: his sister is acclaimed pianist Geri Allen, who has already played at SFJAZZ Center since its January 2013 opening and gives the venue her enthusiastic approval! ■



Photograph courtesy of Henrik Kam

The venue's Robert N Miner Auditorium, which was designed with intimacy, flexibility and acoustic excellence in mind

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Writers Theatre
Glencoe, Illinois

Photograph courtesy of Sally Ryan Photography

Background: The Writers Theatre was founded in 1992 with a mandate to make the written word and the nurturing of artists the foundation of all productions

Little-known fact: Acclaimed by *The Wall Street Journal* as one of the top six regional theatres in the country, the company has offered more than 90 productions, including 14 world premieres

They say: The new facility will resonate with and complement the Theatre's neighbouring Glencoe community, adding tremendous value to Chicagoland and helping establish the North Shore as a premier cultural destination

When Michael Halberstam, artistic director of the Writers Theatre, began talking with architect Jeanne Gang of Studio Gang about a new home for the venerable theatre company, the number one priority was for the venue to be as small as possible, yet big enough to cover its expenses.

The company's home is in the Chicago suburb of Glencoe. Ground-breaking on the new US$32m Writers Theatre is set for late 2014, and the construction should take 12-14 months. The existing Women's Library Club building (which houses a 108-seat theatre) will be rebuilt into a 250-seat thrust theatre (the audience will be arranged around three sides of the stage) with an adjacent 99-seat black box-style flexible theatre, which was previously housed in another location.

"I think the return to the thrust stage, the immersive theatre and the intimate space is all part of a move away from proscenium-style venues," adds Halberstam. "Now that we have movies with so much CGI, I believe people crave a real 3D experience, to be drawn into the world of the theatre. Intimacy is integral to the experience." Thus, the stage and seats will be at the same elevation, blurring the border between performers and audience.

The two theatres will be connected by a lobby that will also serve as a venue for additional performances, lectures and gatherings, enabled by a series of bleacher-like tribune platforms. "It's so open right now in terms of its possibilities; it could be anything and everything," Halberstam says. "When you're building a performing arts centre – and certainly in today's fiscal climate – it's important you enable multiple uses. The two-storey lobby, constructed with timber trusses, offers wide volumes of space to look out from and into through a glass curtain wall on three sides. A portion of the glass façade is also comprised of sliding doors that enable the space to open onto the street and the surrounding Friends Park, with its grove of mature trees."

Halberstam says a contemporary structure was desired because although the company performs "a fair amount of classical revival" theatre, it wanted to give a fresh perspective. But he remembers that when he first talked to the company's board of directors about hiring Gang – who won a prestigious MacArthur Foundation Fellowship, also known as the 'Genius Grant', in 2011 – there was some hesitance. "They worried that we'd end up with a spaceship, a testament to Jeanne's ego," he says. "Yet when we showed them the brochures [with Gang's design], the first thing we heard was, 'Wow!' People are coming to experience great theatre but they'll now leave having also experienced great architecture. She really does live up to the notion of genius that's become attached to a MacArthur Fellowship. She's been a marvellous collaborator. And I think she's one of the reasons the building has reached its funding goals." ■

(Top left) **Jeanne Gang** (Above) **The main thrust theatre** (Below) **The exterior has an open and contemporary feel**

Renderings courtesy of Studio Gang Architects

Wallis Annenberg Center for the Performing Arts

Beverly Hills, California

Photograph courtesy of Wallis Annenberg Center for the Performing Arts

Renderings courtesy of Studio Pali Fekete Architects

Some arts venues are established when an existing arts organisation needs a new home. At other times, as in the case of the new Wallis Annenberg Center for the Performing Arts, the building itself has prompted the creation of an organisation and venue.

The Wallis, as it's familiarly known, was born out of an effort to save and restore the historic Beverly Hills Post Office. The Italianate-style building, which opened in 1933, is teeming with luxurious materials, wide voluminous spaces and intricate architectural detail. "The whole mission was to preserve, adapt and keep this historic landmark, and bring it back to use for the community," reveals Lou Moore, the centre's executive director. "When you walk into the grand hall, it's breathtaking. There's marble, vaulted ceilings. You feel like you're walking into a place that is very special."

The original intent was to create a 500-seat venue for theatre, music and other performing arts, within the massive post-sorting room. But when architecture firm Studio Pali Fekete came on board, lead designer Zolton Pali saw a potential conflict in the plan. "If you actually look at the space you need for a 500-seat theatre, you could never really do it without completely destroying the fabric of the historic structure," Pali explains. "They were already planning to add a new wing for a studio theatre, administration, classrooms and back-of-house facilities. I said, 'You are looking at this the wrong way – you should put those things in the old building. They're small things that will fit. Build a state-of-the-art theatre next to it and connect them."

Indeed, The Wallis now features two buildings – the historic Post Office with a small, flexible studio theatre and attendant spaces, and the 500-seat Goldsmith next door in the former loading dock area. To meet zoning code strictures that stipulate that the new building cannot be taller than the Post Office, Pali's design buries the two-storey Goldsmith one level underground.

"There's a grand staircase that takes you down towards what would be the basement of the old Post Office. You emerge into the lobby of the new theatre," Pali continues. "This new theatre lobby opens up to a sunken courtyard and sculptured garden. It has a 30ft-high wall of glass. And the lower 8ft portion is glass that's not only completely transparent, but actually slides away. You'll be able to open that entire level up so the bar that sits in the middle of that area can be visually turned inside-out."

The building is clad in copper-toned cement panels that are shaped in the proportions of a standard 4 x 9in mailing envelope. "I thought, 'What if all the letters that came through here actually came back? It's a way to play with the geometry," Pali says. The panels are placed at differing widths, ranging from 0.25in to more than 1ft apart, to create a three-dimensional effect. "Pali kept the past and took it into the future," sums up a very pleased Lou Moore. ■

Opening night: The centre is set to open in October 2013 with an inaugural black-tie gala with Jamie Tisch as chair and Robert Redford and Brad Pitt as co-chairs

Financial account: More than a decade in the making, The Wallis will have an estimated final price tag of US$70m. The money for construction was raised privately, and the centre is leasing the property from the city of Beverly Hills for just US$100 a year

New audiences: The Wallis will also feature a 150-seat space called the Lovelace Studio Theatre, which will host performances geared towards children, as well as other intimate productions

(Top left) **Lou Moore** (Top right) **The modern Goldsmith Theater sits alongside the historic Post Office** (Below) **The new theatre's lobby**

Bing Concert Hall
Stanford, California

Photograph courtesy of ©Andy Ryan

Build it and they will come: Turner Construction Company was awarded the US$69.9m contract by Stanford University to provide the construction services for Bing Concert Hall

Did you know? TV actor Anna Deavere Smith of *The West Wing* was the master of ceremonies for the opening night, which featured superstar conductor Michael Tilson Thomas leading the San Francisco Symphony

Technology in situ: The venue is outfitted with Shure UHF-R wireless microphone systems for uncompromised sound and tight system control. The centre has already welcomed notable performers, such as cellist Yo-Yo Ma, violinist Midori Goto, performance artist Laurie Anderson, the Ukulele Orchestra of Great Britain and the Cappella Romana vocal ensemble, among many others

Perhaps as a result of its proximity to Silicon Valley and the tech-industry stardom of many alumni, arts at Stanford University are often overshadowed by maths and science. But as part of the Stanford Arts Initiative and a university-wide effort to enhance and support the arts, there is now a new home for concerts and performances at the elite institution – Bing Concert Hall. "It's become a kind of magnet for all kinds of people on campus," says Wiley Hausam, executive director of Bing Concert Hall and its manager, Stanford Live.

Designed by New York firm Ennead Architects, the 112,365ft² building opened in January 2013. It was budgeted at US$111.9m and funded in part with a US$50m lead gift from alumni Helen and Peter Bing.

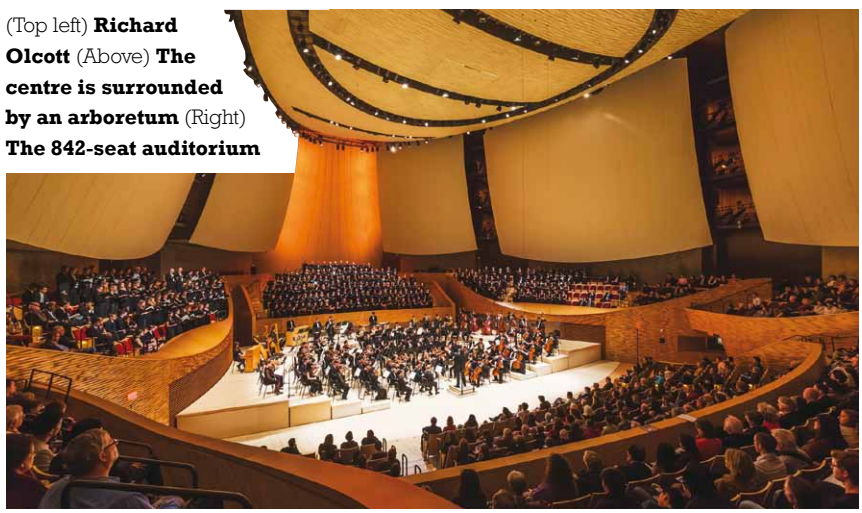
For the 842-seat auditorium, Ennead worked closely with renowned lead acoustician Yasuhisa Toyota of Nagata Acoustics, known for his work on the Walt Disney Concert Hall in Los Angeles. They created a theatre clad in beech and Alaskan red cedar (species regarded for their optimal acoustic properties), with terraced vineyard-style seating surrounding a 3,190ft² central stage. The maximum distance between seats and stage is only 75ft, creating a feeling of intimacy, while 12in-thick concrete walls ensure optimum filtration of outside noise. Yet the space is also grand, with soaring, 48ft-high ceilings, distinguished by an array of 10 acoustic sails, which double as video screens. Also hanging overhead is a 'ceiling cloud' that houses and carefully disguises most of the technical lighting, rigging and sound support equipment.

"We looked at the science of sound and likened it to textures and curves, looking at imagery of water and rippling landscapes, sand dunes, clouds – there are no straight lines or smooth surfaces, just organic shapes," explains Richard Olcott, a partner at Ennead. "Everything was done with the acoustics in mind – all the materials selected and all the profiles designed to provide the optimal acoustic experience."

The oval-shaped building also includes a studio/rehearsal hall, artists' suites, a music library, instrument storage rooms designed to double as practice rooms, an artists' lounge and a 360° lobby that surrounds the auditorium. The lobby's 19ft-high glass curtain wall brings plenty of natural light into the building, as well as a view of the campus arboretum that surrounds the building. The façade also includes sliding glass doors on two sides that open onto the arboretum.

"It really is a complete indoor-outdoor experience," Wiley Hausam emphasises. "This is not a big, bold architectural statement, even though I think it's absolutely gorgeous and elegant; it's rooted in function and a kind of feeling. It has a real sense of peace that is like nature. And you can feel it's creating a sense of community that's quite palpable." ■

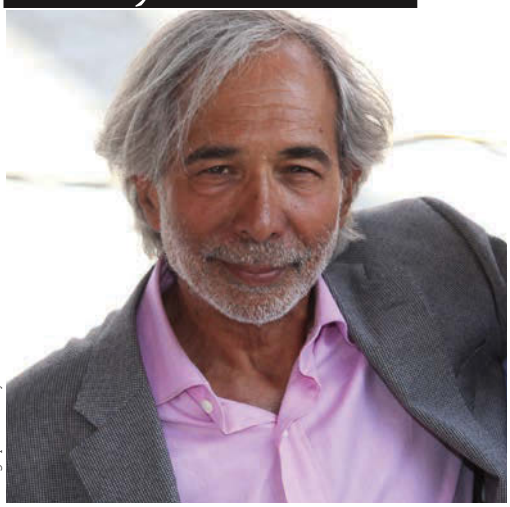
Photo © Jeff Goldberg/Esto



Photograph © Jeff Goldberg/Esto

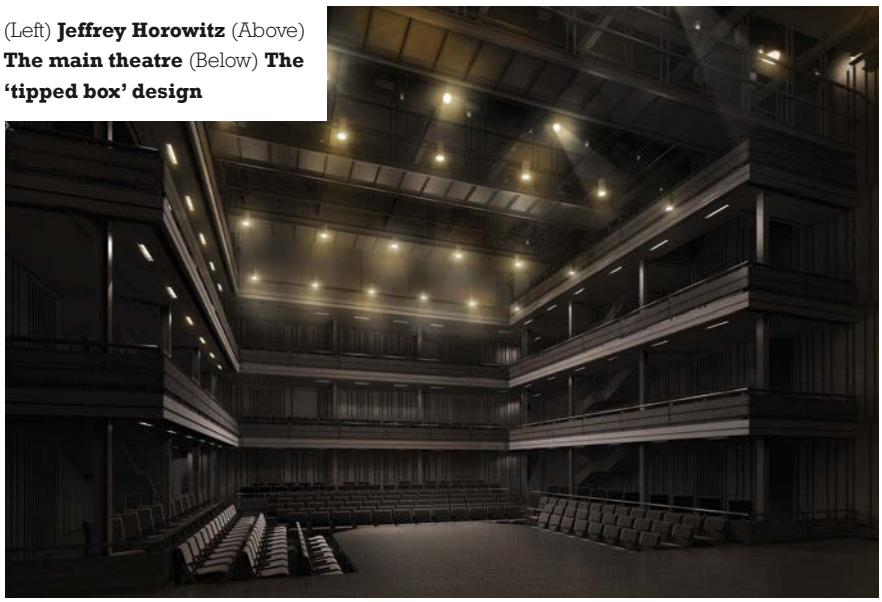
(Top left) **Richard Olcott** (Above) **The centre is surrounded by an arboretum** (Right) **The 842-seat auditorium**

Polonsky Shakespeare Center
Brooklyn, New York



Photograph courtesy of Theater For A New Audience

(Left) **Jeffrey Horowitz** (Above) **The main theatre** (Below) **The 'tipped box' design**



Renderings courtesy of H3 Hardy Collaboration Architecture

The Polonsky Shakespeare Center may have taken 13 years of fundraising and negotiations, two architects and three intended sites in order to come to fruition, but looking at the architecture you can discern its mission within a few seconds.

It is the new home of Brooklyn-based company Theater For A New Audience (TFANA), which wanted a space evoking a black-box theatre: simply adorned but designed for flexibility, openness and experimentation. The theatre was designed by New York firm H3 Hardy Collaboration Architecture to resemble a black box, tilted to both figuratively and literally open to the light. "As our name implies, we're interested in change," says Jeffrey Horowitz, artistic director at TFANA. "You therefore need a space that doesn't impose a single perspective on the audience and artists. We were interested in a theatre that could shape a relationship with an audience in ways we may not be able to imagine."

An earlier version was designed by Frank Gehry, architect of icons such as the Guggenheim Museum in Bilbao, Spain, and the Walt Disney Concert Hall in Los Angeles. But the design was deemed too expensive and Horowitz came to believe the simpler shape of Hardy's tipped box – where the glass curtain wall makes theatregoers a kind of theatre unto themselves – would be a much better option. "It's the proportion that's interesting, the simplicity," Horowitz suggests. "It's not about smashing the form."

Did you know? The first production in the new theatre will be directed by Tony Award winner Julie Taymor, who directed her first Shakespeare play, *The Tempest*, for TFANA in 1986

Financial account: The theatre raised US$65.3m as part of its US$69.1m capital campaign, which included money to support the construction of its H3 Hardy-designed building, as well as programmes and operations

An another thing: TFANA created and runs the largest programme to promote Shakespeare and classical drama in NYC's public schools. Started in 1983, it has now served more than 125,000 students, in 4th to 12th grades

Contrasting with the lobby's bright openness is the darkness of the 299-seat main stage, with the audience surrounding the stage on three sides from an orchestra level and two balconies. Configurable in seven set-ups, its design was inspired by two London venues – the Cottesloe Theatre (which is the smallest of the National Theatre's three auditoria) and the Globe Theatre, associated with Shakespeare. "The audience is very close to the stage and it's very intimate; you see nothing but faces all around," explains Geoff Lynch, a partner at H3 Hardy. "For Shakespeare – where you want to see the actor wink, make those subtle facial changes and be close enough that they don't have to yell – being that close is hugely important."

The theatre, the first major venue for classical work to be constructed in New York since the Vivian Beaumont Theater at Lincoln Center in 1965, was realised through a public-private partnership. The city provided the land and approximately 70% of the construction costs, and will be the building's owner. TFANA signed a 30-year lease with an option to purchase outright.

The 27,500ft^2 building, set to achieve a silver LEED rating, utilises LED lighting. To mask outside noise and vibration from a nearby subway, the theatre itself is constructed like a separate structure, sitting on 8in-thick rubber pads and a 3ft-thick concrete foundation. ■

Claire Tow Theater
New York City

Photograph courtesy of Lincoln Center

(Left) **Hugh Hardy** (Above) **The Tow lights up at night** (Below) **Visually the Tow had to complement the Beaumont, on which it sits**

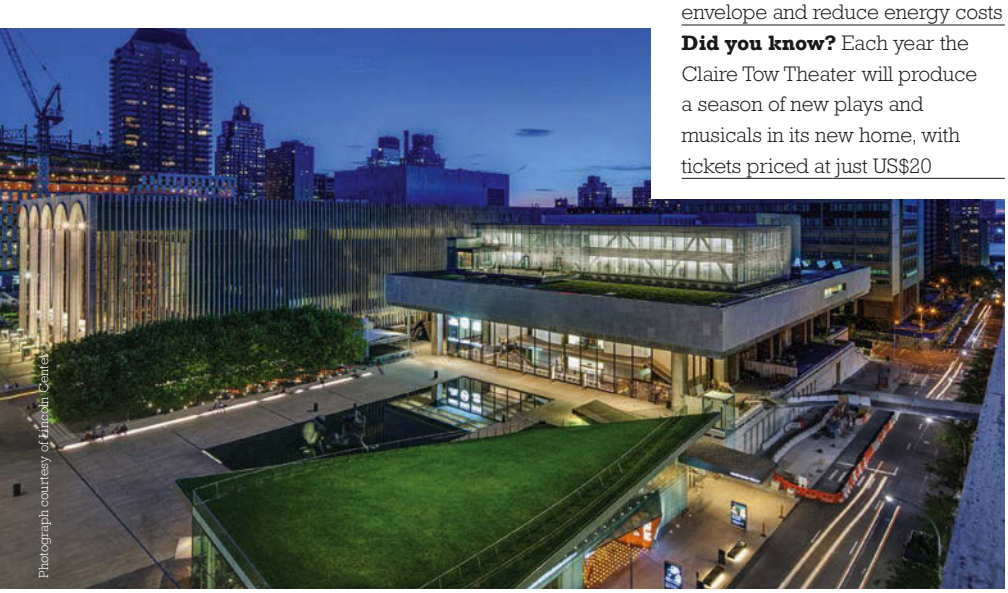
Fifty years after the first building at New York's Lincoln Center for the Performing Arts was completed, the 16-acre complex, home to more than 25 performance facilities, has been undergoing a US$1.2bn dollar restoration, involving 37 projects. "It's New York – we have five million visitors a year," says Lincoln Center's Betsy Vorce. "As a performing arts centre you need to renew."

One of the projects is the US$42m, 112-seat Claire Tow Theater, named after a supporter who donated US$7.5m. The Tow sits on top of the existing 1,080-seat Vivian Beaumont Theater,

Press acclaim: The Claire Tow Theater received rave reviews from *Architectural Record*, *Interior Design Magazine*, *The Architect's Newspaper*, *The New York Times*, and was named a winner of *Architect Magazine*'s 2012 Annual Design Review, celebrating the best of American architecture

Green card: The SGCC-certified tempered and heat-soak tested Lamberts glass channels were provided with a low-e coating, to control the building's thermal envelope and reduce energy costs

Did you know? Each year the Claire Tow Theater will produce a season of new plays and musicals in its new home, with tickets priced at just US$20



Photograph courtesy of Lincoln Center

NYC's only Broadway-class theatre that isn't located in the theatre district near Times Square. The Beaumont differs from traditional Broadway theatres in its fusion of stadium seating and thrust stage. "It is quite unlike any other theatre," says Hugh Hardy of H3 Hardy Collaboration Architecture, which was tasked with the Tow project. "It could have two entirely different configurations, but it's a vast volume for a Broadway theatre. It lacks that intimacy."

The Tow is intended to attract younger audiences and more experimental productions while honouring the Beaumont's architectural integrity. "A lot of architects would be pulled to contrast against something as stoic as the Beaumont," explains H3 Hardy's Ariel Fausto. "We decided that the very best solution was something that would simply complement it."

Although the Tow seems to blend in with the Beaumont during the daytime, at night its horizontal exterior screens (which minimise solar heat gain during the day) help create a jewel effect. "We wanted something translucent, transparent: something that changes as the light changes," Hardy continues. "It's a big box, but it's a different kind of box. It's contemporary because it uses the same forms, the same ideas for structure, but it isn't solid. When it's lit at night, the idea is that it would create a homogenous surface. We didn't want a hodgepodge of lights on this building. There's a certain austerity we wanted to capture as well. When everything is lit, it feels like a continuation of that architecture."

Completed in 2012, the Tow is LEED silver rated. "Theatres are by their nature energy hogs; they don't often have a consistent use pattern," Fausto accepts. "There's an intensity of energy used at very specific times." Working with Arup, the electrical, mechanical and plumbing engineer, the architects focused on managing solar heat gain from the glass wall, and on a green roof for added insulation.

Just as importantly, Fausto notes, not all of the spaces have to be cooled all the time. "If the system is smart enough to prioritise what's in use or not in use, that's a big deal," he says. "That really takes a commitment from your client too. You may be spending a little bit more money at first with an intelligent building management system, but it becomes critical for future use." ■

Saenger Theater
New Orleans, Louisiana

Photograph courtesy of Martinez + Johnson

Image courtesy of Saenger Theater

Among the historic landmarks damaged when Hurricane Katrina struck New Orleans in 2005 was the Saenger Theater in the French Quarter. The Saenger was built in 1927 as a movie palace, featuring elaborate Italian Baroque designs and 150 lights in the ceiling, arranged in the shape of constellations. After being converted to a performing arts venue in the 1970s, it had been undergoing a modest renovation when the hurricane brought flooding to all of the theatre and its basement areas.

In 2009, four years after Katrina, the Saenger's rebirth began. A city agency, the Canal Street Development Corporation, assumed ownership and financial responsibility for the venue, agreeing to lease the building to its previous owner, the Saenger Theatre Partnership, for 52 years. While the city agreed to a US$38.8m restoration – funded in part with approximately US$15m of federal and state grants and tax credits – the partnership is required to host at least 80 shows and sell 100,000 tickets a year.

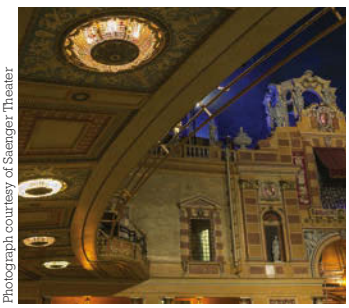
The restoration process began with ventilating the building to dry out its waterlogged interior, a process that took more than six months. Laser scanning was used to create 3D maps of the original design and décor. The goal was for the Saenger to be a multi-use venue with a strong focus on touring Broadway productions. "That dictated a very strong back of house," says Gary Martinez of Martinez + Johnson Architecture, the Washington, DC firm behind the Saenger renovation. Back-of-house spaces were expanded out into Iberville Street, at the rear. "The scheme enlarged the stage house and made it wider, deeper and higher," the architect explains. Dressing rooms were relocated to the basement area, which had held mechanical systems (moved to the roof), with enough room left over to more than double the size of the women's rest room and add concessions.

The building is distinctive for its covered interior courtyard, lined with classical arcades, which were restored. Previously, two sides of the courtyard had been part of adjacent buildings owned by others, but the Saenger was able to acquire them and use the ground floor areas for expanded lobby space looking out into the courtyard. An escalator was also removed in favour of a more compact elevator, which freed up space for guests to congregate. On the second floor, a VIP lounge was added, which connects directly into the theatre from the mezzanine lobby. Throughout, decorative finishes were replaced, from the travertine in the lobby to extensive plaster work in the auditorium. "But we managed to save more than 95% of the original material," Martinez notes. "You get this sense of a bit of a fantasy when you walk in – just a very different feel than the rest of the architecture in New Orleans." ■

Did you know? The Saenger formally celebrated its reopening with a gala event featuring Kristin Chenoweth and the Louisiana Philharmonic Orchestra

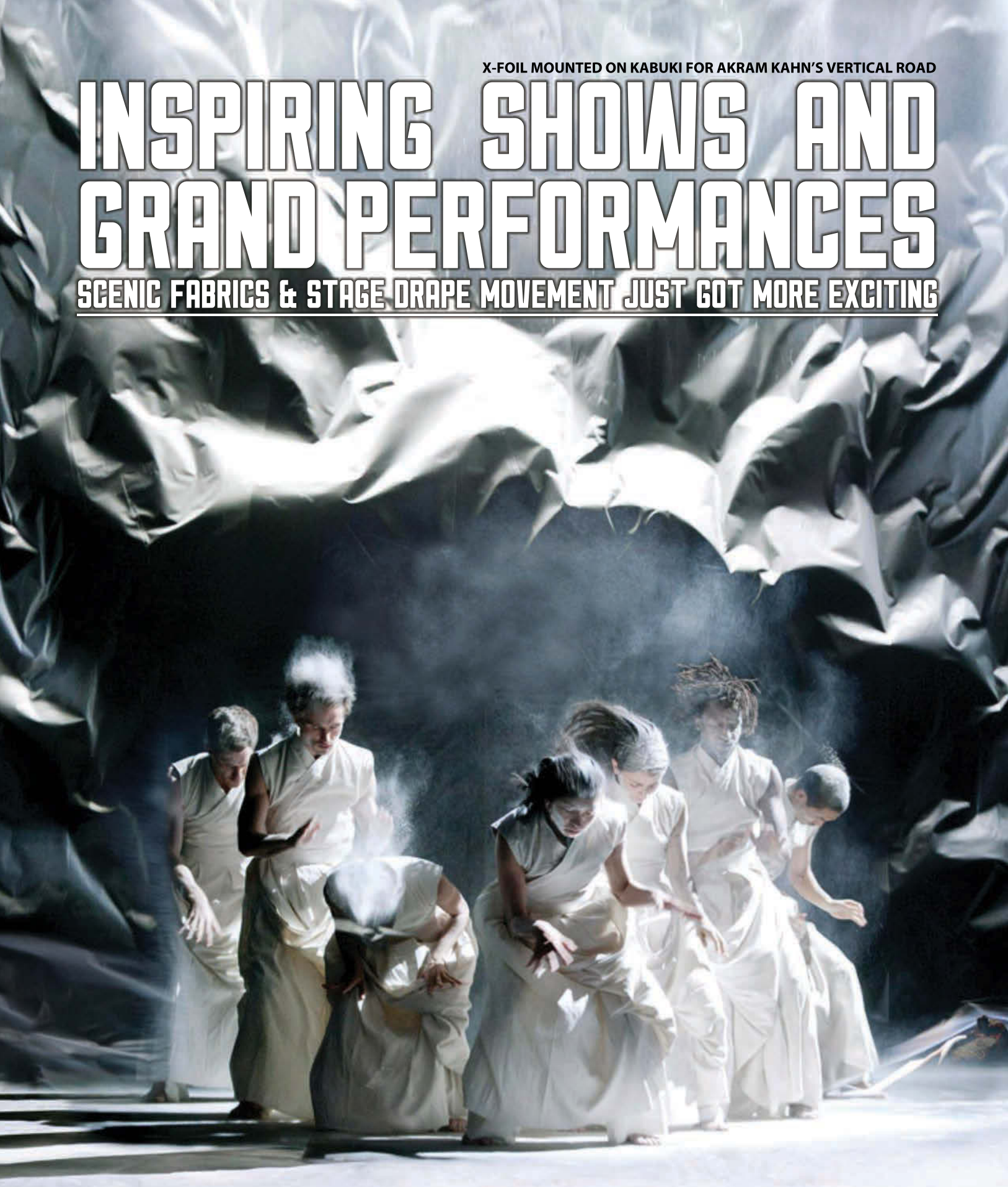
Capacity gains: In order to accommodate the increasing size of citizens, the overall number of seats has dropped from roughly 3,000 before August 2005 to 2,613

All change: The depth of the stage has grown from 35 to 50ft and the height of the backstage has doubled from 50 to 100ft. In light of Hurricane Katrina, the new Saenger has also been specifically designed to withstand 12in of water for 24 hours



Photograph courtesy of Saenger Theater

(Top left) **Gary Martinez** (Top right) **The Saenger reopened in October 2013** (Above) **Most original details have been kept**



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EMMA POMFRET

Phoenix de Paris

Although political and financial complications long threatened to quash France's dream of a symphonic hall in its capital, the beautifully dignified Philharmonie de Paris is – finally – rising into the skyline

The Philharmonie de Paris could just as appropriately be called the Phoenix de Paris. The £316m (€387m) concert hall, designed by French 'starchitect' Jean Nouvel, has risen from the ashes of disaster – twice. Suspended for months in 2010 amid Europe's economic slowdown, in November 2012 President François Hollande's new government threatened to bring down the curtain on the project's spiralling costs – but reasoned it had gone too far and cost too much to abandon. Discussed for some 20 years, the glittering concert hall is due to open in 2015, two years late and more than twice its original budget. So if it can engender national pride – as those close to the project believe it can – it will be a phoenix indeed.

At its most basic, the Philharmonie is the concert hall that Paris has been lacking. Big

Although Orchestre de Paris will be the resident orchestra, the Philharmonie de Paris will promote other forms of musical expression such as jazz and world music

Image courtesy of Ateliers Jean Nouvel & Artefactory

Image courtesy of Ateliers Jean Nouvel

"The Philharmonie de Paris isn't just a pretty box to make musicians more comfortable. It creates duties and challenges that we'll have to be up to" *Laurent Bayle*

on lyric heritage, France has world-class opera houses but it has never had a symphonic hall to compete with Berlin's Philharmonie, Vienna's Musikverein, Amsterdam's Concertgebouw or Tokyo's Suntory Hall. But the Philharmonie is much more than a high-concept concert hall – which will please those who are paying for it, namely the French government, the City of Paris and the Parisian Région Ile-de-France (percentage split of 45:45:10).

The Philharmonie has lofty social ambitions to attract new audiences, to revolutionise music education and – at its site on the northeast edge of Paris – to reconnect central Paris to its *banlieues* or suburbs. In short, it is a *grand projet* in the mould of François Mitterrand's 1980s-1990s civic statements, including the Louvre Pyramid and Bibliothèque nationale.

The Philharmonie was announced in 2006, six months after Paris's suburbs erupted in riots. "It demonstrates that culture remains that vector of emotions and shared references essential to living together in harmony," says Bertrand Delanoë, Mayor of Paris since 2001. (If you've seen Mathieu Kassovitz's film *La Haine*, you'll realise how bold it is to propose classical music as a social glue.) "The Philharmonie de Paris isn't just a pretty box to make musicians more comfortable," argues Laurent Bayle, president of the Philharmonie de Paris board of directors (pictured left). "It creates duties and challenges that we'll have to be up to."

Pride and place

After an international competition in 2006-2007, with Zaha Hadid and Coop Himmelb(l)au shortlisted, Ateliers Nouvel won the contract. "Our client is very ambitious," says architect Jean Nouvel. "And I had to find a solution to their many ambitions."

In fact, understanding what the Philharmonie doesn't want to be is the simplest way to appreciate Nouvel's design. It doesn't want to follow a traditional concert hall shape (shoebox, vineyard, chamber, arena or fan); it doesn't want to promote a conventional concert or outreach experience; it rejects conventional programming; it doesn't want to attract a purely traditional classical audience.

Nouvel's design evolves from the Philharmonie's site within the cultural Parc de la Villette, beside the Paris ring road and in an area considered the border between Paris and its suburbs. It will be a new musical centrepiece alongside the existing Cité de la musique, Grande Halle and the Zenith Arena.

"I try to be a contextual architect and it was important that the building was in harmony [with the park]," Nouvel explains. With its fluid contours, the 20,000m² Philharmonie has no main entrance, but instead opens in all directions to the park. Sloping ramps, steps and esplanades draw the public into and onto the auditorium's five levels. There is a garden beneath the building and Nouvel is particularly proud of la Villette

hill. "It is a walkable mineral relief, which forms an observatory over the urban landscape," he says. From the roof, the public can gaze across Paris as well as its suburbs.

"The site is a little hidden [behind city buildings]," Nouvel continues, "so if there is no auteur's concept, you risk having a building that is insignificant for a project that is very significant." For the exterior, he has chosen pearl-like cast aluminium that flashes grey-silver in the changing daylight. A 'swirl façade' around the auditorium and public foyers is made of mirror-polished stainless steel scales, while opaque or transparent glass is used for other façades.

"The building," adds Nouvel, "creates a sense of wonder; it should make passers-by curious about what's inside". The jewel in this case is the auditorium, which with 2,400 seats remains intimate (no seat is further than 32m from the conductor). Brigitte Métra of Métra + Associés (who worked with Nouvel on his Copenhagen and Lucerne concert halls) was the associate architect on the Philharmonie concert hall for the past six-and-a-half years and she remembers the exciting opportunity to invent a new concert space. "I wanted to work with a void, to have a space empty of everything not necessary for acoustics – to create an instrument with the audience togetherness of Copenhagen [vineyard and the sound clarity of Lucerne [shoebox].

"We asked ourselves if musicians and conductors needed to feel the sound reflections close to them; did they need a certain substance? In short, did a large space frighten them? But it was the opposite; those we knew encouraged us to create an open, fluid space."

Inner space

The Philharmonie envelops its audience in a moderate chamber. The audience walks on gangways through a larger outer space before entering the inner seating space where suspended balconies surrounding the stage appear to float in the void. In many areas it is impossible to define where the inner and outer chambers begin and end, so the hall's shape remains fluid. "It evokes immaterial sheets of music and light," says Nouvel. "One has the impression of being

POLITICS AND ART

With its spiralling price tag, the Philharmonie has faced two major crises: construction was suspended in 2010 and the entire project potentially binned in 2012. Building (by Bouygues and a consortium) ceased in 2010 after three million man-hours and an estimated €10m had been spent on the foundations. Insiders argue the government had misrepresented the initial budget. "It's a well-known tactic to underestimate the budgets for cultural projects so they get the political green light – and to put pressure on the architects," Jean Nouvel told Agence France-Presse (AFP) in 2013.

By 2012, the political agenda was even tighter. President Nicolas Sarkozy's attempts at an architectural and cultural legacy were out of step with the continued economic downturn. Under frugal President François Hollande, the grandiose Philharmonie de Paris was once again in question. In November 2012, Paris Mayor Bertrand Delanoë – an early champion of the project – and new Minister of Culture Aurélie Filippetti denounced the "incredible financial drift" as an extra €50m bailout was sought. "We have to stop throwing away tax-payers' money," they said, and suggested finding private sponsors.

Laurent Bayle blamed double-digit inflation in the construction industry and pledged to reduce costs where he could. Frédéric Mitterrand, Minister of Culture under Sarkozy, said his Socialist successors had "no cultural vision". Ultimately the government concluded that too much had already been spent to abandon the project. And the Philharmonie lives on…

Image courtesy of Ateliers Jean Nouvel

Seen from the outer suburbs of Paris, the innovative architectural design of the Philharmonie makes a strong statement

Image courtesy of Atelier Jean Nouvel & Artefactory

surrounded and immersed." The effect will be heightened as the hall is washed in different light to fit a varied repertoire.

Supporting the architectural 'void' is a new bi-cameral acoustical concept designed by Harold Marshall. "Bi-cameral is a completely new concept in terms of floating one chamber within the other," explains Chris Day, founding partner of Marshall Day Acoustics. "The brief included a larger room volume than normal for a 2,400-seat concert hall. Harold said, 'Why don't we have this larger volume and then the smaller seating area with a series of reflectors?'"

The specific acoustic requirements – large reverberation with a high level of clarity – are conventionally incompatible but they are achieved by the building itself. The big volume of the outer chamber creates reverb while clarity comes from the smaller seating area. Integral reflecting surfaces behind the seating area provide early energy, as do floating clouds at the ceiling. "These help to form the inner chamber," confirms Day. "They are all angled to provide early reflections into the audience, to provide the high lateral energy and high clarity."

Breaking from convention

Looking at the site plans, the Philharmonie's emphasis on education (1,800m²) and public access (800m² exhibition space and a chunk of the 2,300m² rehearsal space) is clear. It has pledged to be a public service that promotes music performance throughout France, to revitalise concert practice and encourage younger and 'underprivileged' groups. It estimates 120,000 people will participate in workshops each year and many more will access a strong digital offering. Bound up with its socio-economic aims, the Philharmonie has pledged to turn conventional programming on its head.

Weekends will focus on family and student concerts – appropriately priced, shorter or with commentary, workshops for children, guided tours and multimedia events – while the headline concerts (guest orchestras and star performers) will appear in the week. "The star system will no longer be the only means used to attract patrons," suggests Laurent Bayle. "Programming more and more 'event' concerts – which are therefore more and more expensive and therefore more and more targeted to an already faithful, upper-class audience – progressively cuts off youth and middle-class patrons from classical concert-going. If we took this route, the Philharmonie wouldn't push boundaries far enough."

THE SCIENCE BEHIND THE SOUND

How many acousticians does it take to tune the Philharmonie? The answer is four. The original acoustic brief was written by Belgium-based Eckhard Kahle, who signed off every element of the hall. Marshall Day designed and engineered the auditorium's acoustics with Yasuhisa Toyota of Nagata Acoustics, personally appointed by Nouvel. "Toyota has a 'marshal' role; I know Toyota well," says Nouvel. Finally, French acousticians Studio DAP engineered noise control for the entire building, and all other room acoustics.

"Such a complex geometry [as the auditorium] has an impact on every part of the project," says Studio DAP founder Federico Cruz-Barney. "My work is more difficult because I have to isolate that geometry from outside and adjacent spaces. We used an exterior envelope all around the room, acoustically decoupled from the inner one. The possibilities for error are greater, like walls that can't touch; when you have people pouring concrete, that can be forgotten in a hurry."

Studio DAP has also designed the acoustics and noise insulation for the diverse practice and rehearsal rooms (2,300m²). "Other halls have rehearsal facilities but the size is impressive with the Philharmonie," suggests Cruz-Barney. "It's a challenge to coordinate the enormous work over so many rooms."

Photo courtesy of Philharmonie de Paris

(Top) **The auditorium brings visual intimacy and – by wrapping the audience around the musicians – creates a new rapport with the stage**
(Above) **Work in progress, as of August 2013; opening is due in early 2015**

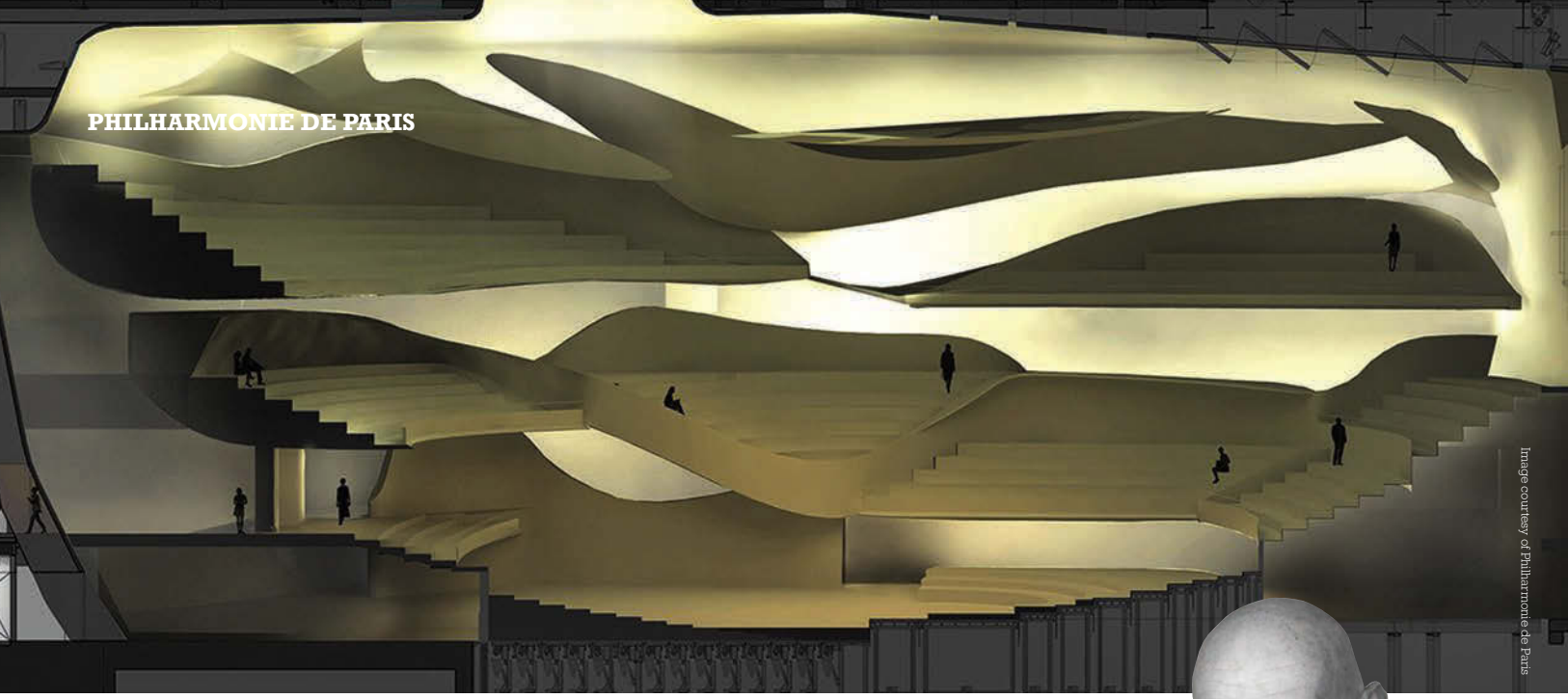


Image courtesy of Philharmonie de Paris

"It's not [about] building a new concert hall in the elite eighth district, but a major piece of musical equipment for the public" *Jean Nouvel*

Photo courtesy of Philharmonie de Paris

(Above) **Large-scale acoustical models offer what architect Jean Nouvel says are excellent listening conditions, providing information that computer simulation cannot** (Top) **The large auditorium can adapt physically and acoustically to different musical styles**

Of course the hall is flexible; orchestral, world, chamber, choral, jazz, and organ music can all play well here. The main stage platform can be raised and lowered on hydraulic lifts; by dropping it entirely, the Philharmonie can fit a standing audience of 3,200. Huge deployable acoustic curtains will help to reduce the reverb time but can also form smaller, alternative stages for jazz or world music. In addition, six small pop-up stages dotted around the auditorium enable soloists to perform among the audience.

Such diverse programming requires diverse rehearsal rooms. The Philharmonie has 16: one orchestral (with an identical stage to the main auditorium) and one chamber rehearsal room, both potentially open to the public; four smaller rooms (acoustic-specific for chamber, strings, vocal, percussion) and 10 rehearsal studios.

The aim is to make the Philharmonie de Paris a global player with a premium placed on excellent rehearsal space for its resident ensemble, the Orchestre de Paris, and for visiting musicians. "Think of a high-level soccer team," offers Bayle. "It can't improve without proper training facilities – the game itself, inside the stadium, isn't enough to unite the group."

Working musicians will also have a staff foyer with bar and restaurant. The commercial offer for the public includes a park-level garden café, top-floor restaurant and terrace, shop, bars in every foyer, and function rooms.

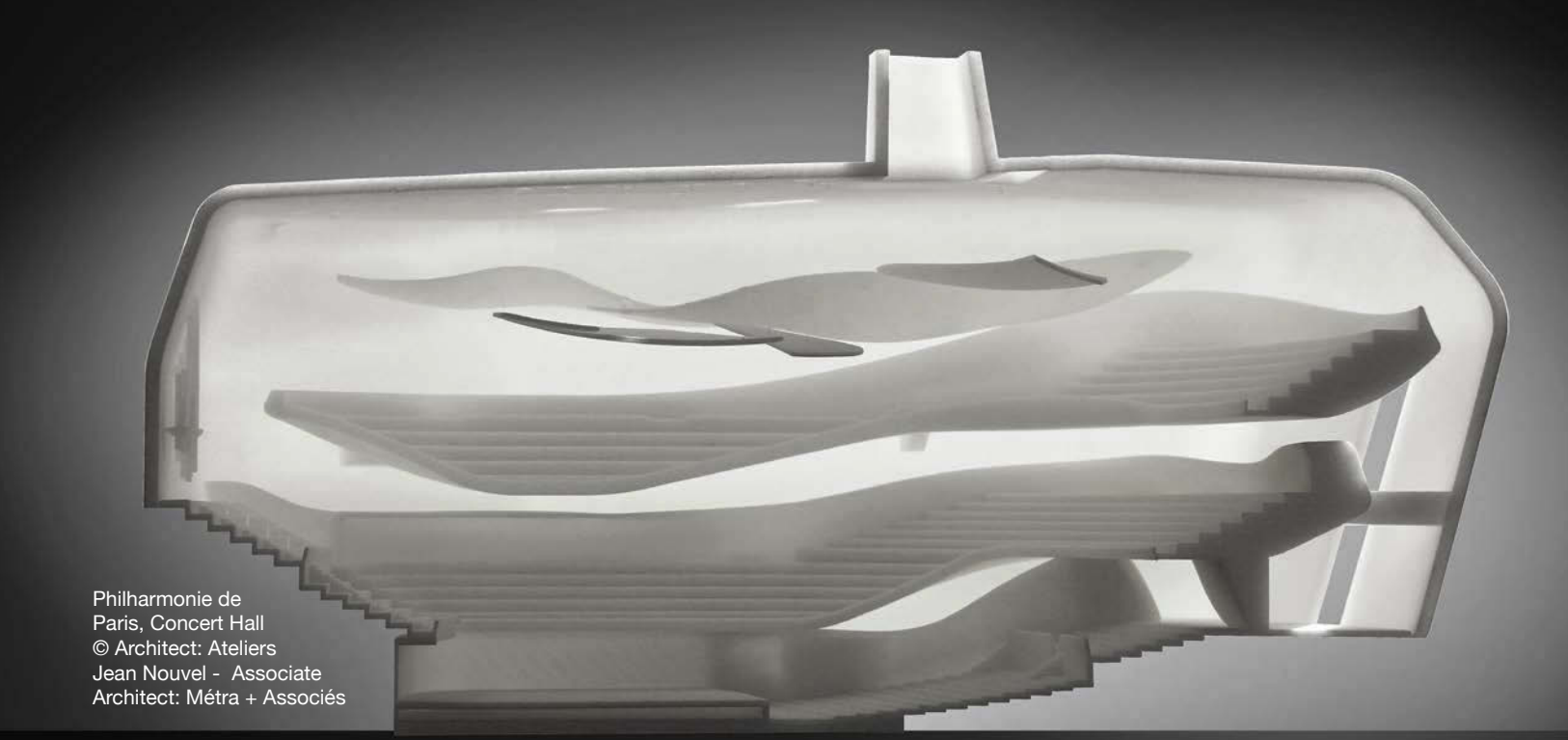
Statement of intent

Throughout his career Nouvel (pictured above) has favoured a technical conceit or two; think of the sun-filtering oculars on his Arab World Institute in Paris. For the Philharmonie, he has designed a wide blade – a vertical screen that rises perpendicular to the ring road. It displays concert listings and lights up at night. "But it's not a big billboard with photos of singers or conductors… not some sort of cinema advertising," he smiles. "It fits with a certain restraint in presenting concerts." Most importantly, this visible blade announces the Philharmonie to the suburbs and city – it makes an architectural connection with its public.

The Philharmonie must hope that the Parisian public accepts it with as much pride as Copenhagen has embraced its DR Koncerthuset."I'm fighting for the Philharmonie to be finished with dignity," Nouvel told a French newspaper in November 2012. "Some people pretend not to understand the importance of the project. It's not [about] building a new concert hall in the elite eighth district, but a major piece of musical equipment for the public. France has been dreaming of this for half a century!" ■

Author

Emma Pomfret is a regular contributor on the arts for *The Times*, *The Guardian* and industry titles including *Opera Now*



Philharmonie de
Paris, Concert Hall
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Theaters, Perpignan,
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Associate Architect : Métra + Associés

Harmony between architecture, acoustics and scenography

"When you build a concert hall, you are not only building a space, you are creating an instrument. Our job is to find the perfect combination, the symbiosis of all the required parameters, and to design an instrument specifically unique, which resembles no other."
Brigitte Métra, IRCAM magazine 2012-2013 Hors les Murs

Competition for the Cité Musicale of Ile
Seguin, Boulogne-Billancourt, France –
Architects: Métra + Associés – ARM

DALIAN INTERNATIONAL CONFERENCE CENTER

BRIAN LIBBY

Cult

Photograph courtesy of Duccio Malagamba

Mural icon

Conceived to reflect the tradition and promising future of its home city, the Dalian Conference Center encompasses a state-of-the-art opera hall and an organised network of modern business facilities

For architect Wolf D. Prix of the Vienna-based firm Coop Himmelb(l)au, his story of creating the Dalian Conference Center in China's northeastern seaport city of Dalian began several years before in Munich, when Dalian's mayor visited another of the firm's designs, the BMW Welt.

Serving as a grand architectural stage of soaring glass and a spinning ramp for its luxury cars – unveiled there to customers as part of the company's European delivery programme – BMW Welt earned substantial praise from both critics and the public. "Its undulating steel forms, suggesting the magical qualities of liquid mercury, may be the closest yet that architecture has come to alchemy," gushed *New York Times* architecture critic Nicolai Ouroussoff about the design.

"They were excited about it," recalls Prix of the mayor's delegation. "They wanted to have it in Dalian, which was a good starting point for a design competition!" And although the city still asked Coop Himmelb(l)au to compete with a handful of other firms first, Prix won the commission in 2008. The biggest challenge was the timetable: the client wanted the building completed in just three years.

Originally planned as a venue to host the Davos World Economic Forum, held in Dalian

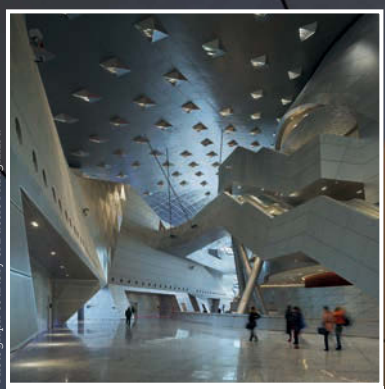
in late 2013, the conference centre is intended to be a landmark that will raise the profile of the city, which, at the tip of the Liaodong Peninsula on Korea Bay, near the North Korean border, is home to more than six million people. It is also part of a wave of high-profile public building and infrastructure projects taking place in China over the past decade, many of which have been designed by the world's most influential architects. They include arts facilities such as Zaha Hadid's Guangzhou Opera House, sports stadia such as the Herzog & de Meuron-designed Bird's Nest, as well as office towers including Rem Koolhaas's iconic CCTV Headquarters.

Shape shifter

The Dalian Conference Center's programme – which combines a traditional conference centre with an opera house – makes it architecturally unique beyond its eye-catching aesthetics. Although the original design called for a hotel with a conference centre, around six months into the process the hotel dropped out of the commission. In its place, the client requested an opera house and added exhibition space. This kind of structure – a shell covering several different cultural venues – is more common in China than in Europe and the USA. The building's shape became shorter and wider as a result of the programme change; less conical and more like a shellfish or turtle shell.

Not only did Dalian seek architecture that would express its emergence on the global stage, the city also reserved a prominent site that had to be factored into the design. Located at the axis where two major boulevards merge in the emerging central business district, the triangular building site – in turn – helped to create the building's triangular shape. The building also expands from its relatively modest plot of land by cantilevering outward in its upper floors. Its form is an aerodynamic wrapping of the numerous different-sized conference rooms and other venues inside, which can accommodate up to 6,000 people at a time.

"I wanted the building to be lively despite of its size," Prix adds. "I also wanted to design a hybrid building where people would be able to orient themselves quickly and not get lost. This was most important. It was a challenge not to

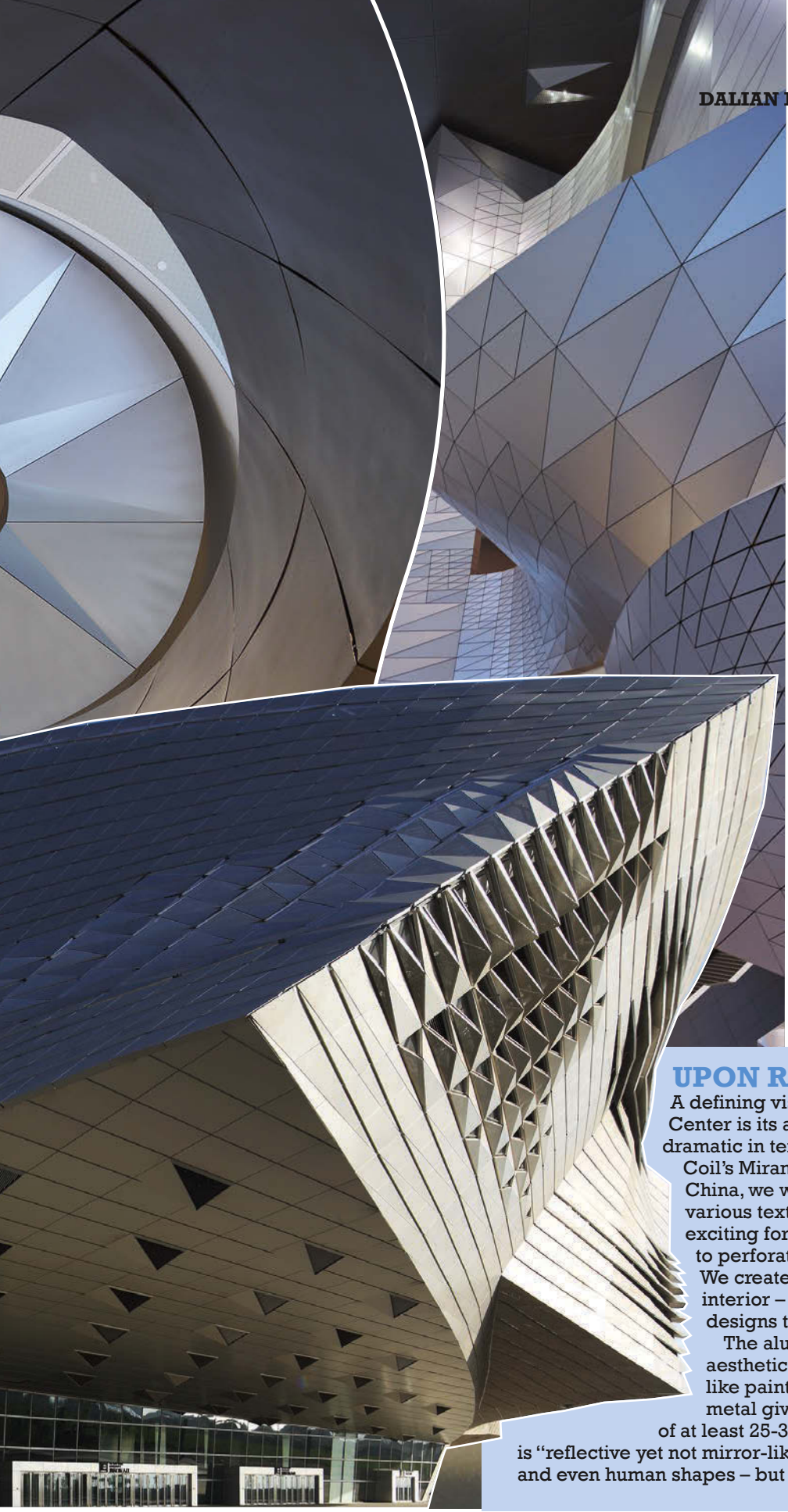


Photograph courtesy of Duccio Malagamba

(Above) **High standards in circulation and comfort have been established** (Below) **The centre was intended as a way to create a bustling waterfront district outside of Dalian's dense urban centre** (Right) **The design resembles a seashell with a surface that contains one million separate aluminium plates that change light reflections according to the time of day or weather**

"It was a challenge not to make it corporate, but we have created a liquid, animated building – a little city for 6,000 people" *Wolf D. Prix*

All main images courtesy of Shu He



make it corporate, but we have created a liquid, animated building – a little city for 6,000 people."

Indeed, although the Dalian Conference Center is 50m tall encompassing 146,800ft^2 (13,638m^2) of space, Coop Himmelb(l)au has made it easy to navigate inside the building. "It feels as though you are walking around a city," explains Cui Yan, chief architect at the Dalian Architectural Design & Research Institute. "You can feel the texture of the city and appreciate the position of the building in its wider context." Yan also says that during Japanese occupation in the early to mid-20th century, Dalian's waterfronts had been sprawled with factories and ports, scarcely allowing public use. Creating a new high-density core wasn't just a matter of progress but re-introducing the people to their coastline.

Functional considerations

Visitors enter the five-storey building at ground level through entrances on four different sides. The ground level is an open urban area with several informal meeting areas, catering zones and gardens. "It was really important to provide spaces for casual interactions, not just formal communication," Prix explains. "We created a number of areas where people can sit together and talk casually. The lobbies of the opera and conference rooms can be accessed by escalators, and the opera galleries are on the floor above.

UPON REFLECTION

A defining visual element of the Dalian Conference Center is its anodised aluminium skin. "It's rather dramatic in terms of the shapes it offers," suggests Coil's Miran Sarkissian. "With the fabricator in China, we were able to work out how to create various textures and forms, which was very exciting for both sides. We went from solid panels to perforated panels and then to bent corners. We created the possibility – particularly on the interior – to produce sculpted surfaces and designs that are completely unique."

The aluminium façade offers a combination of aesthetics and performance and doesn't corrode like painted aluminium surfaces. Anodising the metal gives it a performance, Sarkissian estimates, of at least 25-30 years. At the same time, its appearance is "reflective yet not mirror-like". It will reflect the green of the trees, and even human shapes – but in a "diffused, artistic way".

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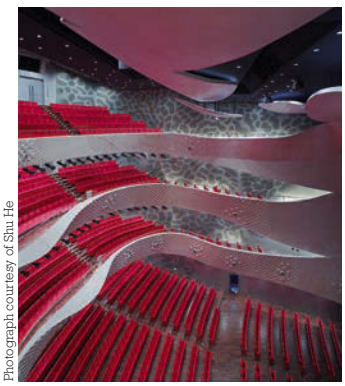
Photograph courtesy of Ducoto Malagamba

Photograph courtesy of Ducoto Malagamba

All these levels are also connected by a bridge. It's a three-dimensional Chinese garden."

Stretching from the second through fourth floors and held in place by striking 15m-high pillars is the 1,650-seat grand theatre, also known as 'the opera'. "This is the heart of the building," Prix suggests. "The conference rooms surround it like a necklace." The opera is linked to adjacent spaces via large zigzagging bridges. The second floor also houses smaller spaces such as a media centre, dressing rooms for performers and an office area. On the third floor, to the side of the opera, are the Davos Banquet Hall and six large conference halls of differing sizes. The fourth floor, meanwhile, is filled with 26 small meeting rooms and two multifunctional VIP halls.

Although the opera was a later addition to the Dalian Conference Center design programme, the client still sought world-class acoustics. "This can only be achieved through close cooperation and mutual understanding between the architect and acoustician," insists Eckard Mommertz, managing director of Müller-BBM International. "This was definitely the case here. It's a perfect example of how acoustical needs can translate into great architecture. The acoustics influenced the general shape of the hall, its surfaces and the materials – but not in an obvious way."



Photograph courtesy of Shu He

(Above) **A fitting space for large theatrical performances** (Top right) **through controlled daylight input, good spatial orientation for visitors is assured** (Top left) **The opera house comfortably seats around 1,600 patrons**

The building's steel structure actually presented challenges in respect of the acoustics, according to Mommertz. "Structural constraints made it difficult to protect adjacent spaces from noise interference," he explains. "Accordingly, sophisticated lightweight constructions were developed for most of the walls and the ceilings. Two concrete walls in the main hall also provide the desired level of sound insulation."

And it's not just a conventional opera space either, since an additional conference hall featuring 2,500 seats is positioned at the back of the opera and combined with it. With this arrangement the main stage can be used for the classical theatre auditorium as well as for the flexible multipurpose hall.

Structure and sustainability

A building of this size required corresponding strength. As such, the structure is supported by 14 core tubes linked by steel truss structures, with the largest overhang reaching 45m. This is part of a larger hybrid of beams, columns and space frames. The roof, overseen by Hunter Douglas, uses a honeycomb panel and vertical locking system; it's also designed to withstand earthquakes of up to 7.0 on the Richter scale.

The building's anodised aluminium skin is independent of the core structure and acts as

OPTIMISING THE ACOUSTICS

Creating optimal sound properties in Dalian's opera house as well as the myriad of other meeting spaces and public areas was a multifaceted challenge. "In the main hall, the conferences, shows, Beijing operas and western operas all have different acoustical needs," comments Eckard Mommertz from Müller-BBM. "Meanwhile the other areas have mainly been designed for reinforced speech events." To avoid excessive reverberation in the large circulation areas and plazas, the ceiling and parts of the outer wall claddings of the halls are designed to absorb sound.

In the opera itself, the team used multilayered gypsum board, which has a high density and an optimised shape, as well as wooden flooring. The perforated aluminium wall cladding is sound transparent. Behind the cladding, acoustic banners are used to adjust the acoustics depending on the event. Even the leather seating has been designed to meet acoustical specifications.

Photograph courtesy of Studio

"The conference rooms surround the opera like a necklace"

a tight sculptural wrap that contributes to energy efficiency. Some portions of the aluminium are perforated while others form a series of louvres, designed using 3D parametric software to maximise natural daylighting and ventilation. Rooftop louvres also help channel prevailing winds inside and guide it upwards and out.

Aluminium has also been used inside the building to emphasise its connection with its surroundings. "The building has come together in a way that has never been done before," says Miran Sarkissian, vice president of global market development for Coil – the conference centre's anodised aluminium contractor. "You can do a lot more with the material than some might think is possible."

As the city of Dalian and the conference centre sit close to the coastline, it was possible to use seawater to cool the air. The aluminium exterior is also part of a double-layered curtain wall system (the interior layer is made of glass) that helps insulate the building. "The design was concerned with guiding sunlight and wind through the building to support the internal climate," says Prix. The resulting building appears somewhat like a spaceship, with its contours and cantilevering giving it a floating appearance. At the same time, it's akin to a high-performance sports car or jet fighter, with the movement of air through its machinery resembling cutting-edge aerodynamics. It is the new architectural geometry of the 21st century, where sustainable performance drives new sculptural abstractions.

Photograph courtesy of Duccio Malagamba

(Above) **The angled louvre system that receives and channels the flow of air keeps the building cool** (Top) **Most of the conference rooms have direct daylight from above**

Form and function

With a building programme this large and complex – and with design and construction team members from different countries – there were inevitably challenges to overcome. "The cultures were different, but we all understood what the goals were," Prix confirms. "It meant we could approach the same problem in different ways." Coop Himmelb(l)au collaborated with the Dalian Institute of Architecture Design and Research, as well as with Dalian firm UD Studio.

Unlike any other building around the world, the stunning Dalian Conference Center has already established itself as a cultural destination for performing arts, as well as a business capital that's able to host some of the largest conferences, conventions and forums. And it's not just symbolic of China's architectural ambitions but – as its economy cools – also of a new national pragmatism that can be found within its multifaceted programme. Although a landmark building with an arresting beauty, its foundations are firmly rooted in function and efficiency. ■

EFFICIENCY AND SELF-SUFFICIENCY

The Dalian Conference Center's sustainable design has helped reduce its electrical load by about 30%, compared to a conventional building. "We used every tool available to reduce energy use," says architect Wolf Prix of Coop Himmelb(l)au. The building employs stacked ventilation, for example, to expel unwanted heat and carbon dioxide, and the use of seawater to cool the air-conditioning system reduces the building's HVAC electricity usage by 15%. "We also undertook wind studies to support the cooling of the building," Prix adds. Furthermore, the rooftop is lined with photovoltaic panels. There was also an emphasis on using natural light. While many conference centres bathe their public circulation areas in sunlight, meeting rooms are often windowless. In contrast, nearly all of the conference rooms at Dalian, as well as the circulation areas, are subjected to direct daylight from above.

Author

Brian Libby is a Portland, Oregon-based freelance journalist who specialises in the arts and architecture

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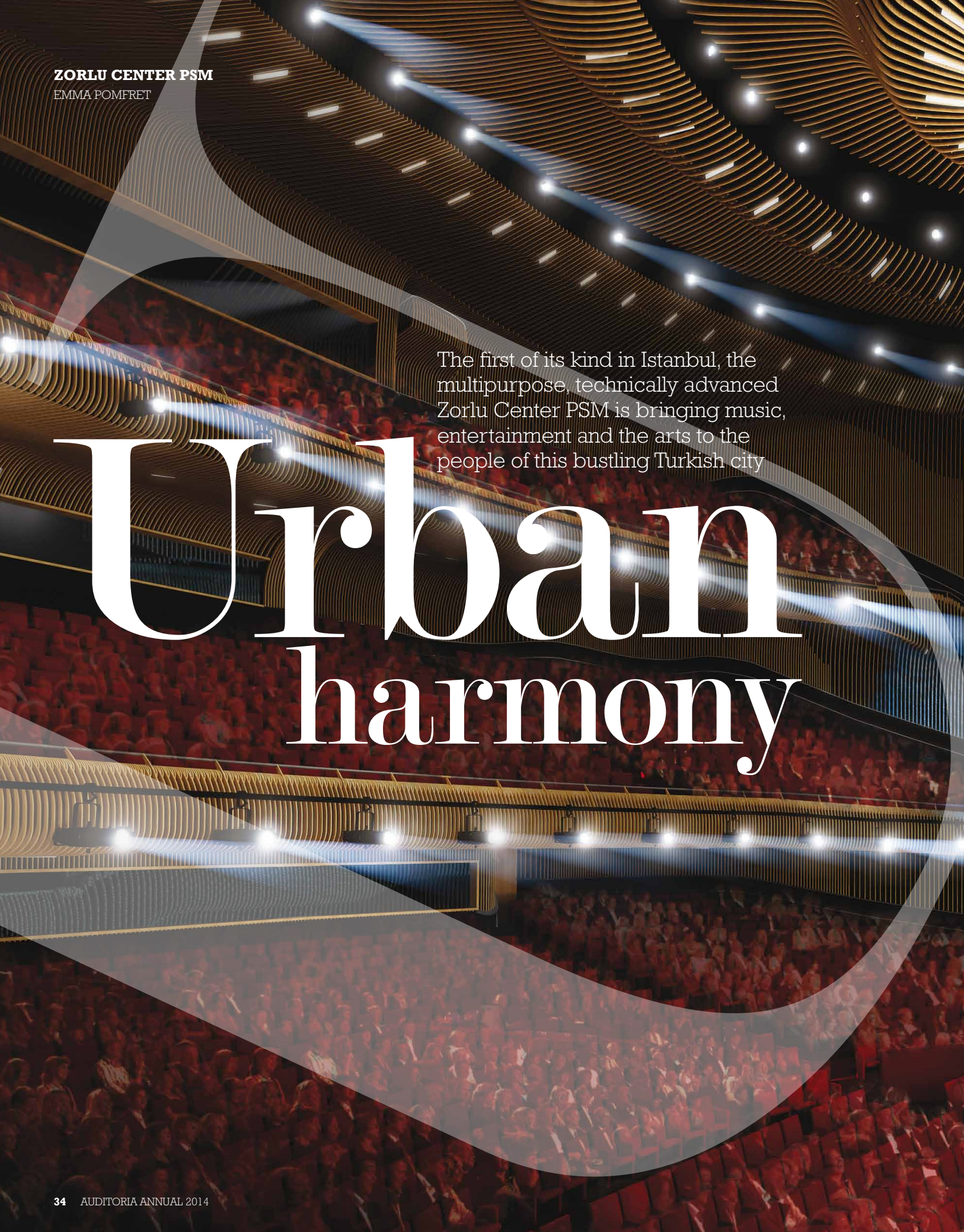
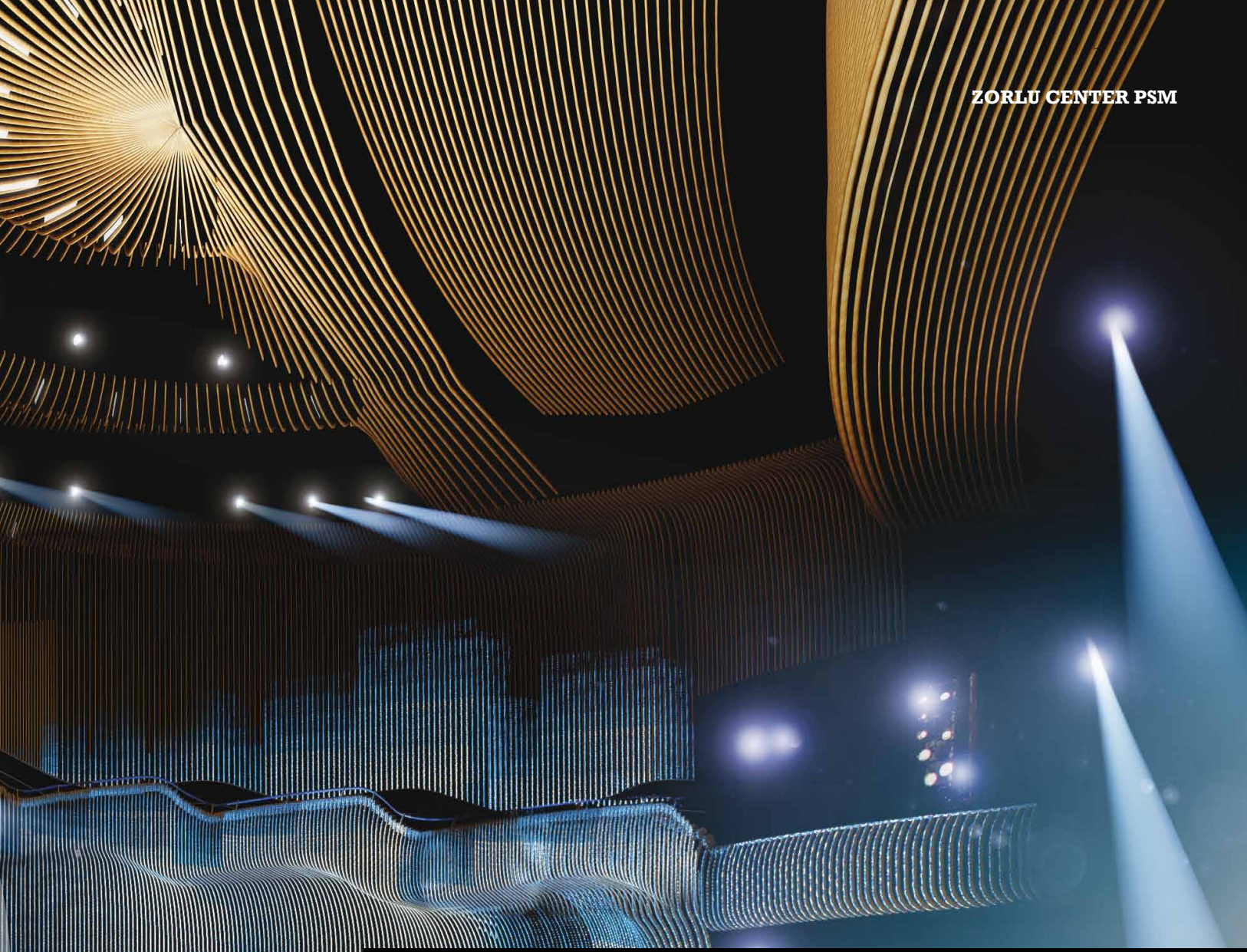
ZORLU CENTER PSM

EMMA POMFRET

The first of its kind in Istanbul, the multipurpose, technically advanced Zorlu Center PSM is bringing music, entertainment and the arts to the people of this bustling Turkish city

Urban harmony





Ray Cullom is sitting in his palatial office in Istanbul discussing the new Zorlu Center Performing Arts Center. "The Turks," he grins. "When they do things, they do them big! This is a PSM on a scale I've certainly not encountered before."

The US$350m Zorlu Center, opened in October 2013, has put Istanbul firmly on the entertainment map. For the first time, the Turkish culture capital has a purpose-built venue designed to present everything from Broadway musicals to Turkish folk dance. Its audience is potentially massive – in the millions. It is technically the most advanced theatre to date. And its operator is one of the world's best: Nederlander Worldwide Entertainment (NWE) – which has dispatched Ray Cullom from Broadway to the Bosphorus as general manager. Cullom's 50,000m² PSM is just one part of a US$2.5bn multi-use complex financed by Zorlu Property Group that includes a Raffles Hotel, glossy shopping mall and luxury flats.

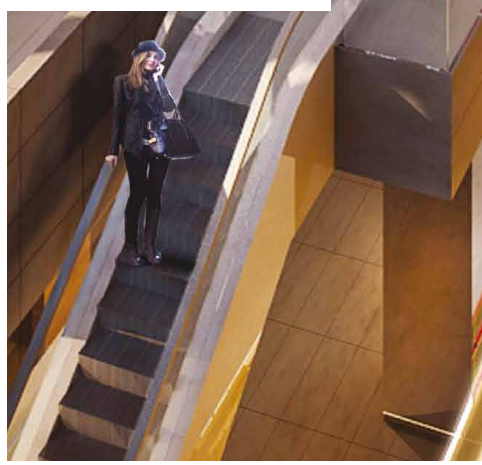
The site occupies a prime spot in Istanbul, in the popular Zincirlikuyu business district in the north of the city, and close to the Bosphorus Bridge, which connects the Asian and European sides of the city. The 100,000m² plot – the last spot with panoramic views over the Bosphorus and historic Istanbul – cost the Zorlu Property Group US$800m in a public option sale of state land in 2007. It was the most expensive land sale in Turkish history – and more expensive than chunks of Manhattan.

What now stands there is an elegant marriage of private and public space designed by two Istanbul architects Murat Tabanlioğlu and Emre Arolat, who were selected in an international competition of 117 entrants. Subtle yet striking, the entire Zorlu Center is an undulating structure

with four towers, 72,000m² of landscaped public gardens and squares. "The piazza at the heart of the complex has modern and fresh characteristics on the one hand and quite traditional ones on the other," says Emre Arolat. "The fact that this private property contains such rich and well-equipped public spaces, open to citizens from all kinds of social classes, is the most exciting part of the project for me."

Under one green 'hill' are the two glass cubes of the Zorlu Ceter PSM: one 2,262-seat musical theatre and a second 738-seat drama theatre. (An additional multi-use studio and recording space seats 112.) "There was a big park here before so the green roof is a reminder for people," suggests Murat Tabanlioğlu (his father designed Istanbul's AKM opera and ballet theatre in Taksim Square in 1969). "The Zorlu Center has many different functions so we didn't want this building standing out more," says Tabanlioğlu of the way the PSM blends into the site.

(Main) **The public foyer/lobby areas welcome visitors with a dynamic three floors of open air space and unique architectural grandeur** (Left) **The PSM delivers world-class performance in an intimate, exclusive and luxurious setting** (Left, top) **The all-inclusive 650m² VIP lounge, which features a limited capacity for 250 guests**



Intimacy and versatility

Anne Minors Performance Consultants (who worked with Tabanlioğlu on the Kazakhstan Palace of Peace, 2006) and Bob Essert of Sound Space Design collaborated on the PSM's interior and acoustics, defining the cultural offering in the process. "The idea of a musical theatre was something Zorlu latched on to relatively early on," says Minors. "It was different for Istanbul and commercial."

That concept was cemented by a Zorlu visit to London to see *The Lion King* musical and Westfield shopping centre. Minors and Essert then advised on how to create a 2,262-seat auditorium that retains intimacy and versatility. "Having two balconies keeps the auditorium near the stage," says Minors, of a feature that is unusual in Istanbul's conference-focused venues. "We also didn't want the 1,000 seats downstairs to feel like a big American roadhouse with aisles and aisles of seats." Instead there is an inner 500 and another slightly elevated 500 behind, a solution that also creates different price options for stalls – essentially there are two front rows.

With Minors establishing the room's geometry and sightlines, architects Emre Arolat and Murat Tabalıoğlu designed the interior aesthetic. The room is clad in thousands of timber strips, modelled by computer but applied by hand. They create fluid lines, eliminating corners. "You get this interesting, almost Gaudí-esque effect on the balconies," says Minors.

"Timber is local and sustainable, and has been used heavily in our project. It was also very convenient for the fluid form of the cladding," explains Arolat. "It was a new experience for the construction company. But I think the result outweighs all the hassles!"

Colourful integration

Programming at Zorlu Center PSM is diverse, to say the least. "The key to a good PSM is versatility," says NWE's Ray Cullom, who is planning more than 400 performances a year. "The heart of our programming will be the Broadway series: three or four titles for multiple weeks, and we're planning three to four years ahead." *Jersey Boys*, *Cats* and *Notre-Dame de Paris* are on the bill for 2013-14, as well as *Cirque Éloize*, classical flautist Sir James Galway and a John Williams film gala. Cullom promises that classical, jazz, and dance at Zorlu Center will have "a unique twist of showmanship".

Zorlu Center will also stage "a very large percentage" of local programming chosen

ZORLU CENTER PSM

> "The Turks: when they do things, they do them big. This certainly is a PSM on a scale I have not encountered before"

TWO FAMILIES, ONE VISION

The partnership between Zorlu Property Group and their PSM operators Nederlander Worldwide Entertainment works on many levels. "We are very interested in proving the 'worldwide' of Nederlander Worldwide Entertainment," explains Ray Cullom, general manager of Zorlu Center PSM. Both Zorlu Property Group and NWE are family businesses; company chairman Ahmet Zorlu is the son of Zorlu's founder, and NWE's current president and CEO is the third-generation Robert Nederlander Jr.

"The family cultures fit each other; we understand each other," says Mehmet Even, executive VP of Zorlu Property Group, which welcomed Nederlander's expertise and vision. "Turkey is not well known to all international groups but the Nederlander family was open to it as a result of their existing operations."

NWE already operates more than 30 theatres worldwide, specialising in emerging markets, including China and Taiwan. "There is a great void when it comes to world-class performance venues in Istanbul, a city with a young, progressive, growing population with disposable income," says Cullom. "The fact that Istanbul is an emerging market for the arts was intriguing for us. And frankly the scale and ambition of this endeavour was very attractive. The forethought that went into this theatre – involving us early enough [2010] so that we could have a good input into venue operations – was impressive."

by staff with local knowledge. By teaming up with the Istanbul Foundation for Culture and Arts (IKSV), dance festivals and international guest orchestras will add to the schedule. "We don't want to be the 800 lb gorilla in town," says Cullom. "We're welcoming local theatre companies, the state opera, state orchestra… There's no point programming against each other since this is such a desirable space for them." That sounds like remarkably friendly programming. "Yes, and it's pretty specific to Istanbul. IKSV is such an established cultural festival that it's far better for us to work together."

Stage presents

Dance, orchestras, musicals, jazz, acrobats. How can one stage encompass such a broad range? A live proscenium (with sliding technical towers) enables the stage to expand from 16m to 22m at its widest (for Turkish folk dance), with a fly-tower height of 30m. Scenery can extend beyond the stage using projection on the adjustable proscenium, and LED lights in the timber strips at the sides of the room and on the balcony fronts. "Around 95% of what they'll perform here will be amplified: musical theatre, pop, rock, jazz and conferences," says Bob Essert. "This wasn't intended to be Istanbul's classical concert hall." But when Nederlander said they'd like to host guest orchestras ("We gulped at that," recalls Essert), a mobile orchestra shell was designed. The pit can also accommodate 70 musicians. Acoustic curtains, concealed in the attic beneath the timber grid, will be extended for most amplified shows to soak up the reverb but retracted for a livelier orchestral acoustic.

Zorlu Center PSM's 738-seat drama theatre will have a distinct character, rather like the Linbury Studio's little brother relationship with the Royal Opera House in London. The intimate, sensual space, with an 11m-wide by 12m-deep proscenium and smaller orchestra pit, has a more natural acoustic. "We aimed to make a good drama theatre sound that supports the natural voice and delivers it to the back row." Essert also advised on external noise, largely from walkable roofs and escalators rather than traffic or aircraft noise (the building has insulating skins).

"Zorlu Center will be the most technically advanced theatre out there," says Ray Cullom of the main auditorium. It has power flying (with capability beyond the stage, in the main auditorium itself), two grids (so a touring musical can put its set on the mother grid), intelligent, full LED lighting, 12 stage scissor lifts, eight-language surtitles, and is equipped for live broadcasts. Seismic proscenium walls (1m thick) can support the heaviest rock-and-roll loads (loading docks backstage can accommodate six trucks at once), and a state-of-the-art sound system and sound cockpit was developed with Nederlander. "When we were tendering for lighting, rigging and so on, we said: 'Don't come with preconceptions," remembers Minors. "Zorlu Center is different – much bigger and more ambitious than you might think."

IN THE WINGS

Zorlu Center PSM is one part of the five-function US$2.5bn Zorlu Center. The 180-room Raffles Hotel offers personal butlers and a 3,000m² spa. The 105,000m² shopping mall features 200 high-end brands – some in Turkey for the first time – and premium office space and apartments complete the complex.

In 2011, the *New York Times* predicted these residential units would be among the world's most expensive residential property. Publicity for Zorlu Center's apartments promises 'Istanbul's most distinguished families an exciting new lifestyle option', including personal wine cellars, a concierge service, smart buildings, and fingerprint and iris security.

Nevertheless, Zorlu Center PSM takes centre stage. "Today we're looking for a quality environment – that requires shopping, leisure and cultural activities," explains Mehmet Even. "So the attraction of the residential complex is supplemented by the PSM. And in a very traffic-heavy city, people can reach culture [at the PSM] on their doorstep."

"There are many high-end residences in the area, so if you want to sell you need other qualities," adds architect Murat Tabanlioğlu. "The PSM is a good anchor." On a personal note, he says, "My mother will live there because there is not only shopping and eating but she can go to concerts every week! That mix is a new thing for Istanbul."

(Top left) **Zincirlikuyu is a place where a jumble of highways from Asia and Europe intersect** (Top right) **The project illustrates the continued dynamism of Istanbul's high-end real-estate market** (Below) **Mehmet Even on the left with Ray Cullom**

Open door policy

The Zorlu Center PSM is undoubtedly a great offer. But can it sell? Pricing across genres ranges

from 35 Turkish Lira (around US$18) to 599 Turkish Lira (around US$300) for the best seats at the hottest events. Broadway shows range from 59 Turkish Lira (US$30) up to 252 Turkish Lira (US$125). "In Istanbul we have 40 million people officially; unofficially around 80 million. If 10 to 15% relate to culture somehow, the potential is huge," calculates Mehmet Even, executive vice president of Zorlu Property Group.

But as Cullom points out, reaching this potential audience requires smart marketing. "In the UK and USA, a large middle class goes to West End shows, dance, etc. But the middle class in Turkey is much smaller; culture, to this point, is reserved for the top 1% or 2% economically. Our challenge is letting a broad swathe of Istanbul know Zorlu Center PSM is for them."

Zorlu is running an outdoor campaign on public transport, initially establishing the 'Broadway in Istanbul' brand. "The people who are arts-goers don't need an education about what Broadway is but for the bulk of our audience – who we hope are going to fill 80% of our seats nightly – we first have to introduce the idea of Broadway," explains Cullom. Social media is also proving essential for marketing in sprawling Istanbul and is well-suited to the city's young, mobile-savvy population. Zorlu Property Group is consulting New York digital agency 87AM (used by *Cirque du Soleil*, *The Lion King* and *Ghost*) to identify likely customers.

Besides box office revenue, Zorlu Center PSM is seeking sponsorship (for seasons, for naming the theatres). "Once we're established in the market, [I'd estimate] somewhere between a quarter and a third of operating costs raised through sponsorships," says Cullom. His projections for the first two to three years of business remain conservative – with Zorlu Property Group's blessing. "The Zorlu family have given us the latitude to hopefully succeed but also to fail sometimes in our start-up years. That's a great benefit you don't often get."

"Real estate is a profitable business when you do the correct things. But public interest is not always the most profitable for the developers," adds Mehmet Even, referring to the state sale and government approval of the Zorlu Center design. "If we'd constructed a shopping mall instead of a PSM it would be more profitable but we wanted this. We see ourselves as a big service to the city."

There is a conscious effort to make Zorlu Center PSM a cultural centre for everybody. The 5,200m² foyer contains free galleries and public meeting spaces, and a community stage will present free daily performances from school dance groups, local bands and more. A new subway line and pedestrian tunnels will also improve access. In the light of the Taksim Square demonstrations in 2013 (sparked by the destruction of a city-centre park in place of another new shopping centre), Zorlu wants to make a community statement. "This should be an open centre, not a gated community," says Murat Tabanlioğlu. "We said to Mr Zorlu: 'Use the main part of this complex as a part of the city.' It will be a new meeting place, I hope, for everybody."

"It fulfils a gap in Istanbul's culture," Even adds. "Istanbul is now strong enough to compete with many European cities in terms of culture and arts. The Zorlu family is fulfilling a dream." ■

VIP ISTANBUL

According to *Forbes* magazine, Istanbul ranked fifth in the world's billionaire cities in 2013, just behind London and Hong Kong (Moscow topped the list). "The level of international sophistication that's going on there is huge," says theatre consultant Anne Minors. "In the time that we've been working on Zorlu Center PSM, lots of things have developed in Istanbul. When you arrive at the duty free store at the airport, you're faced with a wall of £1,300 bottles of wine."

There is certainly spending power in Istanbul and Zorlu Center PSM has refined its VIP offering. Emre Arolat's luxury VIP lounge can host 250 guests and serves fine food and drink. An invitation to the lounge comes with the Zorlu Center PSM's VIP ticket packages. "There's an expectation of a very high level of patron service in Istanbul; a concierge level of care, from valet parking to the VIP lounge, to your seating," explains general manager Ray Cullom.

"The Zorlu family has given us the latitude to hopefully succeed but also to fail sometimes in our start-up years"

(Top right) **Zorlu Center has been constructed to meet the latest technical standards**
(Top left, below and bottom) **The auditoria are designed to reflect the acoustics and brilliance of distinct events from musicals and classics to concerts and ballet**

Author

Emma Pomfret is a regular contributor on the arts for *The Times*, *The Guardian* and industry titles including *Opera Now*

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LINZ MUSIKTHEATER

LAUREN ANSELL

Not only is the Linz Musiktheater the ideal opera venue the city has coveted for centuries, it also sits at the forefront of a blooming cultural district that will make the arts accessible to everyone in the Austrian city and beyond

Theatre of dreams

For centuries, the Austrian city of Linz has been a source of talent and inspiration for the creative arts. Composer Anton Bruckner, for example, was born there in 1824, and his legacy lives on in the form of the Brucknerhaus, Linz's famous concert hall. Mozart is also reputed to have written his *Symphony No. 36* in the city, prompting the piece to be renamed the *Linz Symphony*. Ongoing development, meanwhile, has also seen the emergence of a number of cultural buildings – so much so that Linz became 2009's European Capital of Culture.

Despite the tradition for opera in Austria's third-largest city, it never really had a purpose-built home of its own. Going back as far as the 18th century, the genre had been hosted at the Landestheater, along with theatre, ballet and dance. Originally conceived as a ballroom, it was often criticised for its poor sightlines, acoustics and restricted back-of-house facilities.

In 1984, a group known as *Verein der Freunde des Linzer Musiktheaters* (the association of the friends of the Linz Musiktheater) expressed a formal wish for Linz's purpose-built opera theatre, which it was hoped would become the home to the Linz Opera, the Linz Ballet and the Bruckner Orchestra Linz. The Landestheater, meanwhile, would continue to host drama and smaller musical productions.

In 1997, a competition was launched to design a purpose-built venue for opera, musicals and ballet near to the Landestheater, at the north end of the city. Following a series of logistical and political difficulties, however, the project was scrapped three years later, in 2000. Five years subsequently passed before another suitable site was found, close to the railway station at the southern end of the city where there was an abandoned hospital building, which was separated from the heart of Linz by the Blumauerstrasse, a wide four-lane road.

Cultural shift

Next, an international open design competition was launched in 2005 by the State of Upper Austria. All in all, the project was in the planning stages for 21 years. "The final competition brief was very detailed," remembers Terry Pawson, whose firm, Terry Pawson Architects, submitted

a proposal. "They really knew what they wanted; they even measured how far it would be from the furthest changing rooms to the edge of the stage."

But Pawson wasn't convinced the old hospital was the right venue for the new theatre so his firm's proposal included a suggestion that the Blumauerstrasse be re-routed to make way for a brand-new building that could open out onto the Volksgarten (the People's Garden). "It was such a radical idea, we were sceptical about whether the client would take it seriously," he continues.

The British architect also felt that by positioning the new theatre next to the Volksgarten, it would enable the building to become more than just an arts venue. "We felt it could become something akin to London's South Bank – that its popularity should not just be tied to arts and entertainment and that people should be able to use the building throughout the day," he explains. "Essentially we thought it should become a living room for the city of Linz."

The city's cultural hub has traditionally always been the Hauptplatz – the main square close to the Danube river – so Pawson's idea to create a second cultural destination, at the Volksgarten, would also regenerate a somewhat neglected area of Linz. The city was persuaded and Pawson's firm was awarded the contract in 2006. The theatre owners were also looking for an Austrian architect who would implement Terry Pawson's concepts and designs. The public invitation to tender was won by ArchitekturConsult and the construction of Linz's new music theatre finally began in early 2009.

(Left) **The plush, red velvet seats have large touch-screen displays to control subtitles** (Main and top right) **The auditorium meets every flex of artistic muscle, with burnished gold, dark woods and intimate acoustics**

LINZ MUSIKTHEATER

Creative spark

The Linz Musiktheater breaks away from traditional design and is an anomaly among the majority of modern opera houses, many of which are conceived with a view to create the strongest visual impact. Rather, the project team felt that given the project's limited budget it was more important to create a relationship between the new theatre and the park. "We didn't want to make an 'object' building," Pawson confirms. "We wanted it to be relatively modest – that's if you can call a 54,000m^2 structure modest!

"It was essential for the design to reflect the building's location at the Volksgarten yet also its role in forming a new axis from the Danube to the contemporary buildings near the railway station," adds Markus Klausecker, ArchitekturConsult project manager. "It was a chance to realise a very prominent cultural statement for Linz and Upper Austria.

"We were naturally influenced by classical design, but we also studied contemporary opera houses to help us develop ideas for the interior," Klausecker continues. "We were particularly inspired by the Casa da Musica in Porto, Portugal, as well as The Royal Danish Theatre and the Die Königliche Oper in Copenhagen, but it was a real challenge to develop and formulate contemporary design, materials and surfaces within the envelope of a classical opera form."

Furthermore, traditional opera houses and theatres are often very large and complex, but the Linz Musiktheater needed to be simple and accessible. "We created a building that is well organised and easy to use," Pawson feels. "There is essentially only one corridor that repeats on a number of floors; the design ensures that you always know your whereabouts in the building."

Linz Musiktheater boasts a 1,000-seat auditorium for opera, musicals and dance, a 300-seat chamber music hall, and a 200-seat studio theatre for younger audiences, as well as production workshops, depots, rehearsal rooms and auxiliary stages. As a result of the multifunctional nature of the building, it is essential that production and performance can take place simultaneously, so each area is acoustically isolated. All the changing rooms also have natural daylight. "Due to the scale and density of many opera houses in Europe, the changing rooms usually end up being tucked away in corners and basements in order for them to be next to the stage," says Pawson.

GREEN INNOVATIONS

The sea of photovoltaic panels covering the flat areas of the roof are evidence enough that the Linz Musiktheater is a sustainable building. In actual fact, green thinking has been integrated into all aspects of the design. "We have ensured that recycling of heat and waste energy at the theatre is carried out as efficiently as possible," explains architect Terry Pawson. Waste heat from the building is used to warm the paved area in between the theatre and the park, for example. "It's effectively like a little underfloor central heating system," Pawson says. "Austria is subject to a lot of snow, so this system means that access to the theatre can remain snow- and ice-free throughout the winter months."

Inside the building, heat recovery systems, direct cooling and energy-efficient lighting are used to minimise energy use. "Even the auditorium chandelier has an internally illuminated annular ring lit by thousands of LEDs," reveals Alan Russell of Theatre Projects. "Each LED is also individually controlled so they can run any colour, or even video."

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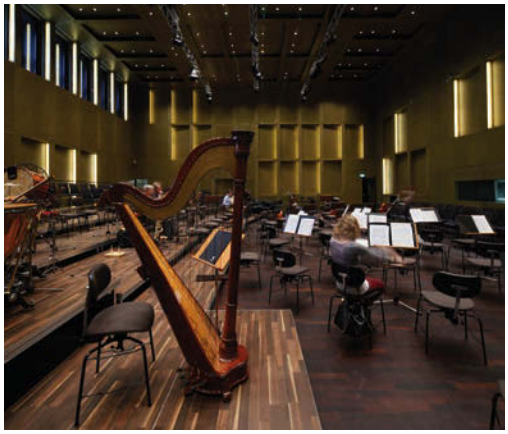

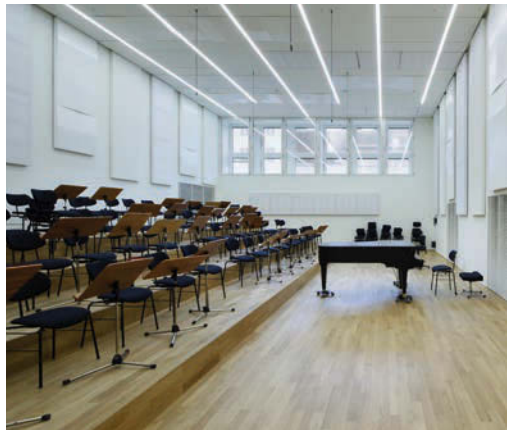

Critical space

Pawson designed the main 1,000-seat auditorium with UK-based Theatre Projects Consultants. In keeping with the desire to establish a purpose-built venue for opera, musicals and ballet, the challenge was to create something that would be unique to Linz, something that would meet a host of technical criteria yet would also be much more than a simple, functional room. "The emphasis was on creating a space with a sense of intimacy and excitement, while still giving the audience a great view of the stage and not compromising on acoustic quality," he says.

To ensure that every guest would be as close to the stage as possible, the seating was designed in a tight horseshoe configuration, although the client was insistent on ensuring it would not be as cramped as in the Landestheater. "Providing really generous seats and spacing throughout the auditorium would have compromised the acoustic and theatrical intimacy, but the seating in the stalls here is wider and the rows are more than 1m apart," states Alan Russell, technical director at Theatre Projects.

Creating intimacy in a venue built for opera required smart thinking with regards to the acoustical design. "The auditorium needed to be suitable for both Wagner and Mozart," Pawson says. "An intimate auditorium is ideal for Mozart, but for Wagner you need a lot of acoustic volume." Ordinarily it would have been impossible to stage large-scale opera in an auditorium of this size as it would lack the required acoustic volume. To overcome this, Pawson and Theatre Projects created an open perimeter around the edge of the auditorium. The space is partially shielded from the audience by screen rods and also houses a series of linking staircases. "These link up between the balconies and also lead directly to the upper foyer levels," Pawson adds. "In addition to disguising the volume of the auditorium, they enable people to get in and out of the hall much more quickly."

"An intimate auditorium is ideal for Mozart, but for Wagner you need a lot of acoustic volume" **Terry Pawson**

(Above left) **The black box-style rehearsal hall, with walls and ceilings clad in veneer, reflects sound in an inimitable way** (Above centre) **London-based architect Terry Pawson** (Above right) **There are numerous backstage practice rooms in the €180m venue**

A first in Austria

One of the most unusual and talked-about aspects of the project is the large revolve on the stage. "This was specified by the client in the original competition," says Pawson. "The idea is based on the way theatres are run in Germany and Austria. Rather than having a single production that runs for a number of weeks or months, there may be an opera in the afternoon, followed by something entirely different in the evening, then something else the following day and another production the day after that."

To ensure the Linz Musiktheater would be able to meet the technical demands of this repertoire model, it was essential that sets could be rotated quickly and easily. The Landestheater's poor back-of-house facilities meant that a large amount of manpower was required to change

APPLIED ENGINEERING

As the theatre needs to quickly switch between one production and another, Theatre Projects worked closely with the technical and production departments to create a purpose-designed automated scenery store. "This is essentially a concrete cube that houses five floors of pallets," says Alan Russell. "Any pallet can be called up from a touch-screen on a random-access basis and the pallets are shunted around by a conveyor chain system, while the chosen pallet is moved onto a lift that transports it to stage level." There are 55 pallets in total – each the size of a standard road container – which can accommodate about 25 shows.

The technology becomes even more effective as a result of the stage revolve. "It would have been difficult to locate these pallets at the best operational position – which would have been on one side of the stage – but the revolve easily turns them through 90°, so they can go in a non-critical space," Russell says.

(Above and top right) **The modern architecture helped to create a connection between the neighbourhood of Bahnhofsviertel and the city centre of Linz**

sets, which was not only inefficient but also resulted in unusually high running costs. As a result, a highly sophisticated stage technology system and substantial backstage facilities were specified for the new Musiktheater.

The stage revolve is 32m in diameter and is 6m deep, with an integral production revolve of 15m diameter. It also includes three integral elevators, each 15 x 4m. A first for Austria, the technology enables entire sets to be moved on and off the stage extremely quickly.

"It's an enormous amount of flexibility," Pawson believes. "They can have a number of sets all set up and all they have to do is move the revolve, which only takes a few seconds."

"Such equipment isn't built very often," adds Theatre Projects' Russell. "It replaces the need for stage wagons and it also requires less space because the payload movement of the revolve is continuous, whereas that of a wagon is sequential [a gap is needed to move into]. While wagons can virtually cover the whole acting area, the circular form cannot, so to overcome this, three wagons are provided, which are stored in a side stage."

A living room for the people

In addition to optimising operational efficiency, the public spaces were a major focus for the project team. "The client wanted very generous cloakrooms, large, open foyer spaces and a public café," reveals Pawson. "There's a public restaurant at the top that faces onto the park, that is accessible separately, even outside of performance times." All the public spaces are also designed as arts spaces.

"When you stand in the landing of the main stairway, you can see a fusion of classic and modern – the exposed concrete and the combination of bronze alloy with the limestone and wooden surfaces – and you can appreciate it is a very generous, open space," says Klausecker of ArchitekturConsult.

The materials selected for both the interior and exterior of the building also help to forge a connection with the park. "With its play of exposed concrete and stone, the façade has a unique appearance that doesn't dominate over the surrounding buildings," he says.

"That relationship is very important," Pawson states. "With the glazed façade, you can sit in the foyer at night and look at the illuminated trees as if you are sitting on the edge of the park."

In actual fact, on opening night on 13 April, a large production took place in the Volksgarten in front of the theatre. "There was an expectation the opening event would be very formal," Pawson remembers. "But Josef Pühringer, the governor of upper Austria, asked that everything be kept informal – he didn't want it to be an elitist assembly and he's really keen for the building to continue in that vein. I think that's why he and the other politicians really liked my idea that this was to be a living room for the people of Linz. Anyone can use the building – at any time."

Although the new €180m (US$244m) Musiktheater was a substantial investment for the state of upper Austria and the city of Linz, it was a small price to pay for the cultural asset the city had always been missing. "Culture is expensive, but lack of culture costs much, much more," declared Austrian finance minister Maria Fekter in her speech on opening night.

The Linz Musiktheater's construction has also sparked a wave of regeneration in the surrounding area. "A lot of places that have been empty for years have now become busy," smiles a clearly pleased Pawson. "It's become one of the places to be. I think this project has actually restructured the city to an extent that wasn't anticipated at the outset. The hope is that it will continue to act as a vibrant focus for the town for years to come." ■

ON DISPLAY

The main auditorium is equipped with 1,013 interactive multimedia screens that are fitted to the backs of the seats. The system, from Radio Marconi (see article on page 136), provides electronic libretto multilanguage translation, connection to the bookstore and reservation facilities, as well as patron profiling through a ticketing office connection. It also includes sponsoring, advertising and donation utilities, and card reader provision as well as multimedia video and personal messaging.

The patented system is connected to a content management system and is supervised by the theatre marketing and production team in the theatre control room. The system management enables real-time control of each display regarding brightness, reboot, updates, shutdown, etc. OnStage software enables a multilingual libretto translation with embedded pictures, while a smart subtitles interface and LED display enables the screen to be used for both viewing the performance and for subtitles at the same time.

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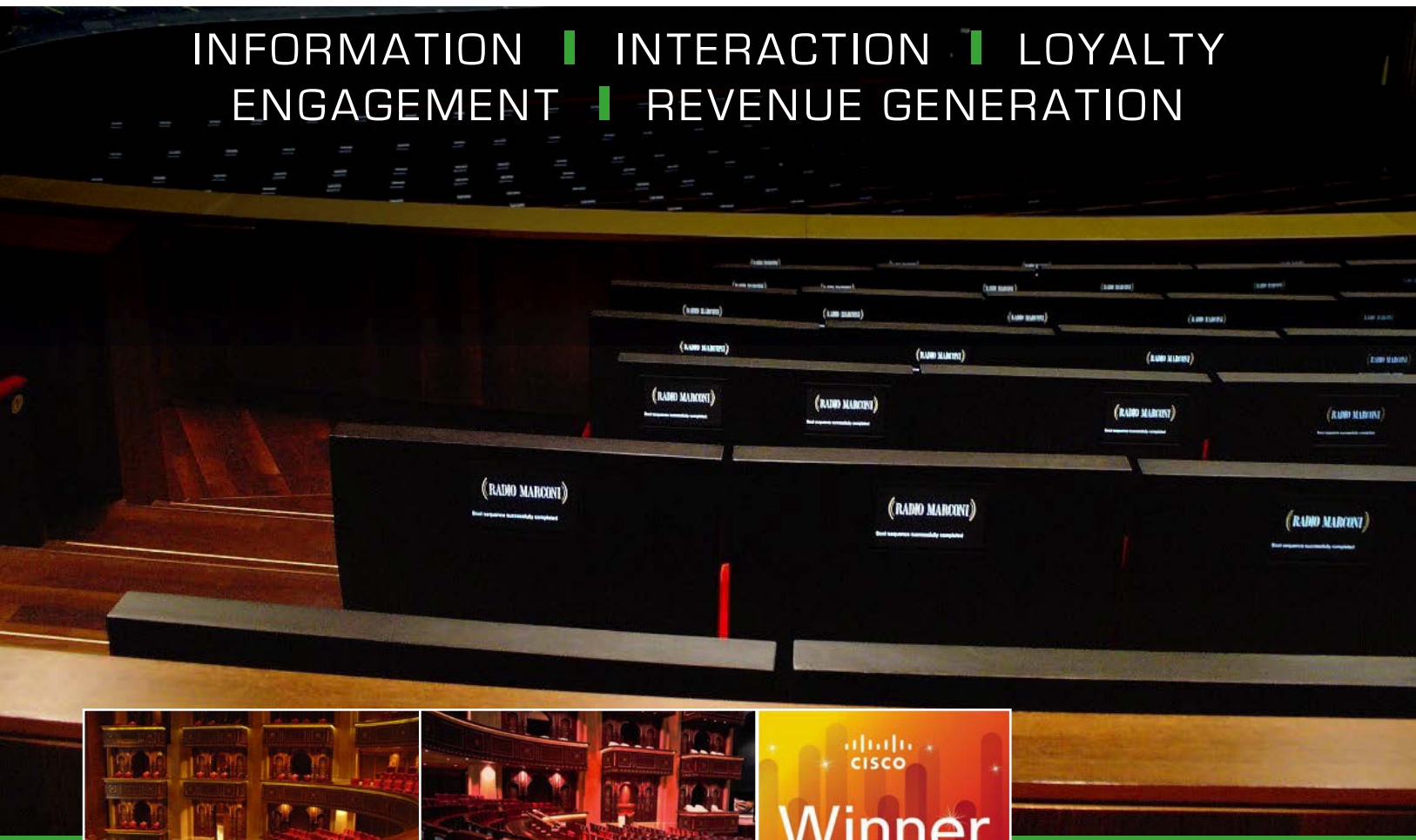

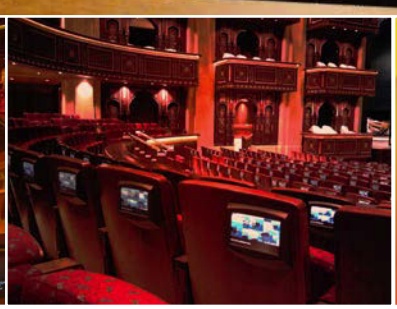

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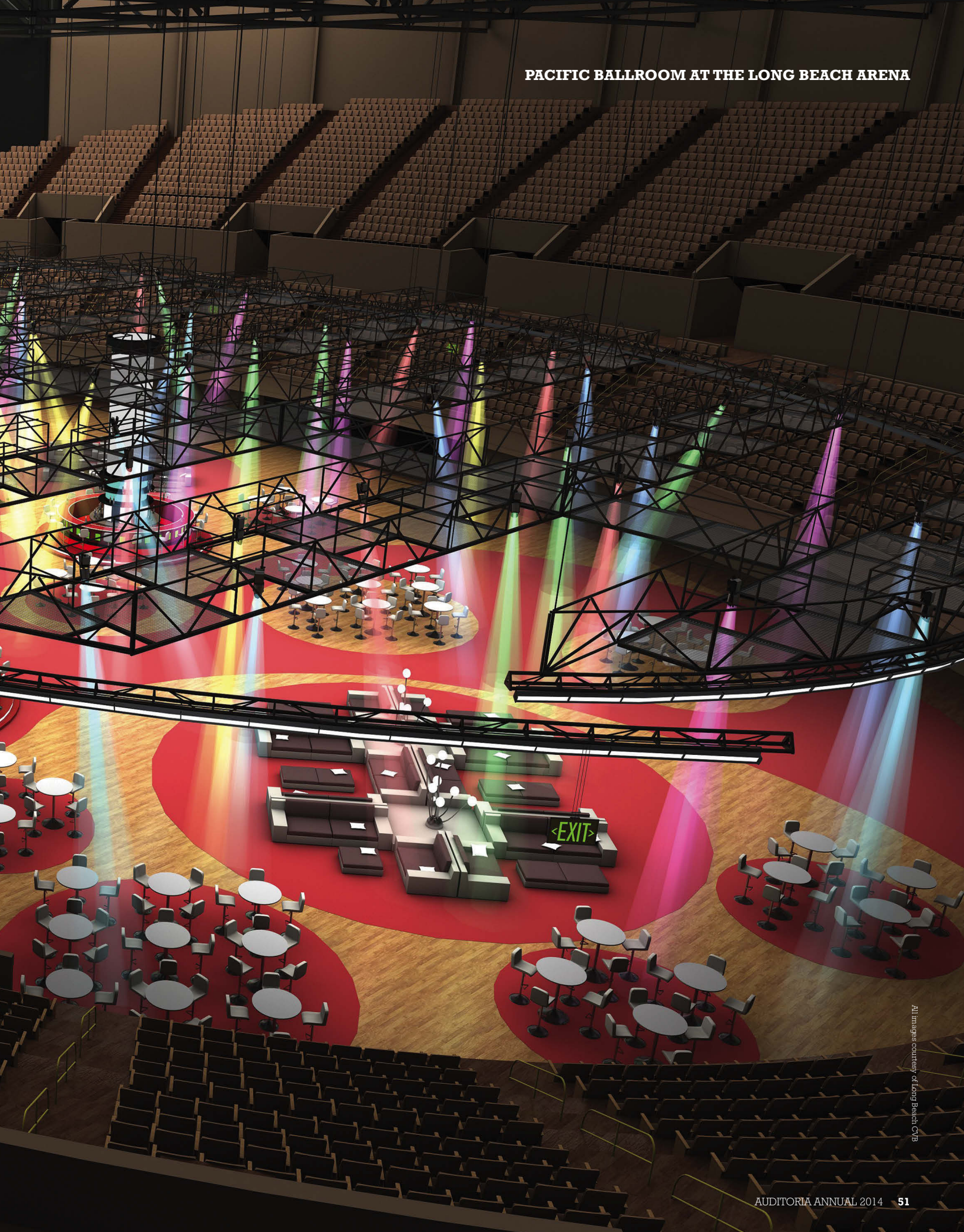
PACIFIC BALLROOM AT THE LONG BEACH ARENA
BRIAN LIBBY

Blank canvas

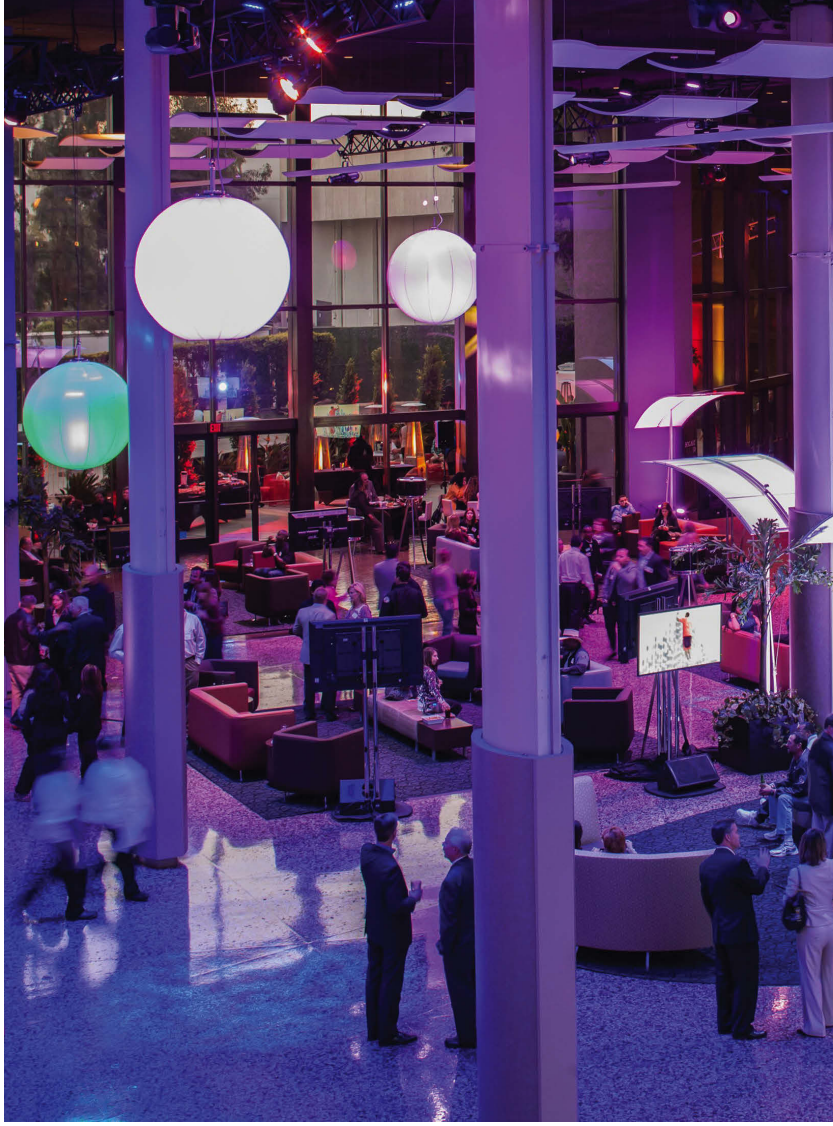
US$7m has been spent ingeniously at the 51-year-old Long Beach Arena, giving it the flexibility to morph from a venue to host a 500-guest wedding reception to a 13,000-capacity boxing match – and whatever clients wish for in between



PACIFIC BALLROOM AT THE LONG BEACH ARENA

All images courtesy of Long Beach CVB

PACIFIC BALLROOM AT THE LONG BEACH ARENA



When Long Beach Arena opened in 1962, John F Kennedy was in the White House and The Beatles were scarcely known outside of Liverpool and Hamburg. But as popular culture exploded over the ensuing decades, the venue played host to some of the genre's biggest stars, from rockers such as Elvis Presley, the Rolling Stones, the Eagles and the Red Hot Chili Peppers to rap acts such as Run-D.M.C. and the Beastie Boys. Sporting events have been a mainstay, too, from Los Angeles Kings hockey in the 1960s to Olympic volleyball in 1984, not forgetting the early rounds of the National Collegiate Athletic Association men's basketball tournament back in 1986.

Throughout that time, the business model of small arenas has mostly remained unchanged – a mix of concerts, travelling shows and sporting events. Yet part of what has helped the now 51-year-old Long Beach Arena remain viable as a business was the synergy of having adjacent conference facilities, including 34 meeting rooms, a grand ballroom, three exhibition halls and two small theatres that augment the arena itself.

More recently, traditional revenue streams have been depleted due to newer competing facilities, so the aim of a recent US$7m interior renovation was partly to increase its flexibility, as well as to enable it to compete for much smaller

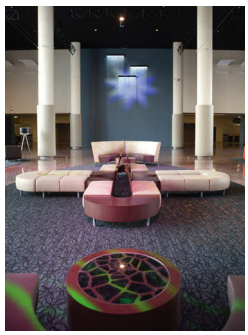
The essence of the refurb project was to transform the arena into a multipurpose loft ballroom space that creates a unique theatrical environment

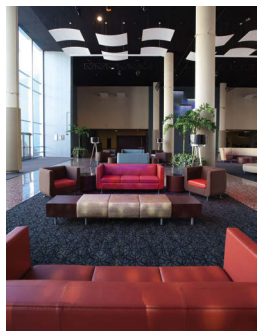
HOME IMPROVEMENTS

The renovation and re-imagination of the Pacific Ballroom at the Long Beach Arena come as many other local landmarks are undergoing improvements. After much of its downtown fell into disrepair in the 1960s, a host of revitalisation campaigns have again made the city within a city (Los Angeles) a destination of its own, starting in the 1980s with the area's first high-rise hotel, the Hyatt Regency.

In the 2000s, the Metropolitan Transit Authority began operation of its first light-rail train, the Blue Line, which linked Long Beach to Los Angeles. More recently, in 2012, Long Beach Airport completed a US$140m renovation and modernisation, including new passenger lounges with upgraded amenities and a renovation of its historic art deco terminal, which also included outdoor seating areas. "You can sit outside next to fire pits with wine and sushi bars," says Charles Beirne. "It was that kind of thinking about the customer experience that inspired some of the changes we undertook at the Long Beach Arena."

Those changes were lauded in November 2013, when more than 1,300 guests attended the opening of the new space. Called 'Sky Transformation', a section of the arena's curtains disappeared seamlessly for a 'big reveal', doubling the floor space by nearly 50%.





(Main and left) **Millions of dollars have been invested to redesign all spaces, with new furnishings, lighting and sound systems**

ALL IN YOUR IMAGINATION

"We've never seen anything like this before," enthuses Michael Ferguson, principal at Theatre Projects Consultants, when asked about his firm's involvement. "It's a first of its kind in the USA; it's dynamic, it's very cool – a blank canvas waiting for somebody to think of a way to use it," he says. What the team – which includes John Sergio Fisher & Associates, J R Clancy, SMG and Theatre Projects – have created is a technical ceiling and a surrounding curtain wall that can be manipulated to create the sidewalls. "We can breathe new life into an existing space and give it the ability to triple or quadruple its use almost instantly," Ferguson predicts. "The lights and sound systems are in already – it's a one-stop shop for events that will be very attractive for the Long Beach Arena's clients.

"The truss system enables you to have a third-house, two-thirds-house or a full-house. It's a very high-tech environment where you'll be able to change the colour and feel of the space at the touch of a button. This venue will be one of a kind in the world, transformed by colour and by form. It's really exciting. Its flexibility is unlimited, so it's just up to your imagination."

events. Funded through the city's tidelands oil reserve fund, the refurbishment was finally completed in November 2013. "We're fortunate that we're always pretty busy, but we wanted to fill in the midweek market," reveals Charles Beirne, general manager of the Long Beach Convention & Entertainment Center, through management company SMG. "Of course we'll still host the big shows such as *Disney on Ice*, but we're looking to augment our portfolio with smaller functions. Our goal has been to repurpose the facility into a venue that would be much more competitive in the tradeshow and convention market."

What that shrewd US$7m injection offers the Pacific Ballroom at the Long Beach Arena is the capability to morph its spaces to provide for both large and small gatherings. Operators can now create a "room within a room", according to Jerry Sherman, associate architect, JSA, to facilitate events for 800 to 13,000 people.

"It's really a layering of the arena," adds Sherman, who is no stranger to Long Beach himself, having been a member of the team that designed and oversaw the construction of the 10,000-seat swim stadium used for the US Olympic Swim Trials in 2004. "The industry has changed and Los Angeles has built new venues, so sports is no longer the primary source of income for Long Beach Arena," he says. The trick for all involved here was to find a way to continue to accommodate sports yet also provide a platform for a much wider variety of events.

Flexibility and intimacy

Continuing on that theme, a bit of technical magic has been conjured up to facilitate a high level of flexibility. The arena features an advanced steel tension-grid system – the largest of its type in the USA and the second largest in the world, featuring eight miles of cable that's holding up 500,000 lb of steel – created by John Sergio Fisher & Associates (JSFA), the architect of record and theatre consultant on this project. The grid also supports US$1m worth of LED and stage lighting, sound systems and decorative elements.

"It's suitable for every type of event at the arena and can be lowered to a height of 30ft," explains architect John Fisher of JSFA. "No other arena in the world has such a flexible ceiling that moves up and down in this fashion."

Charles Beirne is confident the Pacific Ballroom at the Long Beach Arena's newfound flexibility will see the return of A-list artists, professional boxing matches, new conventions and a host of other events

PACIFIC BALLROOM AT THE LONG BEACH ARENA

"We anticipate being able to put a lot more business into not just the building, but into the city because of this" *Iris Himert, executive VP, Long Beach Convention & Visitors Bureau*

The Planet Ocean mural by environmental artist Wyland wraps around the Long Beach Arena and has been recognised by *Guinness World Records* as the world's largest of its type

Yet despite its size, the tension-grid system is relatively easy to disassemble and move out of the arena. "We can accommodate events such as boxing and martial arts, but then host much more intimate concerts of 3,000 to 5,000 people," confirms Beirne. "The grid system gives us the flexibility to make the venue feel very personal."

With the arena boasting the lighting and sound infrastructure for concerts and theatrical performances, as the ceiling moves down for smaller events it can cater to dinners, receptions and other gatherings with a level of audio-visual capability that traditional convention centres cannot come close to matching. "I'm pretty sure there isn't another facility in the country that offers such a complete lighting and sound package," continues JSA's Sherman.

HUB OF ACTIVITY

Over the past three years, the broader Long Beach Convention & Entertainment Center – which includes Long Beach Arena – has also undergone a US$35m renovation. Improvements include enhanced lobbies and public areas, new chandeliers and custom seating pods, a newly landscaped plaza with a new palm tree tropical garden, upgraded VIP rooms and the replacement of all 3,000 seats in the Terrace Theater. Overall, the centre offers more than 400,000ft^2 of meeting and exhibit spaces. "Besides Long Beach Arena, there is a convention centre and a performing arts theatre – all under one roof," reveals SMG's Dan Lee, assistant general manager, Long Beach Convention & Entertainment Center. "There are lots of hotels nearby, too, as well as a park that can host events. This renovation is going to expand the arena beyond its own limits. With this flexibility and creativity, we can make things happen that other venues cannot."

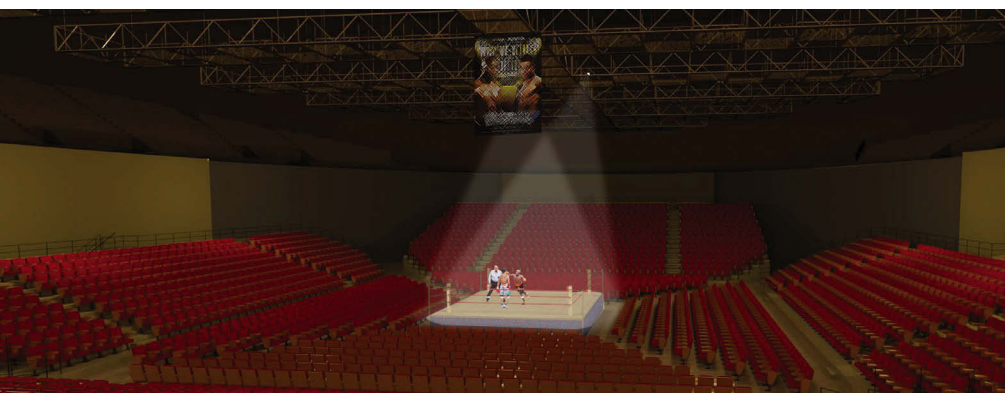
Electronically controlled curtains also drop from the ceiling, enabling the floor area to be encircled, with arena-level sound and lighting. "This is the icing on the cake," Fisher says. "A traditional ballroom can now be divided into pre-event and performance spaces in one and I don't know of any other arena of this type that can achieve that."

Furthermore, the tension grid is proving to be the ideal solution for the illumination which – with 180 pinpoint lights – can light up the entire space or direct light to a single glass (or speaker) at a given spot anywhere on the floor. "It is very flexible," Fisher adds. "The team can walk on the grid and lights shine through it – all the while it's invisible to the audience." Speakers can also be positioned and moved to anywhere on the grid.

"All venues and auditoria are trying to become more flexible, to host more events of different sizes, in order to keep them busy and in the black," Fisher suggests. "There has been a lot of movement in this direction in the past five years as economies have struggled."

"Having that flexibility to accommodate these differently scaled programmes all under one roof is tremendous," enthuses Dan Lee, SMG's assistant general manager for the Long Beach Convention & Entertainment Center.

However, to be able to compete realistically for small events such as banquets, meetings and weddings – in addition to larger-scale sports and entertainment events at full-arena capacity – Long Beach Arena also needed a touch of



aesthetic improvement. "It was in really good condition considering its age, but it did look a bit dated," Lee concedes. "Now, though, it feels as if the venue has had a proper facelift. I would say the environment feels less institutional – it's more like a lounge than an arena."

This is most evident in the lobby area, which itself has been subject to a makeover. Waveform lighting trusses have been installed on the three-storey high ceilings, while mid-century-inspired furniture and floor lamps have been placed in moveable seating pod arrangements to create a pre-function area unseen in most modern arenas.

"To have this outer area for cocktail receptions and to get the mood going before events is a trump card," suggests Iris Himert, executive vice president, Long Beach Convention & Visitors Bureau. "We anticipate being able to put a lot more business into not just the building, but into the city because of this."

(Above) **The grid and curtains are the secret to the venue's flexibility. In this case they are down to create a circa 3,000-seat venue** (Top) **The 45,000ft², multipurpose event space will have the capability to customise itself to suit any event planner's palate**

The pride of the lobby's upgrade is Bogart & Co. – a 350-capacity restaurant, bar and customisable space. It replaces what was once a pirate-themed Captain Morgan's restaurant, which merely served up grab-and-go food in a rope-and-barrels setting that felt more like amusement park meets frat house than contemporary eatery.

Technical ingenuity

Bogart & Co. and the new lobby space, the Pacific Gallery and Patio, are the perfect complements to the restyled arena, the completion of which has not been without its challenges. The tension grid, as an example, more than tripled the weight of the original system, necessitating structural strengthening to the main trusses of the roof as well as a scaling back of the grid itself. "We originally wanted to cover the whole ceiling," Fisher reveals. "But instead we have nine rows of tension grids with spaces in between and a walkway in the centre." The arrangement still provides the same level of flexibility however. Meanwhile the arena's electrical capacity had to be upgraded to meet modern-day lighting and sound requirements.

One aspect that hasn't changed is the Planet Ocean mural covering the exterior façade. The 116,000ft² image by Wyland depicts migratory grey whales and other marine life found in the waters off Long Beach, which fits with the arena's setting – close to the Rainbow Lagoon Park, with the shoreline just across the road to the south.

As pretty as its waterfront setting may be, it is Long Beach Arena's new paradigm for flexibility that will give this historic venue a chance to remain viable for another half-century. "We needed an edge," confirms SMG's Dan Lee. "We now have a number of different facilities within one building. It's opened up new possibilities and event organisers are already looking at this facility in a whole new light." The proof? More than US$20m in new business so far as a direct result of the renovation, plus another US$40m pending. Quite literally, watch this space… ■

Author

Brian Libby is a Portland, Oregon-based freelance journalist who specialises in the arts and architecture

Photographs courtesy of Royal Estates Affairs and Royal Opera House Muscat

Flexibility defined

(Main and inset) **The auditorium at the Royal Opera House Muscat is equipped to provide an ideal acoustic and theatrical environment for all types of musical performances**

Whether completely transformable or partially adaptable – and even somewhere in between – there can be no one-size-fits-all approach to designing flexibility into the modern performance space. Appreciating that, and listening to clients' needs, is the only way to achieve a successful outcome

Often at the outset of a new building or renovation project, clients will say that they need flexibility. But what exactly does 'flexibility' mean? The definition is as varied as the artists, designers and craftspeople themselves. At Theatre Projects Consultants, the discussion about designing a flexible space often starts with a simple question to the client: What does flexibility mean to you and your organisation?

Does it mean the space will support multiple users and different art forms? Does it mean you need to rent the space to both performance and nonperformance users? Does it mean your creative mission requires the space itself to be transformable, in doing so supporting a distinct artistic vision for each performance?

Sometimes the solution to a simple request for flexibility ends up being an intricate, complex building with multiple moving parts. Sometimes the solution is as simple as not letting the building's design get in the way of the user's creativity. The goal shouldn't be to just build the most elaborate technical masterpiece that can be dreamt up; it should be to always listen to the client and make a space that works specifically for them, answering their need for flexibility as they define it.

Spaces for multiple purposes

"We have to figure out how to build a space that works for all of the users, without building each of them their own space," says Scott Crossfield, principal at Theatre Projects, when asked about cases where flexibility is required because of multiple users. A proscenium theatre with adjustable acoustic elements and simple flexibility in the forestage zone can be adapted to a variety of uses. A more involved approach actually alters the audience and stage configuration to accommodate different art forms, in doing so transforming the venue from one single-purpose space into another. A wide range of approaches falls between these extremes, and Theatre Projects works with the client to find the best solutions for their space.

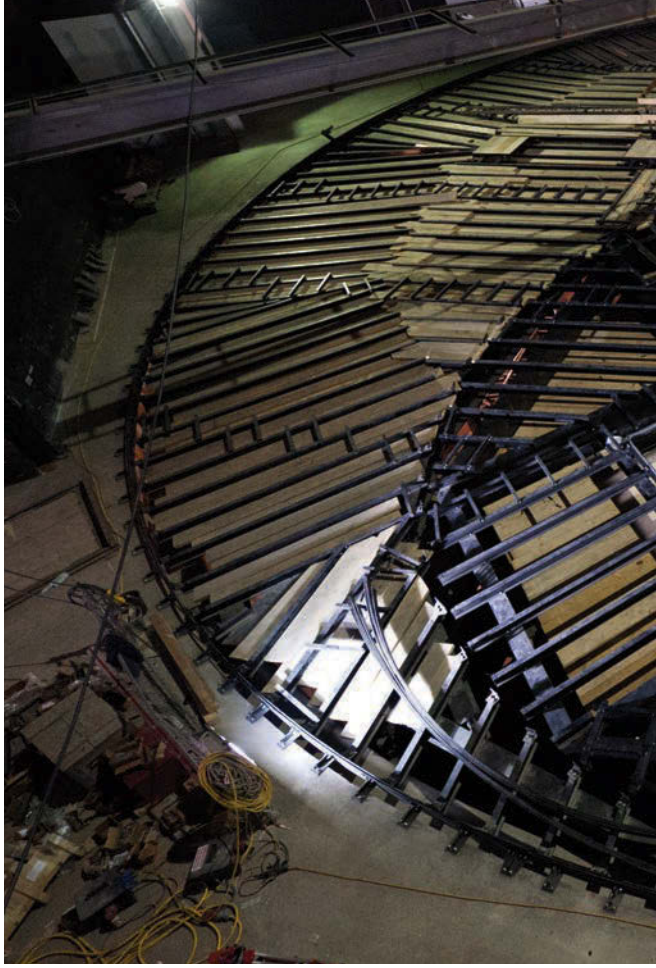
For the Royal Opera House Muscat in Oman, for instance, the client wanted a world-class opera house and a world-class concert hall in the same footprint. In the 1,100-seat multiform venue, the auditorium remains static while the stage transforms. In its opera form, the stage has a proscenium arch and the traditional cruciform shape with large backstage areas to accommodate mammoth opera sets. To create the concert hall form, the proscenium arch is retracted and a unit orchestra shell is tracked from backstage to join seamlessly with the auditorium walls, which transforms the room into a traditional concert hall with superb acoustics.

Several resident companies plan to use the Dr Phillips Center for the Performing Arts, Orlando, Florida's 1,700-seat multiform acoustical theatre when it is complete. Theatre Projects' task is to design the room and its equipment so that it can change from opera house to concert hall to ballet theatre. Crossfield, Theatre Projects' designer for this ongoing project, explains that changing a single space into multiple forms helps the building not sit dark so often.

"With multiple users, you can compress the schedule so the building can be more efficient and successful overall," he says. Plans include a moveable orchestra shell with an integrated ceiling for optimal symphonic conditions, an adjustable proscenium zone that's narrower for opera and ballet and wider for symphony, and multiple forestage lifts. The orchestra floor can change from tiered seating to flat floor with the push of a button, easily accommodating unique performance configurations, receptions and other events.

From the initial briefing and feasibility exercises, it was clear that Scotland's Edinburgh International Conference Centre (EICC) needed an additional single-events space capable of handling banquets, lectures, exhibitions and multiple performance types. Given the wide range of anticipated uses, a fast turnaround was key to the space's operational and commercial success. Theatre Projects helped design an innovative moving floor system for the Lennox

Photograph courtesy of Philip Gould



Suite, which changes from a flat floor to a tiered 2,000-seat auditorium or a 1,400-seat arena. "When the room is in flat-floor mode, it can be converted into two or three smaller, independent spaces, maximising the versatility of the room," reveals project manager Tom Davis. "The greatest challenge was to create a solid and stable flat floor out of 11 primary lift tables with integrated sub-lift tables, and to coordinate this solution with structure, services and equipment. Designing and integrating a moving floor at this scale was a real challenge, but it was worth the added effort since it's the best solution to help meet the aspirations of the EICC."

Projects such as the EICC, Dr Phillips Center and the Royal Opera House Muscat are complex, requiring substantial infrastructure and technology to support their transformations, but it doesn't have to be that way to be effective. With the Acadiana Center for the Arts in Lafayette, Louisiana, for instance, Theatre Projects' project manager Benton Delinger says the venue had no real defined user and needed a lot of options for community rentals. "The solution we proposed would intimately hold the required number of audience members and allow them the option to stage drama, music, dance and even flat-floor performances and events," he explains.

With the potential for a different performance each day, quick reconfiguration was essential to the design, but the budget wouldn't support a fully automated system. So an array of telescopic risers and manual, moveable platforms were provided in their adjustable floor arrangement. The 300-seat space can be changed from a flat floor to endstage seating in 30 minutes, which is pretty good timing when the next rental is due to arrive any minute.

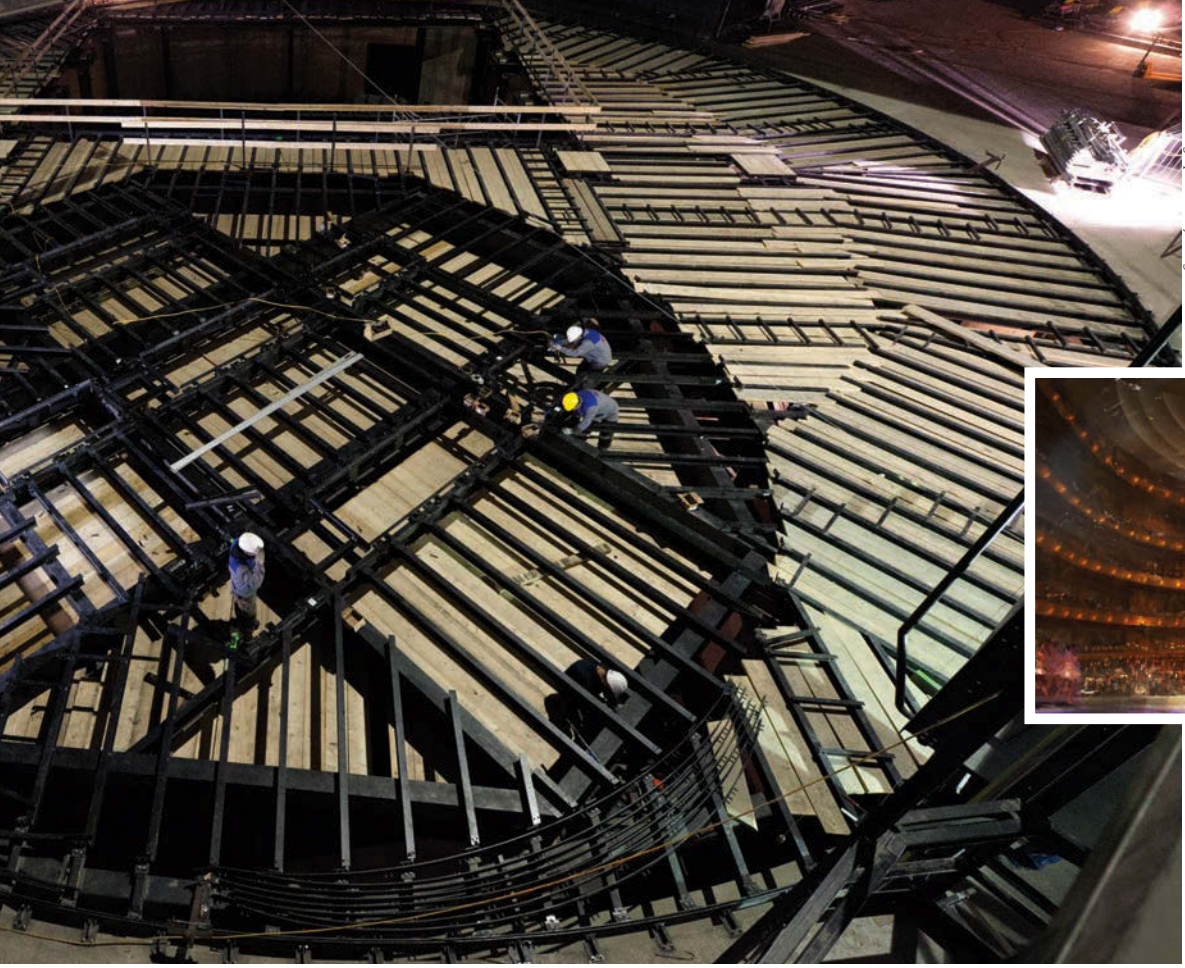
(Above) **The 300-seat courtyard theatre at the Acadiana Center for the Arts can accommodate anything from theatrical presentations to Cajun music and dance** (Right) **The 32m diameter stage revolve at the Linz Musiktheater enables entire sets to be moved on and off the stage extremely quickly**

> "Sometimes the solution to a simple request for flexibility ends up being an intricate, complex building with multiple moving parts"

Artistically driven spaces

When it comes to a project planned with a dedicated, primary user in mind, the definition of flexibility is usually driven by artistic goals. For such spaces, the capability to alter or control the space is a key component of the creative mission of the user. Adapting to a new space for each production was part of what fueled Theatre for a New Audience's (TFANA) 30-year legacy, and they didn't want their new, permanent space, The Polonsky Shakespeare Center, to change their dynamic approach to the arts. Theatre Projects' Michael Ferguson, project manager on this 299-seat development in New York City, points out that the flexible solution for TFANA was 100% artistically driven.

"They're a producing company, so for them, artistic philosophy and freedom were key," he says. The new space is a courtyard theatre inspired by the Cottesloe Theatre at the National Theatre in London. For TFANA, maximum versatility meant everything, so Theatre Projects veered away from motorised systems, which, although convenient, can be limiting in their flexibility. From the full-floor platform system to the removable balcony seating, everything



Photograph courtesy of Sigrid Rauchdobler

Image courtesy of Craig Mullens

(Above) **Dr Phillips Center for the Performing Arts will include a 1,700-seat acoustical theatre, a 2,700-seat Broadway theatre and a 300-seat community theatre**

at TFANA is manual, enabling a 360˚arena and providing limitless configuration possibilities. Rigging beams span the entire ceiling, providing countless scenery hanging options. Lighting positions follow suit, placed throughout the space. "You could hang more pipes anywhere," Ferguson says.

At the Musiktheater am Volksgarten, in Linz, Austria (see page 42), the users were primarily looking for an efficient way to make repertory and production scene changes in their 1,000-seat auditorium, delivering scenery from below-stage storage through the stage revolve. A sophisticated stage engineering solution was prepared to give them that utility. To support the opera's need to change quickly from one production to another, an automated scenery store was designed that stacks and stores palletised scenery. The system can deliver any stored set or scenery to stage level, regardless of its stored location. Three elevators pass through the revolve to transport the required components with scenery, reveal production scene changes, and even act as scenic elements during performance.

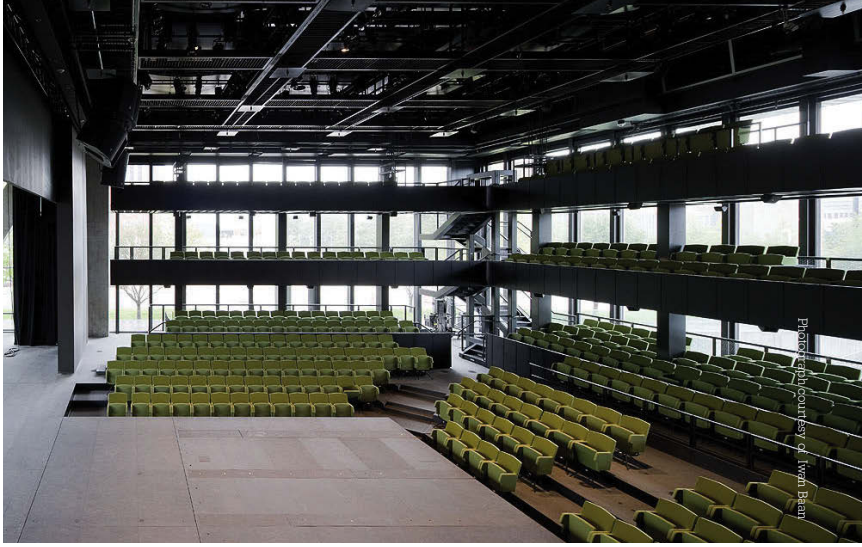
"The challenge was to retain the concept of a large revolve, maintain its utility as a device to enhance repertoire changes and operation, while simplifying and creating a more practicable system," comments Alan Russell, Theatre Projects' technical designer for the project.

The former home of the Dallas Theater Center (DTC) was a simple shell and they were adept at using the blank-slate nature of the building to accommodate artistic inspiration. In their new home, the Dee and Charles Wyly Theater at the AT&T Performing Arts Center, DTC wanted to retain the flexibility of their old space while dramatically shortening changeover times that would keep them in one configuration for long periods of time. So with those goals in mind, Theatre Projects developed purpose-built rigging, platform and lift solutions to make the Wyly Theatre a uniquely transformable space.

The lift and platform system uses turntables to enable the stage and flooring to easily be configured for up to 600 seats in proscenium, thrust, arena, traverse and flat-floor arrangements, and also enables the seating wagons to flip down and store underneath the auditorium. A fully automated, custom-designed power flying system flies out seating galleries on three sides of the auditorium as well as the proscenium wall, leaving behind a large empty room. When the DTC wants to change the auditorium configuration, it takes no more than one eight-hour day with a six-person crew.

"The key component to the success of this room is that it is an outgrowth of what the users do, and not an outgrowth of what the

Photograph courtesy of Alex Eshelbrenner



Photograph courtesy of Iwan Baan

(Above left and right) **The Dee and Charles Wyly Theatre at the AT&T Performing Arts Center can be arranged in a variety of configurations, depending on the company's artistic needs**

design team thought would be cool," states Benton Delinger, who was Theatre Projects' project manager for Wyly as well as the Acadiana Center for the Arts. "It is cool and it really is groundbreaking but it works because of the Dallas Theatre Center and their complete embrace of all the flexibility."

Making spaces work better

An entire room doesn't have to change shape or transform into something else in order to be flexible. A flexible theatre space can simply be one that works with – not against – its users. Sometimes a single piece of equipment or a little inventive idea is all that's needed to provide this kind of everyday flexibility. What happens, for example, when an arts centre needs to accommodate international touring productions with differing electrical power requirements? The King Abdulaziz Center for World Culture in Dhahran, Saudi Arabia faced that exact problem, so Theatre Projects' Jason Osterman came up with a solution to enable the building to function with an in-house 120V rig and touring 230V equipment. "A separate network of company switches is located in critical areas," he explains. "These are powered from a central energy centre comprising voltage transformers and frequency-conversion equipment to the European standard of power provision. That means an external production can treat the space like a European roadhouse."

Simple design choices can help future-proof a space and make it work smarter. Since every project is unique, not every solution works for every project. In the sidebar (left), there are some ideas Theatre Projects provided to add functionality when designing theatre spaces.

Defining flexible is just the beginning

Designing and building a successful performance space is a marathon of choices, big and small. A client's answer to 'What does flexibility mean to you?' informs many of those choices. In the end, flexibility means different things to different people. The first job is to sort through why a client needs or wants flexibility in their new or renovated space. Once that is understood, a custom space can be created with the appropriate level of flexibility to meet those needs. Whether a room ends up as completely transformable, partially adaptable, or something in between, it's listening carefully to the people who are going to live and work inside the building every day that drives a successful design. ■

www.theatreprojects.com

FLEXIBLE FRIENDS

As no two projects are the same, solutions that work well in one venue may not be best suited to another. Here are some ideas that Theatre Projects has used to add functionality and flexibility.

- A combined orchestra pit and trap room gives the users the capability to adjust the orchestra pit size, relocate or reshape the stage edge, and place traps as far downstage as desired.
- Fold-down instrument shelving in backstage areas gives the musicians room for uncasing, but when the shelves aren't needed, they can be folded up out of the way, making room for traffic and other uses.
- Telescopic seating risers that can be retracted and relocated can be combined with smaller movable platforms to provide multiple seating layouts and stage formats both economically and quickly.
- Cable passes into rehearsal rooms with no lighting power and control infrastructure enable temporary services to be provided from adjacent spaces, holding open the possibility of future performance use with little upfront cost.
- Unistrut or a nailing strip (or both) embedded at various heights on the walls of a black box or rehearsal room lets users secure equipment and scenery where they need it.
- Trusses on chain motors in banquet rooms and ballrooms enable service from the floor for quick, economical, and safe changeovers.
- Well-placed, easy access to technical areas provides crews with more flexibility in operations. Placement of vertical circulation is very important, and in a large stagehouse, an elevator from floor to gridiron saves many man-hours of walking.

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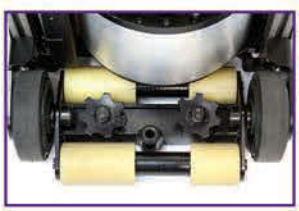

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Celebration of creativity

After 65 years of success in innovation and collaboration within the global arts community, ISPA is looking forward to continued growth, diversity and development

While the idea of global interconnection is now gaining ground in a world that has become isolationist and divided, it is something the International Society for the Performing Arts (ISPA) has quietly understood and embodied since its founding in 1948. Built on the idea that we are all connected – that no artist, organisation or community is an island – and that the arts will flourish when we capitalise on the strength of our relationships, ISPA has grown into an impressive international network of arts professionals, including 400+ members from more than 50 countries and diverse sectors of the performing arts field. ISPA understands that culture, trade and world events are inextricably intertwined – and that members' investment in understanding, exchange and relationship-building is an important form of leadership in the arts.

In 2013, ISPA celebrated its 65th anniversary. The festivities began in January in New York and were continued throughout the organisation's June Congress in Wrocław, Poland. While 65 is a significant number, ISPA is keen to place emphasis on what it has accomplished, and even more importantly, where the organisation is headed. However, there is a certain sense of achievement in reaching this grand old age and as such, the organisation did not want to let the anniversary go unrecognised.

It is also significant that as ISPA gets older, it is becoming more diverse, accepting and accessible – reaching out to different regions, cultures and ages. Therein lies the true celebration…

Now, as ISPA looks forward to the next 65 years (or perhaps five at this juncture), what lies ahead? Reflecting its core values, the organisation hopes to represent and support a greater diversity of leadership in the international performing arts community, expand its learning and professional development opportunities for both established and emerging leaders, and develop additional opportunities for fostering communication and exchange.

"Strengthening the sector and indeed our communities is key to ISPA's mission and values," comments ISPA's CEO, David Baile. "I think what separates us from a traditional arts marketplace is that it is more a marketplace of ideas. In the words of one of our board members, 'ISPA is where I come to get my next idea.'"

Ahead for business

ISPA is kicking off its next 65 years with two opportunities to convene. The first – in New York, 14-16 January 2014 – will view the performing arts from a holistic perspective, looking to funding, partnerships, new models and other elements that comprise the entire ecology of the field. These wide-ranging discussion points will provide attendees with the opportunity to explore the global performing arts through the broadest possible lens. The event will also bring together a wide range of voices including Louise Herron from Sydney Opera House, Marshall Marcus from the European Union Youth Orchestra and Karen Hopkins from the Brooklyn Academy of Music.

(Above) **Pitch presenters at the Seoul 2012 ISPA Congress** (Below left) **Keynote speaker Fiona Shaw at the congress in New York, 2012** (Below right) **Delegates greet each other in New York, 2012**

ISPA HIGHLIGHTS

1948 The first New York Congress and decision to organise as the National Association of Concert Managers (NACM)

1949 NACM incorporated and Patrick Hayes is appointed as founding President

1956 A group of university managers split off to form the Association of College and University Concert Managers (forerunner of APAP)

1975 Distinguished Artist Award presented for the first time to Beverly Sills

1980 Patrick Hayes Award introduced and bestowed on the award namesake

1982 The International Society of Performing Arts Administrators Foundation is incorporated and the first (part-time, volunteer) executive director is appointed

1985 Under the presidency of Joseph Golden, a conscious strategy of international growth is pursued

1987 The first International Congress takes place in London, UK with 200 delegates from four countries

1997 50th anniversary

2007 ISPA's signature Fellowship Programme is born

2012 Seoul Congress attracts a record 434 delegates, representing 34 countries and 97 cities

2013 ISPA's Leadership Development offering is expanded – 12 Fellowships and 12 Legacy Grants are awarded

ISPA
LLOYD FULLER

(Above) **ProEx participants share knowledge at the congress in Seoul, 2012**
(Right) **More than 300 delegates attended the Wrocław 2013 ISPA Congress**

The second meeting will be held in Bogotá, Colombia. This meeting usually takes place in late May/early June, but the 2014 dates are 7-12 April. The much earlier time slot is intended to coincide with the Iberoamerican Theatre Festival of Bogotá. This bi-annual festival showcases theatre, dance and music from around the world and will run from 4-20 April 2014. It will be an opportunity for delegates to see Bogotá at its cultural peak.

The theme of the Congress itself is 'What the Arts Move' and with that simple theme, ISPA will explore the role of arts in a region in conflict and the impact on cultural, social and political perspectives.

Opportunity knocks

ISPA works continually to provide programmatic opportunities to encourage the exchange of work. Both 2014 congresses will offer two opportunities for artists and arts organisations to promote their work. The first, ISPA's signature programme, is Pitch New Works. Here, 10 projects are selected through a competitive review process. Those selected are then given an opportunity to present their work in seven minutes to the delegation, followed by a three-minute Q&A. All projects must be either in development or fully realised, but not yet have toured. Many of the past projects have gone on to find commissioning and presenting partners, representation or extended touring opportunities.

The second programme is more like a traditional arts market but in a condensed period of time. ProEx (professional exchange) facilitates an opportunity for delegates to speak with each other about their work in an informal but structured 'marketplace'.

Primarily, however, ISPA is a meeting place – an opportunity for delegates to broaden their personal and professional network, a place to reconnect with colleagues and a venue to explore ideas and challenges with perspectives from a variety of voices from around the world. Registration for both of the 2014 congresses is now open. ■

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Tale of two cities

The new performing arts education centres at Calabasas and Agoura high schools offer professional facilities within an educational environment

Calabasas and Agoura Hills are small cities in Los Angeles County, just south and southwest of the city of Los Angeles. They are somewhat affluent suburban communities and contain many families with parents working in the entertainment industry. The Las Virgenes Unified School District encompasses both cities and has two high schools: Agoura High School and Calabasas High School. Both have good reputations for performing arts education, with Agoura specialising in music and Calabasas focusing on drama. However, until recently neither school had adequate facilities. As such, the communities passed a bond issue for new and renovated K-12 school facilities, including two new state-of-the-art performing arts education centres (PAECs).

Parity was important for the two high schools – they wanted exactly the same facilities and design for the two projects, which meant the same architect, general contractor and engineers. Contractually it was implemented as one project.

Design developments

A preliminary programme was developed by Team Concepts Development Services (TCDS) and the stakeholders. Based on this, there was then a public bid for architecture and engineering services. The brief asked for recommendations for siting the PAECs on the two campuses and hoped for an identical design for both. Five firms were shortlisted, from which John Sergio Fisher & Associates (JSFA) was selected by a committee.

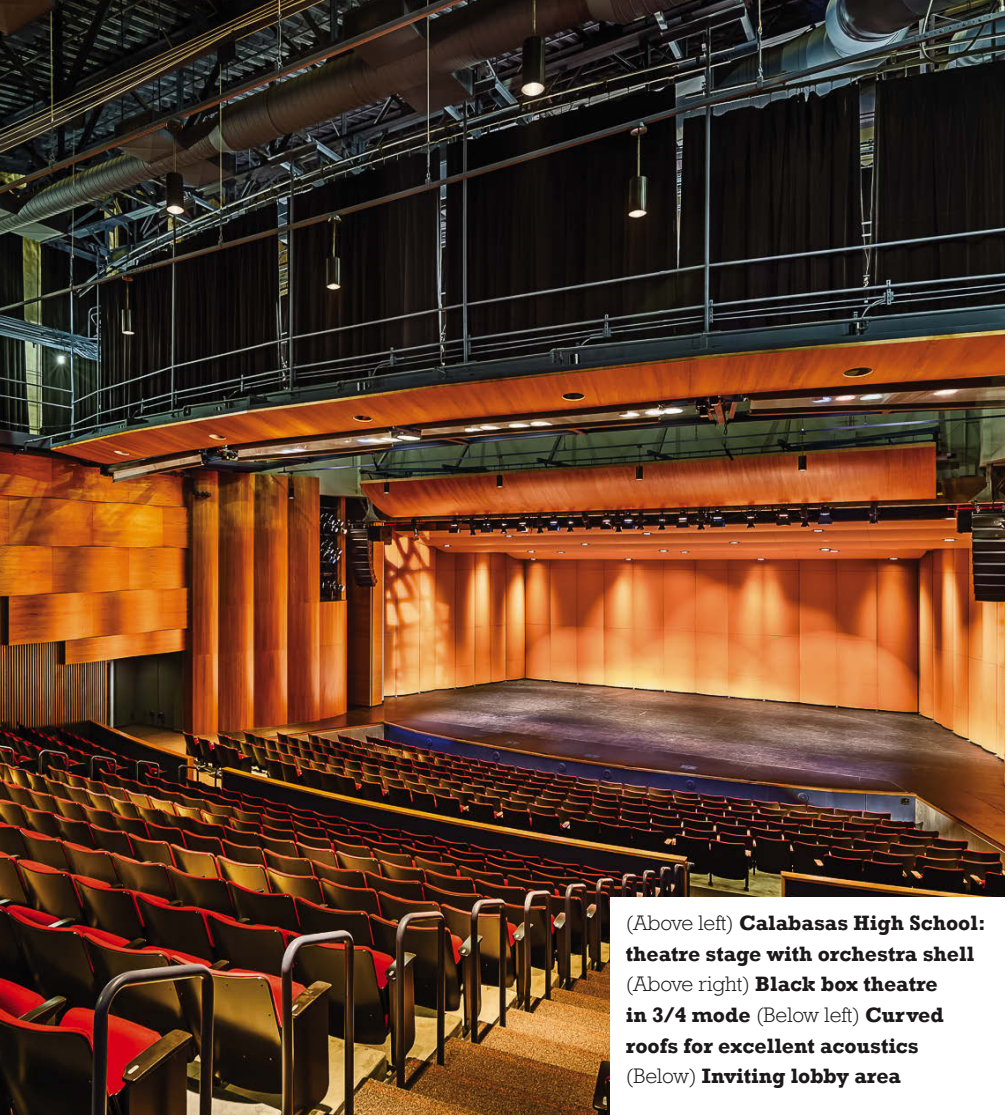
What then followed was a series of design charrettes facilitated by John Fisher as a neutral observer engaging the board, administration, teachers of both schools and TCDS. The initial programme was refined and expanded. The design team then generated several options for each requirement, from which the stakeholders made the design decisions.

Despite the many artistic differences among the dramatists, the musicians and the dancers from both schools, consensus was reached on the final programme and designs. Everyone wanted the performing arts centres to be comparable with collegiate or professional facilities; they did not want typical high-school auditoria. They wanted excellent acoustics, optimum sightlines, theatrical lighting and impressive sound systems. They also wanted professional features such as an orchestra pit lift, traps, an orchestra shell, a rear projection bay, a counterweight, hemp and motorised rigging, a tension grid and catwalks. The expansiveness of their needs was testimony to their commitment to make these educational venues excellent, particularly for students wishing to advance in performing and technical theatre.

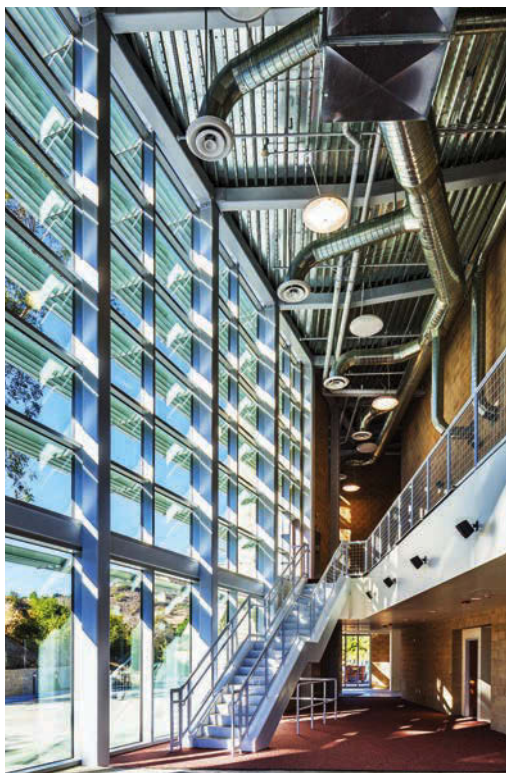
Adaptable and sustainable

Although the two PAECs are identical in terms of their facilities, site constraints meant that the floorplans had to be different. The Calabasas site was level but constrained by tennis courts, resulting in a two-storey building. The Agoura site was sloped and was developed as a three-storey structure. The theatres are very similar

Photographs courtesy of Cito Cielho



(Above left) **Calabasas High School: theatre stage with orchestra shell** (Above right) **Black box theatre in 3/4 mode** (Below left) **Curved roofs for excellent acoustics** (Below) **Inviting lobby area**



but are not twins dimensionally. Calabasas' centre line cross-section orients north-south, while Agoura's is east-west.

Both buildings were designed so that the juxtaposition of the curved roofs and the lobby create icons that serve as functional beacons for the arts at the campus entrances. The roofs are wired for future photovoltaic cells. The use of concrete masonry unit walls throughout the buildings (coloured to integrate with the rest of the campus) assists in conserving energy due to the high-mass thermal delay. The buildings are receiving LEED certificates, assisted by the use of local, recycled and non-toxic materials. Both have won American Institute of Architects Design Excellence awards.

Professional qualities

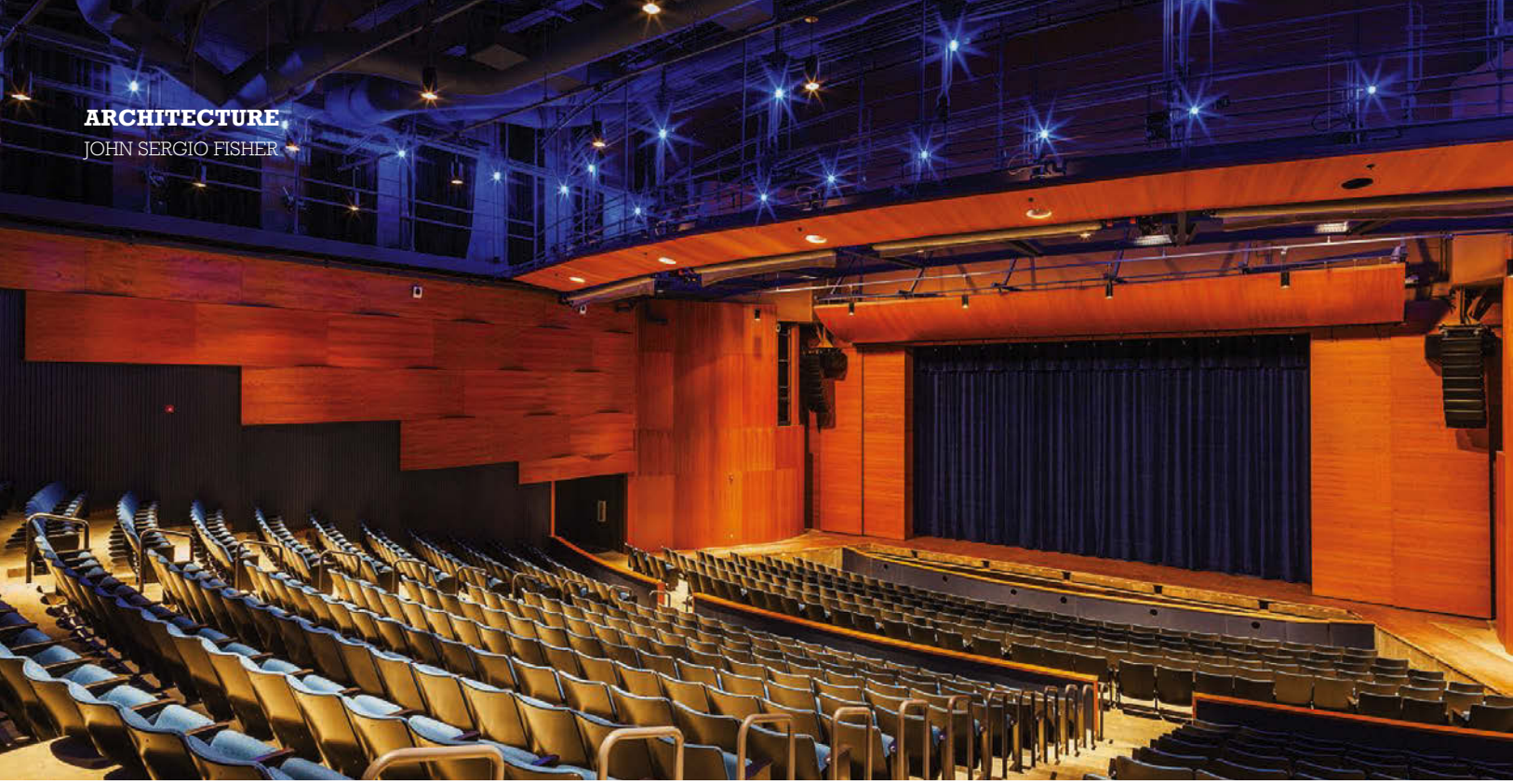
In terms of acoustics, these facilities are ideal. Their high, curved, exposed-catenary ceilings give a reverberation time of 1.8 seconds for orchestra performances, and the acoustic properties can be adjusted by moving drapes to dampen or reinforce the sound. This way, the reverberation time for drama productions can be reduced to 1.0 second.

"The acoustics for both music and drama are exemplary," says Gilles Chiasson, manager of both centres. "My wife [actress Sherri Lee Parker] and I have performed all over the country and we can think of only one other venue that compares."

The main theatres at Calabasas and Agoura both have a counterweight rigging system comprising 24 general-purpose battens, two motorised battens, four electrics battens, two light ladders and two orchestra shell ceiling units. They also have a hemp rope rigging system for spot and scenery flying.

The orchestra pits are both equipped with a lift mechanism that can be raised to extend the seating area at the audience level and extend the stage apron.

Both theatres have a 432-circuit dimming system for theatrical and house lighting.



(Above) **Agoura High School: main auditorium stage with tormentors deployed** (Right) **Seating view with roll drops** (Below and bottom) **An inviting beacon on the school campus**

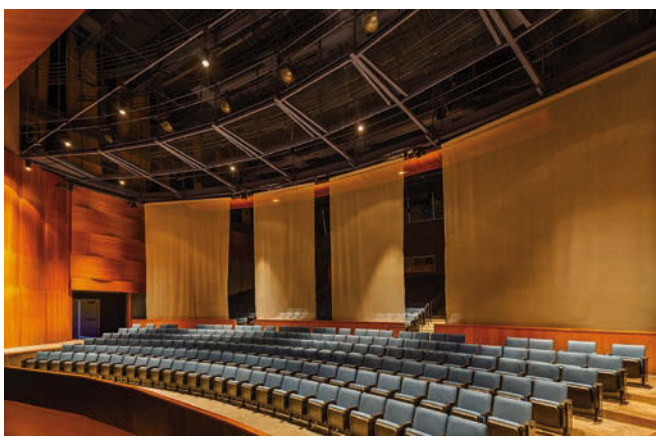
They are additionally equipped to accommodate touring shows. Roll drops separate the orchestra seating (200 seats) from the rest of the house, in order to create an intimate venue for performances such as plays. The orchestra seats also feature arm tablets for exams.

The main stage audience chambers at both venues contain 666 seats, and the flexible black box theatres can each hold up to 100 people.

Perfect finish

The Calabasas and Agoura PAECs encompass 3,065m^2 and 2,970m^2 respectively. The cost of construction was approximately US$5,964/m^2, which resulted in a total cost of US$18.4m for Calabasas and US$18.1m for Agoura. "JSFA designed and delivered two spectacular high-end performing arts facilities simultaneously on separate high school campuses on time, on budget and with no lawsuits," praises Don Blake, president of TCDS. "The team successfully led a diverse group of stakeholders through an incredible collaborative design process. The vision JFSA brought to the team resulted in two stunning, beautiful buildings that functionally meet the needs of a wide variety of arts and education programmes."

"These facilities have been fully embraced by the students, teachers and local residents," adds Cindy Iser, co-chair of the board facilities committee. "It is incredibly exciting." ■



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A stage for soul

A brand-new, purpose-built jazz performance centre is San Francisco's newest hotbed for cool notes

For 30 years, San Francisco's SFJAZZ organisation didn't have a home of its own. It presented its annual festival and other performances in rented spaces scattered around the city. But not any longer. This year saw the opening of the SFJAZZ Center – the first freestanding facility built specifically for, and dedicated to, the creation, teaching and preservation of jazz in the USA.

Auerbach Pollock Friedlander and founding principal Len Auerbach were part of the planning and design process from the start, collaborating with SFJAZZ founder and executive artistic director Randall Kline. "Auerbach was instrumental in the creation and realisation of SFJAZZ Center," says Kline. "He listened to our wants and needs, guided us with his experience early on and helped us fulfil this ambitious dream. But most importantly, he brought heart into the project."

The firm initially assisted in studying vacant buildings that could be adapted into a jazz hall, including a retail space on Market Street, a warehouse space in the SOMA district and former military spaces in the Presidio. Although each of these buildings offered some suitable features, they did not fulfil all the criteria outlined by the team for the new SFJAZZ Center, which included access to public transit, high interior volume and a highly visible location. These spaces would have required substantial renovations yet still wouldn't have been the perfect building to suit the SFJAZZ programme. A possible joint-use venue with the San Francisco Symphony was also explored and a concept developed, but in the end SFJAZZ decided that it was time for a facility of its own.

Customised from scratch

Auerbach Pollock Friedlander then began collaborating with Mark Cavagnero Associates for a new-building project. Together they studied several locations before SFJAZZ acquired a site that was once home to a muffler shop. Even though the site had a smaller footprint than originally envisioned, it was a very good fit geographically as a result of its proximity to other cultural venues – the San Francisco Conservatory of Music and the San Francisco War Memorial & Performing Arts Center, which includes the Davies Symphony Hall, the War Memorial Opera House and the Veterans Building's Herbst Theatre. Notably, Auerbach Pollock Friedlander had previously provided consulting services for these venues.

"I look at the Civic Center/Hayes Valley area as a performing arts campus," says Auerbach. "The venues work together. Each contributes a different element that enhances the whole district but they also maintain their individuality and are a stronghold to performing arts in the city. We also considered how SFJAZZ Center would be used as it relates to our current work on the Herbst Theatre."

After finalising the location the design team – including SIA Acoustics – began the collaborative process of developing a concept for the building. From San Francisco to New York City, the team and representatives from SFJAZZ

Photos (right and above): Matthew Millman

(Above) **The auditorium design encourages a strong artist-audience relationship** (Below left) **The SFJAZZ Center is a community space and social hub** (Below right) **Its transparency makes it a beacon in San Francisco's cultural corridor**

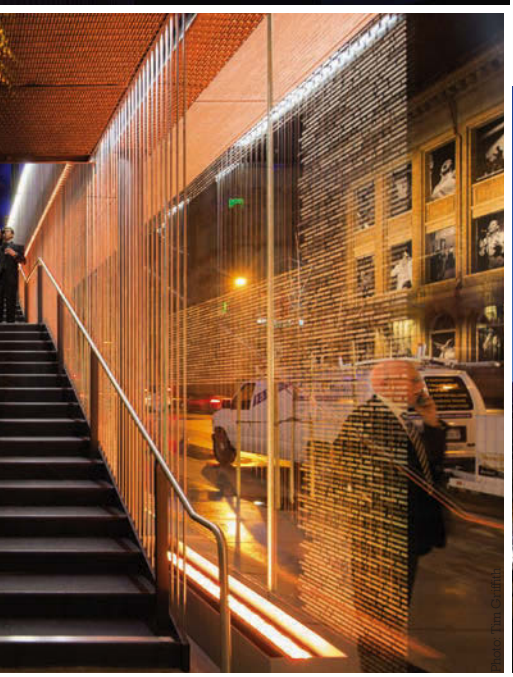

Photo: Tim Griffith

toured and experienced a wide variety of jazz venues – from small back rooms for jam sessions, to intimate night clubs, to historical music halls. These expeditions were an essential part of the development of the design and determined not only the essence of the venue but also helped to further develop the identity of SFJAZZ.

"Underpinning all of the spatial and visual design priorities was the most important goal: to create performance spaces with the highest-quality performance and acoustic qualities throughout," says architect Mark Cavagnero. "We worked closely with Auerbach Pollock Friedlander and Sam Berkow, founder of SIA Acoustics, to create the highest-quality acoustics and a performance experience specific to jazz. While the public spaces are highly transparent, the performance hall is strong and focused. This great room is flexible and multidimensional, designed so audience members can have very different views of the performers, even from the side and rear. This required a great deal of creativity from the Auerbach team."

Flexibility and intimacy

The centre's main room, the Robert N Miner Auditorium, can be formatted in up to eight configurations – from 350 to 700 seats –

Photograph courtesy of Tim Griffith

The Robert N Miner Auditorium was visually and acoustically designed to enhance the creation of spontaneous music

depending upon the performance requirements. "Numerous iterations of the room configuration were developed for the auditorium, from the most formal to the most eccentric," explains Auerbach. "One of the biggest challenges was developing each of the various desired designs to fit within a very compact building site."

Miner Auditorium is configured for optimal intimacy, with the stage on four sides wrapped with tiered seating risers and terraces, ideal for experiencing jazz performances and other events. Flexible stage and seating configurations are achieved with manual and semi-automated platforms, stair plugs and custom portable seating. A resilient floor in the lower orchestra accommodates standing concerts and dancing by the audience and performers. The auditorium recently hosted a concert by pianist and composer Jason Moran accompanied by 10 professional skateboarders improvising tricks on a 36 x 20ft ramp installed at the front of the stage.

Designed for connection

Auerbach Pollock Friedlander was integral in the development and adaptive design of the centre's family of custom seats, which include fixed theatre seats, loose stacking seats and swivel stools. Tailor-made, they create a unified visual audience experience, providing excellent sightlines and comfort while meeting all ADA guidelines. The swivel stools, in particular, are one of the details that make the venue feel more like a club and less like a formal concert hall.

The firm also developed theatrical systems to support production flexibility, including a technical catwalk system, overhead rigging support, theatrical lighting, room-reduction banners, video projection systems, a broadcast infrastructure, piano lift and a material lift.

In addition to the main hall, the centre includes the Joe Henderson Lab – an ensemble room and rehearsal space that also hosts small performances. This intimate multipurpose space is accessed directly from the lower lobby and can accommodate 70 patrons.

The facility's interaction with the surrounding urban landscape plays a vital role in the overall visitor experience. The building is a three-storey glass, concrete and steel structure, with the two lobbies, street-level restaurant and ensemble room all visible to people wandering past outside.

"We wanted to lock it into the street and to have the sidewalk, the lobby and the café all open up into the public realm," notes Cavagnero. "There is no opaque wall between you and the SFJAZZ Center. Once you start engaging the neighbourhood, the neighbourhood can benefit from you – but you can benefit from it, too. The lobby isn't 25ft wide, it's 125ft when you look through an open window wall to the old brick schoolhouse across Fell Street."

The *New York Times* has called SFJAZZ Center, "a temple of jazz in California", while the *Wall Street Journal* affirmed, "This building sounds the right note". The *JazzTimes*, meanwhile, declared "jazz has an enviable new home in San Francisco". And indeed, it has. ■

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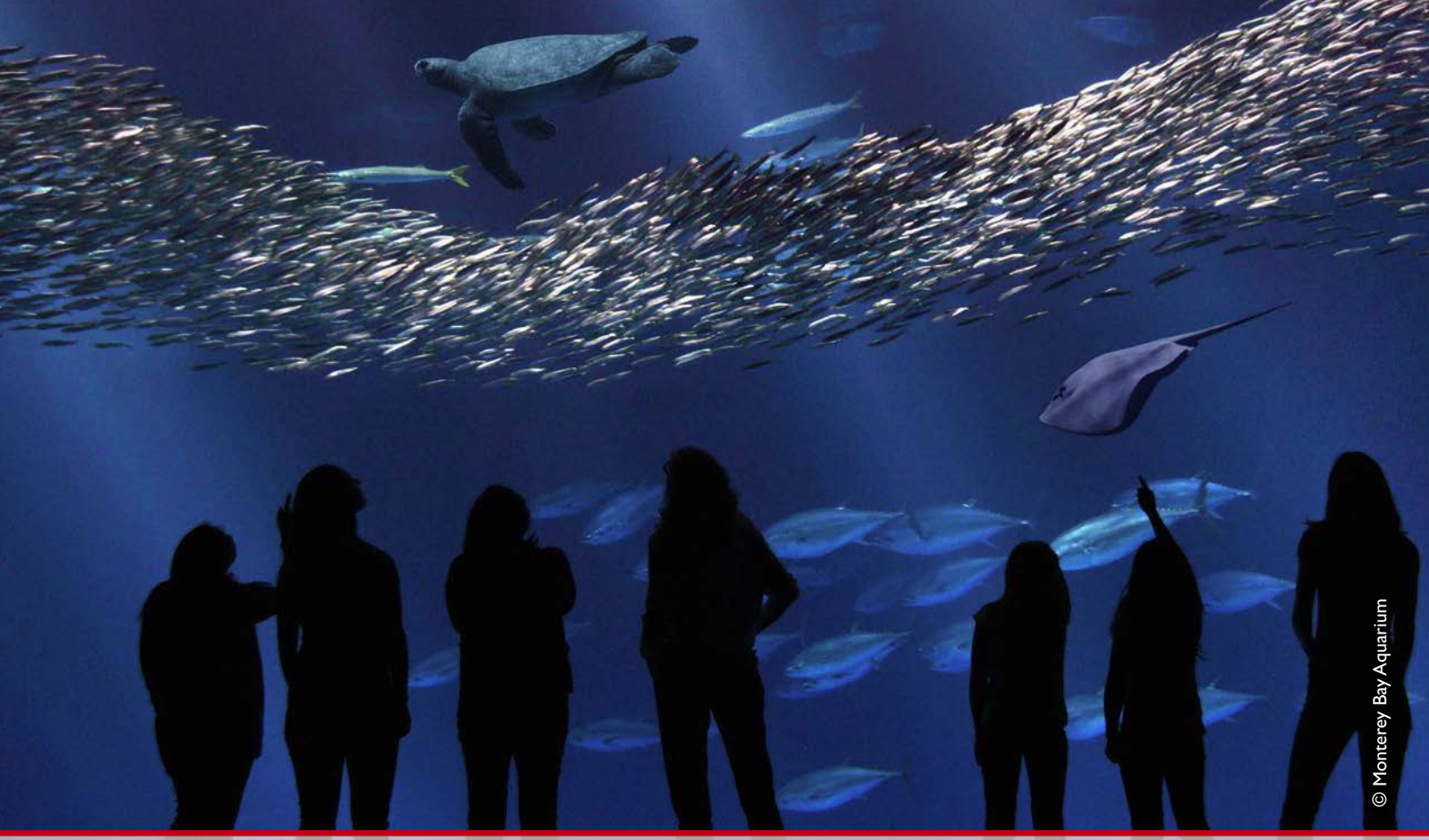
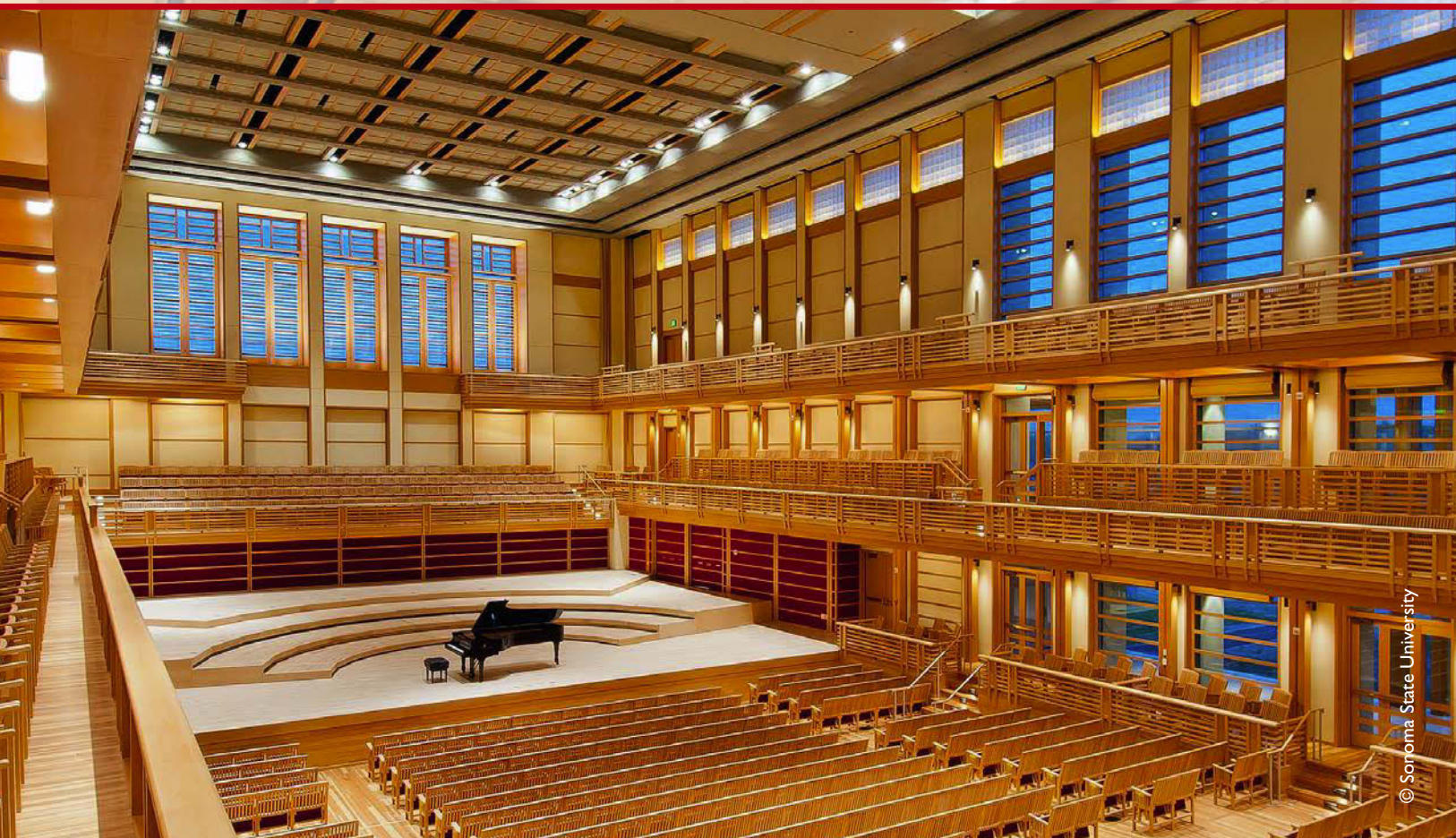




ontext and experience

Images courtesy of Arup

(Main) **The Montreal Symphony Orchestra at Maison Symphonique de Montréal in Québec, Canada**
(Right) **Innovative rigging solutions at the Star Performing Arts Centre, Singapore**

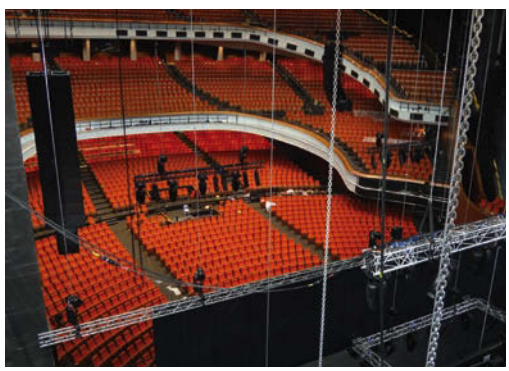
Arts districts and venues must be flexible, accessible, resilient and sustainable in order to remain culturally relevant and beneficial to the local community

According to Raj Patel, an Arup principal based in New York, to achieve long-term sustainability for the arts we must go beyond the implementation of environmentally conscious building solutions. "Working closely with arts groups and the communities they serve, cultural districts and individual facilities need to be designed around specific needs and aspirations," he says. "These need to be delivered at the right level of capital investment, with the right tools for management and cost-efficient operation, and the aim to achieve a very high level of use."

Arup's multidisciplinary arts and culture practice comprises well-connected, highly skilled teams that includes arts professionals, cultural planning and financial planning specialists, acousticians, theatre planners, audio visual and theatrical systems designers, lighting designers, and project managers – in 19 offices spread strategically around the globe. This provides projects with global knowledge, experience and skills delivered by local teams that respond to local contexts.

"In our practice, cultural diversity is encouraged," notes Rachid Abu-Hassan, an Arup associate based in Amsterdam. "Short- and long-term assignments between offices are common. The result is a tightly knit network of teams that may physically sit at a distance, but work closely together on projects around the world."

The fruits of these collaborations are visible in the myriad of arts buildings Arup has delivered in its 56-year history. They are why the firm is at the forefront of the planning and design of cultural spaces in the 21st century.



"Starting from the initial visioning process, we engage with venue owners and their communities to define the key success factors that will drive each arts project," says Michelle Tabet, a senior planner based in Sydney and a leader in strategic visioning work for cultural districts. "Getting this right is essential for achieving a sustainable arts community."

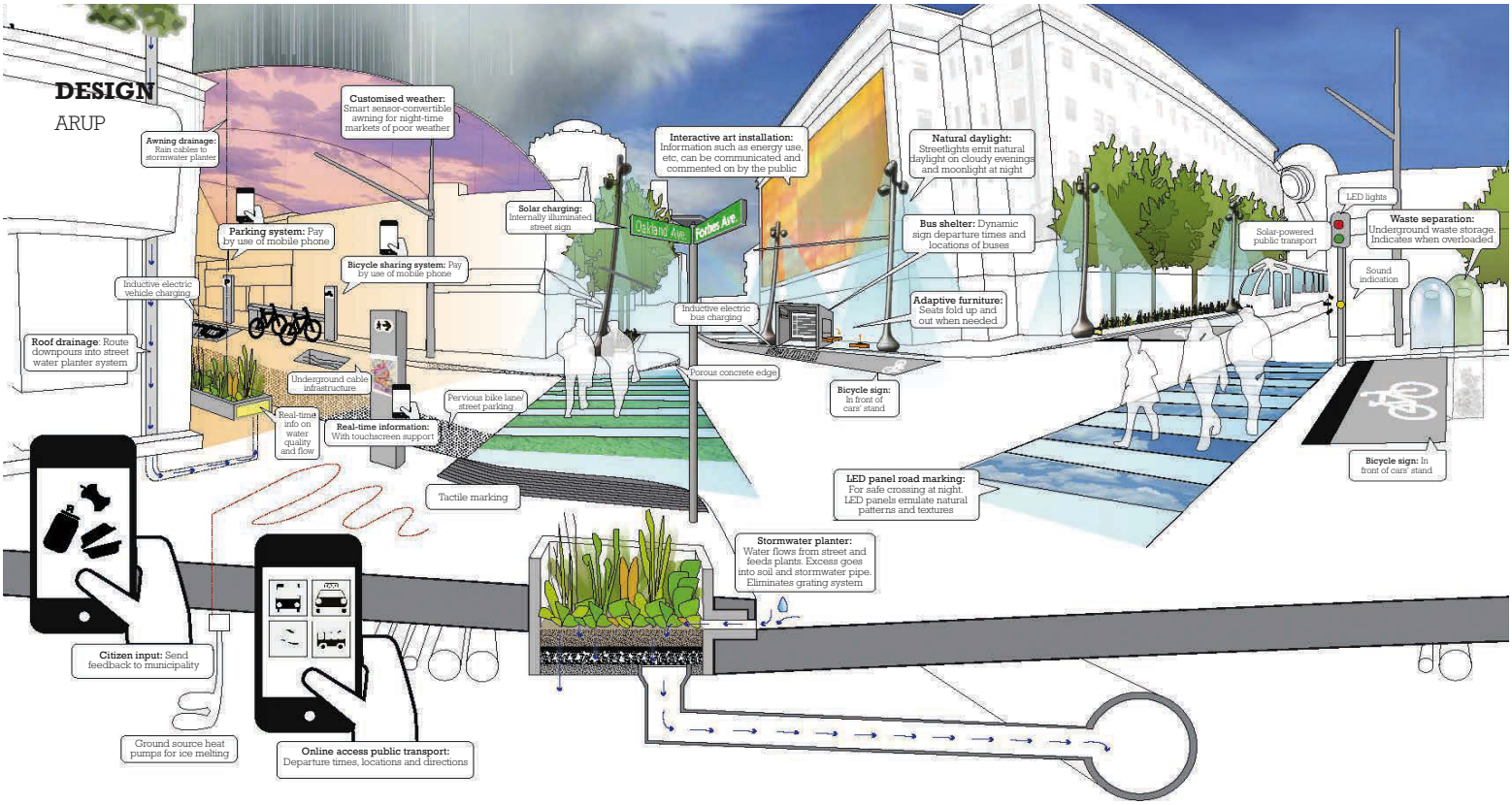
Superior experiences

Integrating with Arup in early 2013, boutique performing arts design firm Artec had a history of early visioning, planning and delivery of performing arts facilities spanning more than 40 years. "This integration has enabled us to bring our approach and skill set to Arup, and the team is excited at the promise that the integration of these two world-class practices brings to the future of facilities and districts for the arts," says Tateo Nakajima, now a principal based in Arup's New York office. Recently completed Artec projects include Harpa, the award-winning Icelandic concert and congress centre, and La Maison Symphonique de Montréal, the new home of the Montreal Symphony Orchestra.

The Arup team has a fundamental understanding that designing superior visitor and artist experiences at all scales and investment levels is critical to long-term sustainability of the arts within communities. "We have been fortunate to have been involved in a broad reinvestment in the long-term sustainability of the performing arts across Scandinavia through a series of fantastic new venues," says Rob Harris, a director at Arup based in the UK. "The opera houses of Copenhagen and Oslo are two key components in a diverse family of halls that more recently includes the Kilden Concert Hall in Kristiansand, and upcoming venues in Bodø and Aalborg, which together with Artec will be our seventh and eighth performing arts venues in the region."

Flexibility and adjustability

Flexibility in the types and range of use accommodated in performing arts facilities, without loss of quality, is fundamental to ensuring diversity, as well as the financial and social sustainability of venues. "On each project,



Arup's Smart Cities concept is being applied to Pittsburgh, Pennsylvania

we work with the client to creatively look at how theatre planning and acoustic solutions can enhance cost-efficient, safe operations and create opportunities for the building operators and artists," says Ed Arenius, Arup associate principal based in New York. "Whether the solution takes the form of holistically conceived adjustable systems for the performance area and acoustics environment in concert halls, or unique hybrid theatre concepts and rigging solutions – such as those integrated into the new Star Performing Arts Centre in Singapore – our design and planning process is all about the long-term sustainability of the massive community investments these projects represent."

Continuous evolution

Sustainability is also about responding to change. "The media industry, for example, has been undergoing fundamental changes in response to technological advances and societal changes," says Ian Knowles, an Arup associate director based in London. "We have been fortunate to have participated through our work with Sky Studios on naturally ventilated and exceptionally low-energy TV studio spaces, and our work with Bloomberg on rethinking newsroom spaces to meet the evolving landscape of the industry."

In Pittsburgh, this thinking is being applied to the streetscape joining the downtown area to the Carnegie Mellon University campus by using the entire built environment as a cultural venue. "We were selected as a result of our approach that puts the public at the centre of the project," says Trent Lethco, an Arup principal based in New York. "By integrating large-scale digital artworks with wayfinding and signage, underpinned by a technology infrastructure, arts and culture become ubiquitous in the urban environment."

"Smart building technology, which ties the physical systems of the facility together, can help management achieve quantifiable improvement in efficiency, sustainability and resilience," adds Andrew Nicol, an Arup director based in Melbourne. "We are proud of our 40-year relationship with the Sydney Opera House, where we've recently completed work integrating smart building technology, enabling preventive maintenance of the facility."

Many members of the Arup team have close working relationships with artists in the fields of sculpture, light, sound and video installation, set design, chamber and symphonic music, theatre, opera and ballet. This extends their insight into all aspects of the design practice.

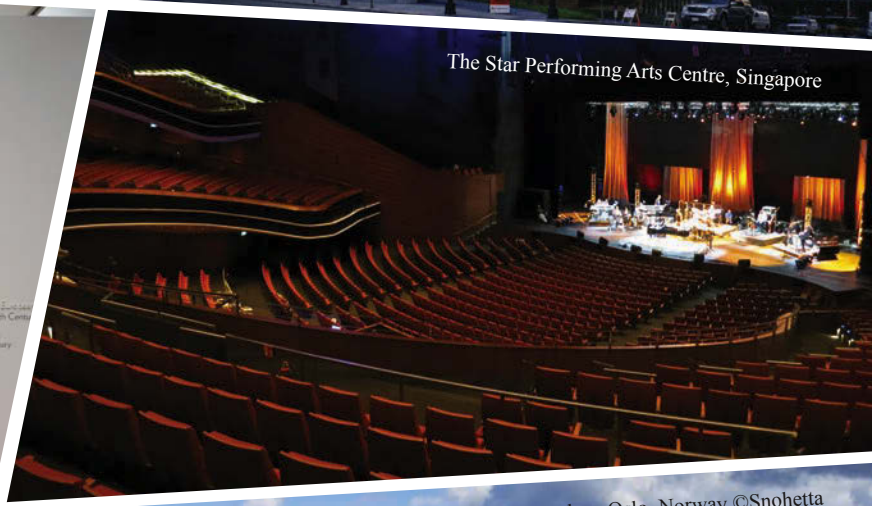
Achieving long-term financial and social sustainability and resilience in facilities and spaces for the performing arts requires a profound understanding of the arts, evolving technologies and the associated organisational change. It also necessitates the ability to design for the highest-quality experiences and the creativity to work in partnership with clients and constituencies to apply this insight to developing innovative and tailored solutions. ■

www.arup.com

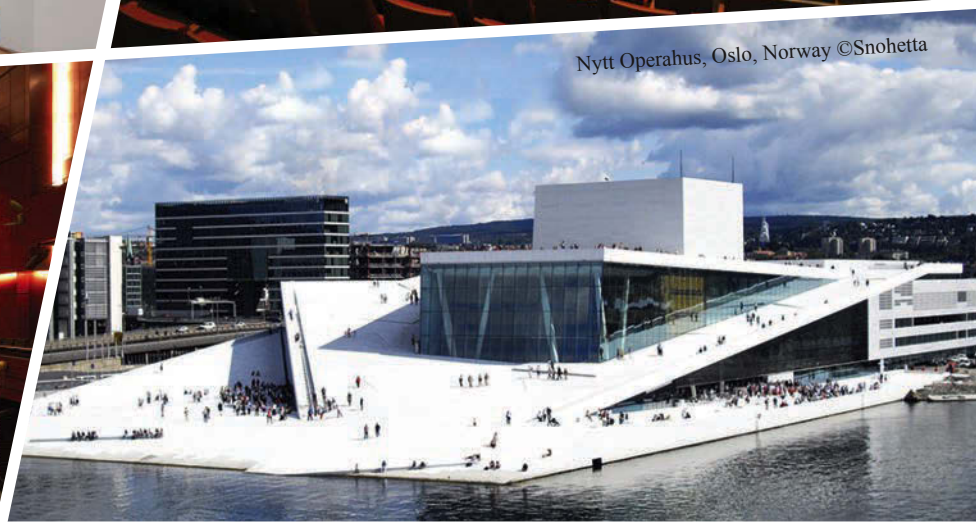

Rose Theatre, Jazz at Lincoln Center, New York NY


Seattle Central Library, Seattle, WA ©Christian Richters


North Carolina Museum of Art, Raleigh, NC ©Scott Frances


The Star Performing Arts Centre, Singapore


HARPA, Reykjavik, Iceland


Nytt Operahus, Oslo, Norway ©Snohetta

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Southern celebration

Combining modern technology with a flexible configuration to create the ideal performance venue, the new Dallas City Performance Hall is cause for jubilation in Big D

As the newest addition to the acclaimed Dallas Arts District, the function of Dallas City Performance Hall (DCPH) is to showcase performances by Dallas's multitude of mid-sized theatre, music, dance and multimedia companies. The hall was conceived more than 10 years ago when a consortium of these companies approached the Dallas Office of Cultural Affairs (OCA) seeking a higher profile in the rapidly growing Arts District. Dallas Opera had announced plans to build its own opera house, while Dallas Theatre Center had declared its intention to build a new theatre facility there. OCA's project became known as the Third Venue. To the design team it was The Theatre for the Rest of Us.

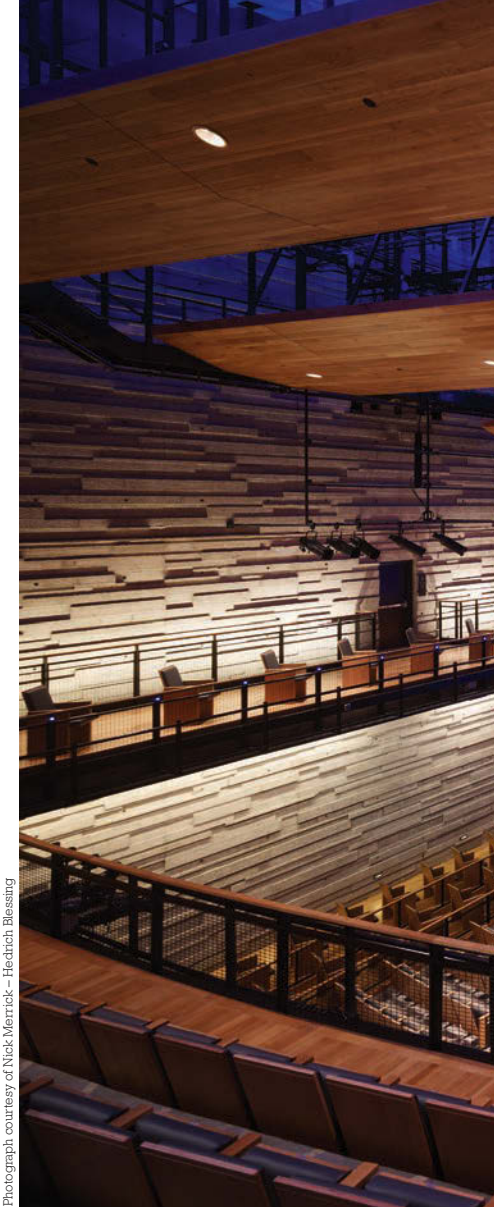
That team – of which the principal players were Skidmore, Owings & Merrill (Chicago), Corgan Associates, Schuler Shook Theatre Planners and Jaffe Holden Acoustics – then began an intensive user interview process. OCA identified a large number of potential user groups, 69 of which were invited to meet with the design team to ascertain how they each saw themselves using performance space in the Arts District. Many of the groups were seeking a flexible black box-type space with a seating capacity of fewer than 200 for drama and dance performances. Quite a few – primarily music ensembles – were hoping for 600 to 800 seats for music performance. Almost all the groups also expressed the need for more rehearsal and educational space. These groups represented a wide range of cultural traditions – from African-American and Mexican to Chinese and Native American. In addition to their production requirements, they expressed the need to facilitate activities before and after performances to enhance their relationships with audiences.

The design team distilled the user group needs down to a final building programme that included one 750-seat proscenium theatre, two 200-seat flexible theatres, two rehearsal rooms, two classrooms, a multipurpose room, an art gallery, a café, production facilities and administrative offices. For funding reasons, the decision was made to construct the building in multiple phases, with the first phase to include the 750-seat proscenium theatre and its associated front-of-house and back-of-house support spaces. Phase One of the construction began in 2010 and was completed in 2012.

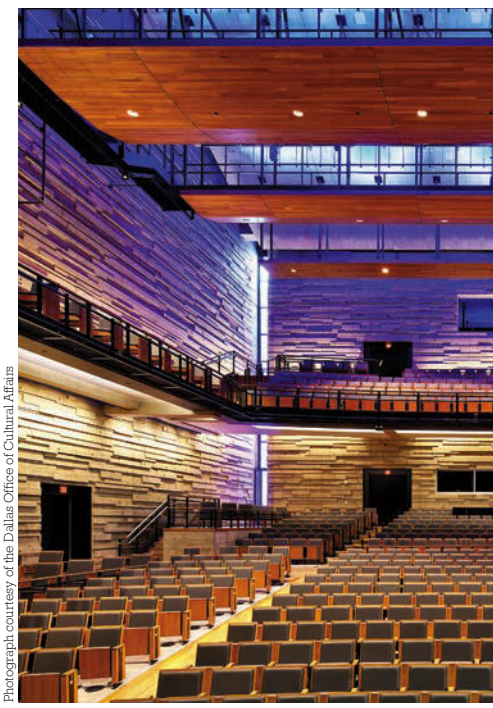
Poised for prosperity

DCPH's site on Flora Street couldn't be more ideal, right next to the Wyly Theatre, the new home of Dallas Theatre Center, diagonally across from the Winspear Opera House and directly across from Booker T. Washington High School for the Performing and Visual Arts. The design team wanted the building to be a welcoming visual beacon, so the front glass curtain walls enable its activities to be noticed by anyone in the district at any time of day, and it's a busy place. More than 150 performances have been booked for the first year alone.

The design team realised the keys to making DCPH successful were to ensure it was extremely flexible, inexpensive to operate and easy to

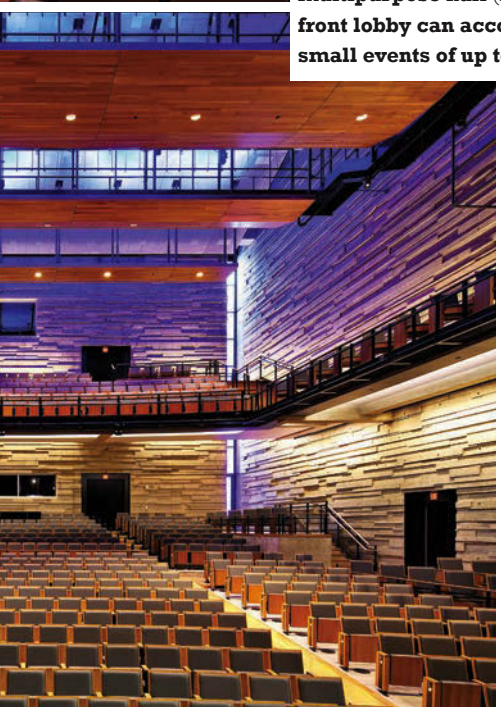


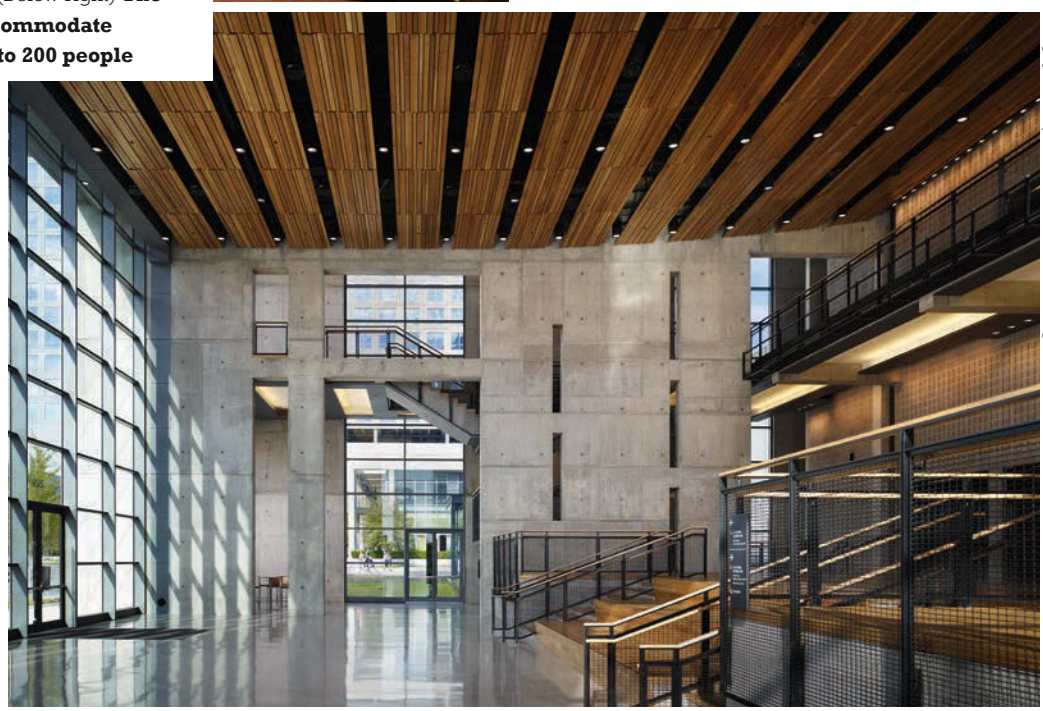
Photograph courtesy of Nick Merrick – Hedrich Blessing



Photograph courtesy of the Dallas Office of Cultural Affairs

(Above) **The low-resolution LED main curtain** (Below left) **The 750-seat multipurpose hall** (Below right) **The front lobby can accommodate small events of up to 200 people**





Photograph courtesy of Nick Merrick – Hedrich Blessing

maintain. Every aspect of the design was filtered through those criteria, in addition to having superior standards for acoustic performance and technical operations. With a shoebox design, the proscenium theatre has seating on two levels and informal galleries that visually connect the audience to the stage. Set away from the side and back walls by 30in (760mm), the balcony appears to float in the room.

Vertical sightlines were optimised for dance performances, so all seats have excellent views of the entire stage floor. Audience seating is by Ducharme, with ample provision for disabled patrons within the seating sections as well as direct access from the audience to the stage. The front-of-house lobby space is large and open, enabling it to be used for pre- and post-performance events, and the lobby connects to back of house via generously wide and tall corridors, to encourage interaction between the performers and their audiences.

Connection through technology

Uniquely, DCPH's main curtain is actually a low-resolution video display that fills the proscenium opening with 4,300 RGB LED modules attached

Courtesy of the Dallas Office of Cultural Affairs

Through its location and open design, the DCPH serves as a multidisciplinary gateway to the Dallas Arts District

to an 8 x 8in (200 x 200mm) wire grid of steel cables. The LED curtain is on its own counterweight set, and directly behind it is a black velour curtain on a separate lineset. This two-part arrangement enables the main curtain to be used as an opaque closure, or as a scrim through which a performance might be viewed. The curtain's video interface is an ETC Mosaic, so any video file can be played back on the proscenium. It is intended that local artists be regularly commissioned to produce artwork for the LED curtain, so the theatre not only supports performing artists but visual ones as well. The LED curtain was fabricated by RGB Lights and installed by Texas Scenic Company.

Manual and electric

The technical systems are straightforward and high quality, in keeping with the desire to make the theatre easy and inexpensive to operate and maintain. The dedicated electric sets (lighting bars) and the acoustic ceiling panels are supported by fixed-speed motorised line-shaft hoists. All the other rigging linesets have manually operated counterweights and are on 8in (200mm) centres. DCPH's stage lighting systems comprise 442 circuits distributed throughout the auditorium and stage, along with a dense distribution of CAT5e control networks capable of supporting current and future lighting and projection control protocols.

The stage lighting system is by ETC and includes EOS and ION consoles. The initial inventory consists primarily of ETC Source Four ellipsoidals and PARs, Selecon cyclorama lights and Lycian M2 long-throw follow spots. Texas Scenic Company also provided the stage rigging and lighting systems.

Stage lighting positions in the auditorium are well distributed, with three overhead catwalks, large box boom frames over the seating galleries and balcony rail positions captured by an architectural 'basket' assembly that makes it possible to organise the usual cable clutter by providing a continuous mesh floor and back.

Among the many challenges of this project was the requirement to vary the acoustic character of the room for different types of events, including chamber music at one end of the spectrum and film/video presentations at the other. This acoustic swing is accomplished through fabric banners that deploy down from above the ceiling. At 66ft (20m) long, DCPH's banners are among the tallest ever constructed and include two layers of wool serge that retract vertically like a Roman blind for storage above the ceiling line. These banners were fabricated and installed by Texas Scenic Company.

Flexible lighting

Schuler Shook also designed the architectural lighting for the building, and the broadest strokes are expressed in the theatre. The walls of the auditorium are a visually striking – and acoustically diffusive – design of board-formed cast-in-place concrete. These walls are enhanced by continuous white LED strip lights that tuck into the gap between the balcony and the walls; this arrangement also accentuates the floating nature of the balcony. To ensure that each performance company is able to put its own stamp on the theatre, there are several ways in which the colour of the room can be changed. The high ceiling, for instance, is illuminated with RGB floodlights shining up from the catwalks, and the balcony front-edge railing contains RGB marker nodes. In the two back corners of the auditorium are architectural light wells that allow daylight into the theatre when desired, and at the bottom of the light wells are RGB floods (Color Kinetics provided all RGB LED lighting).

The final design of the DCPH was a tremendously rewarding collaboration among the design team. It does, in fact, transcend its expectation of being The Theatre for the Rest of Us and is its own rewarding destination. All the companies that perform there are well supported and are able to proudly make the theatre their home in the Dallas Arts District. ■

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Theatre of opportunity

With excellent sightlines, state-of-the art facilities and an unprecedented level of technology, the Zorlu Center PSM is all set to rejuvenate the arts in Turkey's biggest city

In October 2013, the curtain went up on the main stage of the Zorlu Performing Arts Center and a new era for entertainment began in Turkey. Zorlu Center PSM is a gift to the city of Istanbul from the Zorlu family. The two theatres, foyer and backstage facilities encapsulate their ambitions to create a new, dynamic performing centre for visitors to the shopping area, guests in the hotel and residents in the flats – which together comprise the Zorlu Center.

Finding a unique theatre type that would bring new performance opportunities to Istanbul and that would match the ambitions of the client was an exciting challenge for Anne Minors Performance Consultants (AMPC) and Sound Space Design (SSD) acousticians, working closely with Tabanlıoğlu Architects and Emre Arolat Architects, both leading firms in Turkey.

The Zorlu management visited London in March 2009 and experienced first hand the vibrancy of cultural events available in the city. After exploring other performance buildings and taking advice from both international and local groups, Zorlu Property Group decided on a large theatre for musicals and a smaller theatre for drama, local productions and community events. The Group also asked AMPC to assist in finding an operator to run the completed facility. Nederlander was appointed in early 2012.

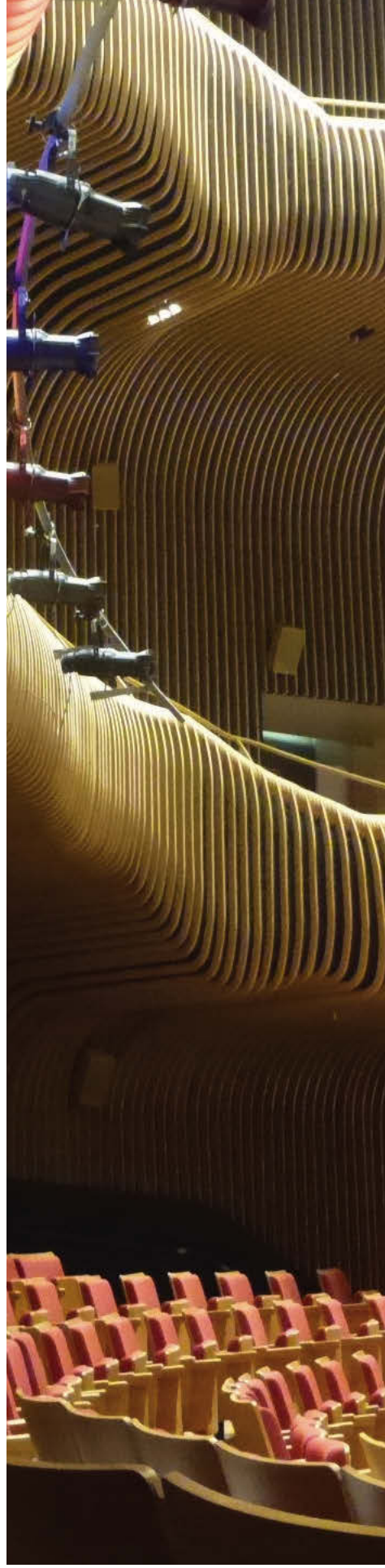
The vision for the main theatre was a space for up to 2,300 people that would be unlike anything else in Turkey – an intimate yet spectacular experience. For the performers, the intimacy and immediacy of their connection to the audience is evident from standing on the stage. Being able to see the faces at the back of every level of seating and communicate with the whole audience creates an exciting atmosphere before a word is spoken or a note is played.

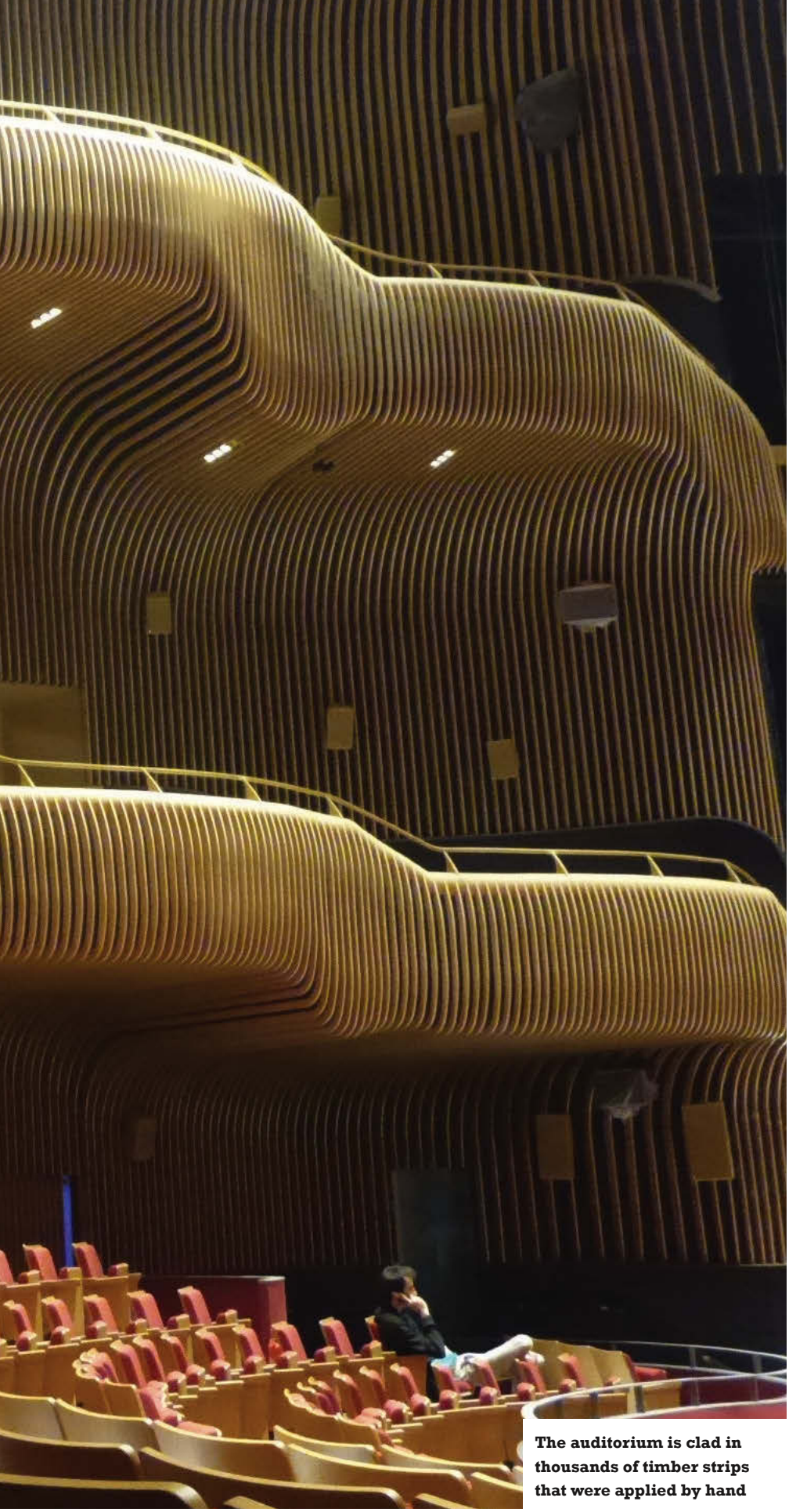
As theatre consultants and auditorium designers, AMPC established the 'bones' of the main theatre, onto which Tabanlıoğlu Architects and Emre Arolat Architects laid the internal skin of undulating and radiating lines of timber, emphasised with LED lighting.

Guest connection

At each level, the audience cascades down towards the stage with rows of people continuing around the side of the auditorium to meet with the proscenium boxes and embrace the performer. In order to bring 2,300 people close to the action, the balconies are wide and near the stage. The quality of the audience experience is consistent along the rows within each balcony.

The audience seating geometry at stalls level has been specially designed to promote a sense of collective intimacy with the performers and to encourage awareness of the neighbouring





The auditorium is clad in thousands of timber strips that were applied by hand

audience – a three-way connection. This emphasises the live theatre experience, sending the energy between the audience and the stage around the room, which is so different from a cinematic experience where the stage connection is more individual and less collective.

The front stalls are surrounded by a raised area, creating a new front row within the mid-stalls. A lyre-shape stalls plan enables those at the end of the front row to be extremely close to the stage and at the same level. These seats are accessible to wheelchair users as well.

The sound mixing position is ideally located in the middle of the auditorium but out of sight of the audience by being recessed into the floor.

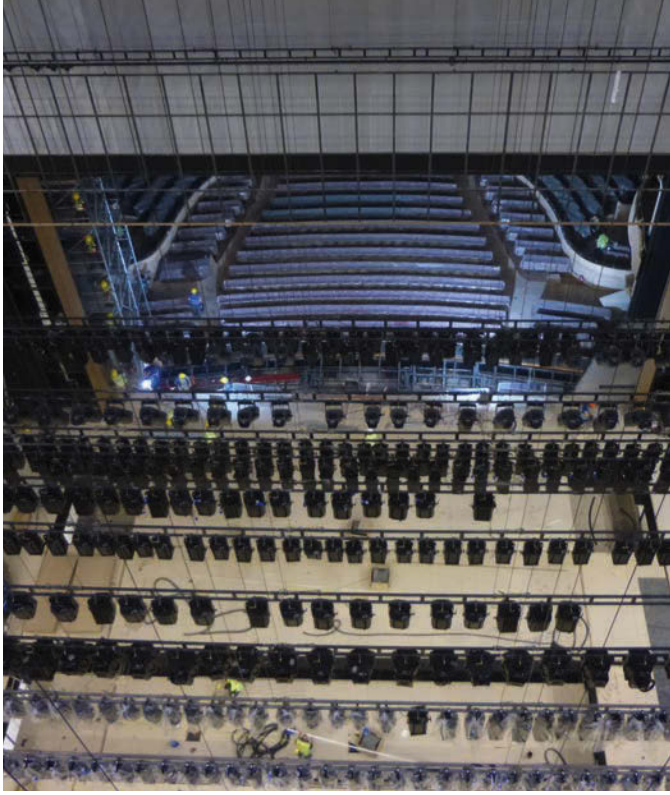
The first balcony slopes downwards towards the stage and then steps down in three boxes to meet the proscenium towers. The angle to the stage gives an exceedingly good overview of the choreography, with the sightlines working right out to the edge of the forestage when it is in use. Each box has a very good view of the stage as well as being close to the action, and links the performers with the balcony behind. The second balcony also offers an excellent vantage point to the ceiling and its detail.

The characteristic pairs of tulip-shaped aisles at stalls and first balcony levels are a reference to the national flower and popular motif of Turkey. These will help identify the venue as Zorlu Center PSM during broadcasts of live events.

Another unique architectural feature is the enclosure of flowing timber ribbons. This open lattice is acoustically transparent, enabling sound through to the wall and ceiling surface behind, where some areas are sound-reflective and some are sound-absorbent. Above the open ceiling are sound-absorbing curtains that can be extended or retracted to tailor the acoustics.

Grand ambition

Many of the recently built venues in the city of Istanbul have been congress centres rather than performance spaces. The Zorlu Center PSM caters for boundless ambition on stage – scenically, artistically and spatially – providing power-flying facilities over stage and forestage, and strong points throughout the auditorium.



(Above left) **The seating cascades down towards the stage, creating intimacy between the audience and the performers** (Above right) **The main theatre flytower being completed** (Below) **The drama stage is intimate, with a distinct character**

The great scale of the stage derives from the ambition to house full Turkish dance performances indoors, as well as attracting performances from overseas. The proscenium itself can be adjusted between 16m and 22m by sliding proscenium towers and technical boxes, which together act like an iris on a camera lens, opening up the scenic world to the audience. The production can even be extended beyond the stage and proscenium into the auditorium with the addition of projection screens or LED screens in front of the technical towers.

Behind the proscenium there is a 30m-high flytower, with full power-flying, including 92 cross-stage linesets, six up-and-down stage linesets, and side and rear stage suspensions. At grid level there are rolling beams for show rigging in addition to the regular sets to enable unusual props and scenic elements to be flown individually. There are 12 stage lifts – four main ones and eight smaller ones – for the larger stage configurations. These enable scenery to move vertically and performers to enter from below, and also enable the show deck to be recessed, thus preserving the sightlines for the audience. Through the collaborative relationship between AMPC and Nederlander, the latter's staff contributed greatly to the final operating and theatrical systems.

Nederlander, the operator of Zorlu Center PSM, has matched the spatial and technical ambition of the theatre with a rider of equipment second to none. AMPC provided a flexible technical infrastructure and connectivity to the rest of the complex, so that the visibility of the Zorlu Center PSM will promote the flagship status of not only the theatres, but also the centre as a whole.

With the addition of an orchestra shell, Nederlander anticipates broadening the range of performances beyond musicals and local shows to receiving international artists and ensembles.

Culture connection

In contrast to the spectacular ambition of the main theatre, the drama stage is more modest in scale and complexity. Nevertheless, it is characterful, with undulating plastered surfaces and a curving balcony to bring 750 seats into close proximity to the performers on stage. The space will be mainly for local companies, children's theatre, conferences and dance.

The drama stage has 29 cross-stage sets, two up-and-down stage sets and two lighting bridges over the auditorium. With a small orchestra shell for recitals, this room will accommodate chamber works using traditional Turkish instruments as well as amplified sound for music and speech. Compact proportions, convex-shaping and sound-reflecting finishes achieve a natural acoustic suitable for amplified and unamplified events.

A third area was created out of the double-height rehearsal space adjacent to the main stage of the main theatre. Accessible to the public, Nederlander, AMPC and SSD have designed a recording venue for artists with room for a small audience. It is anticipated that the Zorlu Center PSM will be highly influential in the regional arts and music scene. ■

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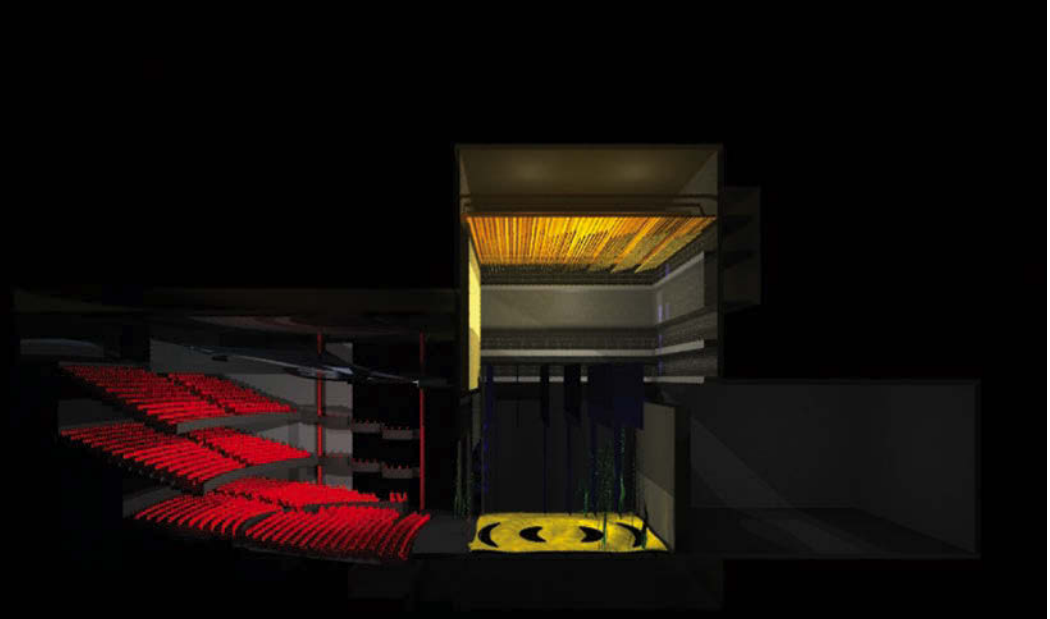
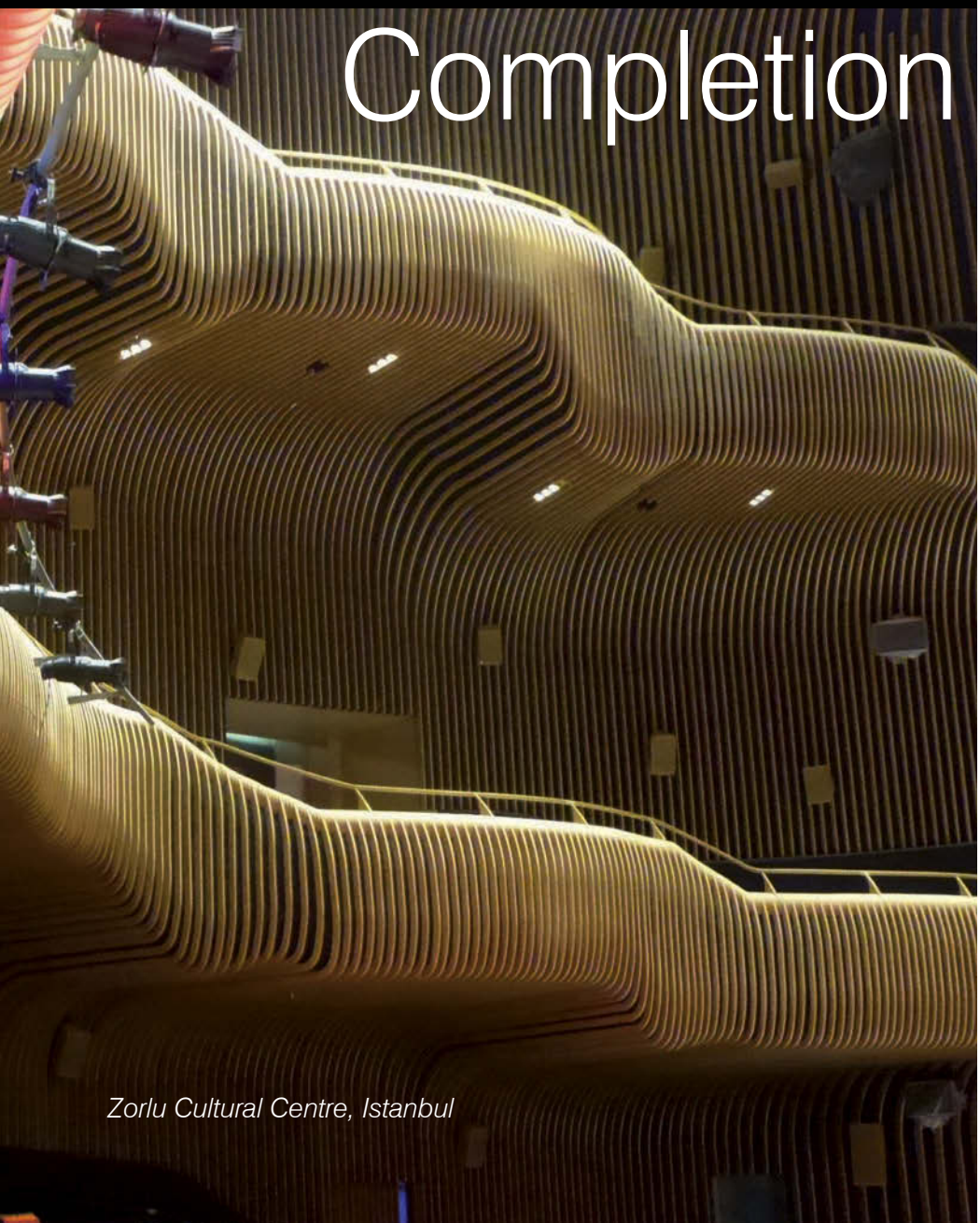


Concept to Completion



Zorlu Cultural Centre, Istanbul

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Bright and beautiful

The bold, colourful and stylish seating in the renovated Jaarbeurs Media Plaza 2.0 is a vital element in the auditorium's functional and inspirational design

The Jaarbeurs is a popular exhibition and convention centre in Utrecht, the Netherlands. Designed to accommodate a wide range of activities, the 100,000m^2 complex comprises 11 interconnected halls, a conference and meeting centre, a theatre and a media plaza. The first Dutch Annual Exhibition (Nederlandse Jaarbeurs) took place in the halls in 1917 and attracted 150,000 visitors. Some 96 years later, Jaarbeurs remains a modern, innovative facility and welcomes approximately 2.65 million international guests each and every year.

However, one of the centre's auditoria – Media Plaza 2.0 – was in desperate need of modernisation. The grey colour scheme and outdated furnishings made for a very sterile environment that wasn't attractive to event organisers. The venue owners decided it was time for a change. But the change had to complement the Media Plaza, a previous project inside the Jaarbeurs. The design had to be fresh and inspirational, while accommodating 200 fixed seats in the existing amphitheatre shape and structure. Furthermore, the project had to be completed within eight weeks.

Dauphin was asked to provide attractive and comfortable seats for the auditorium. An ultra-modern, sophisticated chair designed by Martin Ballendat – the Perillo – was chosen as a result of its simple, sculpted appearance.

Architect Liong Lie and his team from 123DV architectuur worked closely with Dauphin to develop a customised colour palette that resulted in a bold and inspirational design that gives the auditorium a cheerful and dynamic atmosphere. The seats were created in yellow, lemon, rose, pink, purple, light blue or dark blue on the outside and feature a soft white leather cushion on the inside. These specially designed seats enhance the room's design and atmosphere by appearing to morph into butterflies that exude a radiance of colour.

Inspirational environment

Other important improvements that have increased the functionality of the auditorium include new acoustic panels at the back of the room and a new lighting plan. LED lights integrated into the steps, the ceiling and the back wall of the auditorium provide the required level of intensity and luminosity. Also, by having the acoustic panels at the back, audience distraction is reduced and audibility is enhanced. To further ensure optimum visibility, the Perillo seats are fixed in positions that offer excellent sightlines.

Media Plaza 2.0 has become a state-of-the-art auditorium that provides a unique and uplifting experience. All the elements that contribute to the success of the venue – the seating, the design, the acoustics and the lighting – work together to create an atmosphere conducive to the needs of the lecturers and the spectators. The project is an excellent example of how design can be tailored to influence the aesthetics and the ambiance of a creative space, as well as the functionality. ■

www.dauphin.com

(Above) **The white steps are accented with coloured LEDs** (Inset) **The Perillo seat is crafted from a single sheet of material** (Below left) **A fresh, inspiring location for lectures and conferences** (Below right) **The seats feature soft, white leather cushions**

Perfect harmony

Culturally significant arts venues around the world have incorporated modern seating solutions that are innovative both in their functionally and visual creativity

The bold Carla seat design complements the architecture of the Archives Nationales de France

January 2013 saw the opening of the new Archives Nationales de France – the conclusion of a three-year construction project. Situated in Pierrefitte-sur-Seine, in the northern suburbs of Paris, the impressive new building has taken over from the centre in Le Marais as the main archive of documents charting the history of France. Covering 80,000m^2, the complex was designed by Italian architects Massimiliano and Doriana Fuksas, and contains 320km of shelving to house the country's vast collection of historical documents, from the French revolution onwards.

Specially designed to radiate brightness and transparency, the building comprises two separate wings, with offices and a conference room contained inside a stack of glazed structures at the front, and the archives housed within a 10-storey aluminium-clad block at the back. The conference room contains 300 striking red seats designed by Poltrona Frau.

It took the Poltrona Frau Contract team more than six months to develop the 'Carla' prototype, which was created to complement the light and airy approach of the building's architecture. The model's rhomboid armrests are inspired by the shape of the central building, while a square cushion and back fan out to give shape to the seat.

Comprising a wooden structure covered in MDF, the seat and armrest are also designed to be highly ergonomic. The back can be adjusted to obtain the optimal viewing position, while flame-resistant foam padding and intersecting elastic straps contribute to making the seat very comfortable. The foam is covered with soft Pelle Frau. A counterweight and ultra-resistant nylon supports are used as the seat lifting mechanism and operate very quietly.

An exclusive interlocking device enabled the seats to be easily installed on a metal base covered in a scratch-resistant epoxy coating, which can easily be dismounted for maintenance. The model enables the seating areas to be laid out radially or in straight lines. The seat can also be fitted with tablet arms and lighting. A clever combination of design, comfort and function encapsulated in a minimalist structure, the Carla seat was conceived to take advantage of the smallest, most complex spaces, and is suitable for auditoria, concert halls and theatres.

Poltrona Frau Contract has previously worked with Massimiliano and Doriana Fuksas on the Peres Peace Center in Tel Aviv, the Ferrari headquarters in Maranello and the headquarters of Nardini Distilleries in Bassano del Grappa, where the company's BIBI chair was installed.

Historic fusion

In December 2012, a Poltrona Frau creation made its mark at the El Greco Congress Center in Toledo, Spain. Designed by Spanish architect Rafael Moneo, the 12,000m^2 Congress Center inhabits the site of an old car park that was demolished in order to give the historic location a more valuable purpose.

The Spanish architect designed the building to blend with its surroundings. At first glance, it appears as a platform, or terrace, among a collection of buildings and vegetation on steep, fortified flanks, overlooking the Tagus River. Despite a few contemporary flourishes, El Greco Congress Center has a subtle presence, whether viewed from a distance or up close.

The building forms part of a master plan – developed by Barcelona urbanist Joan Busquets in 1993 – which sought to improve access to the hilltop core of this UNESCO World Heritage site and to promote new activities. Toledo was an important centre under the Romans, Visigoths and Moors, and was the capital of Catholic Spain for nearly 600 years. Working with the planner, Moneo suggested moving the car park to the site of an existing garage, replacing the structure with a new building that also includes a conference facility originally planned for another site.

The centre's outer wall replaces sections of old rubble walls, which were in poor condition and of no historical value. The excavation behind it accommodates parking for 600 cars and the convention centre, which houses a 1,000-seat auditorium, a multipurpose hall with the capacity for 500 people, a restaurant, and four smaller conference rooms, all underneath a terrace-like roof that has become a popular evening attraction.

The auditorium's 1,000 'Circa' seats were designed by Rafael Moneo and manufactured by Poltrona Frau Contract Division. The Circa model was originally designed for the Auditorio Nacional de Cataluña in Barcelona, but it is highly adaptable and was ideal for the El Greco Congress Centre. The seat itself is made from painted aluminium, but the back structure is beautifully moulded solid wood. Upholstered in Pelle Frau, the seats also feature leather-upholstered metal elbow rests.

Arabian insight

The adaptability of Poltrona Frau seating had previously been demonstrated in June 2012, when 1,000 L.C. seats were installed at the €31m (US$41.2m) National Theatre of Bahrain. The L.C. seat model was initially created for the Lowry Centre – a theatre and gallery complex in Manchester, UK – in 2001. The seat design allows for customised adjustment of legroom between rows and back angle alteration, which made it an ideal choice for the Bahrain National Theatre. The seat has a wooden structure and is covered with non-deformable fireproof polyurethane padding and handcrafted Pelle Frau. The seats feature a gravity system with noise-damping nylon joints, enabling them to recline almost silently.

The theatre's 1,000-seat auditorium is ideal for drama, small symphony concerts, conferences, jazz and other amplified music events. Designed to promote an intimate atmosphere, the room was engineered to enhance the actor-audience relationship. The bold design and the single seating rake provide excellent sightlines and embrace the stage, bringing the audience closer to the performances. Meanwhile, the flexibility of the forestage and proscenium enables several different staging options.

The National Theatre complex also houses a 150-seat studio theatre. Designed as a functional, flexible space, the studio is more than just a simple black-box theatre and is used for conferences, drama, rehearsals and ceremonies.

The architecture of the Bahrain National Theatre is culturally connected to the Arab world, with its layout reminiscent of an Arab palace, settled around an empty central space. In the place of a traditional palace patio, the theatre's main foyer invites guests into the auditorium, which is located at the centre of the complex. Equipped to accommodate national and international events, the theatre also serves as an urban and cultural centre where local art is created and rehearsed.

(Above left) **The El Greco Congress Centre auditorium has the capacity for 1,000 spectators** (Above right) **The L.C. seats at the Bahrain National Theatre** (Below) **The highly unusual Array seat design by Zaha Hadid**

Functional creativity

With the view to continue meeting the growing needs of modern auditoria, Poltrona Frau places great emphasis on researching and developing new seating concepts. In April this year, it was revealed that internationally renowned architect Zaha Hadid had designed a system of twisting seats for the company. The chair is a new concept in seating that combines unconventional shape with ergonomic design and high levels of comfort.

Aptly named 'Array', the new model breaks the mould of traditional auditorium and theatre seating systems. A single, compact, dynamic unit built on the principles of Euclidean geometry, the back, arms and seat appear to form a flower bud ready to burst open. Challenging the idea of form, the chair disrupts the traditional visual monotony of rows of seats. The Array design incorporates dynamic angles to create a range of unique visual effects that change according to the viewer's vantage point and transform the theatre into a welcoming, self-contained place. ■

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Ahead of the curve

The intelligently engineered and robust seating system at the new SSE Hydro in Glasgow provides the flexibility and durability the venue needs for years of successful operation

When a fire caught hold in the uncompleted roof of the spectacular new structure that has taken root next to Glasgow's 'Armadillo' exhibition centre in mid-July, it seemed that the opening of Britain's newest arena would have to be postponed. Immediately after the incident, though, John Sharkey, the chief executive of the Scottish Exhibition and Conference Centre (SECC), declared that, although a great deal of hard work would be involved, they would still make their stated deadline. And when Rod Stewart took to the stage of The Hydro on 30 September, Sharkey was proved right.

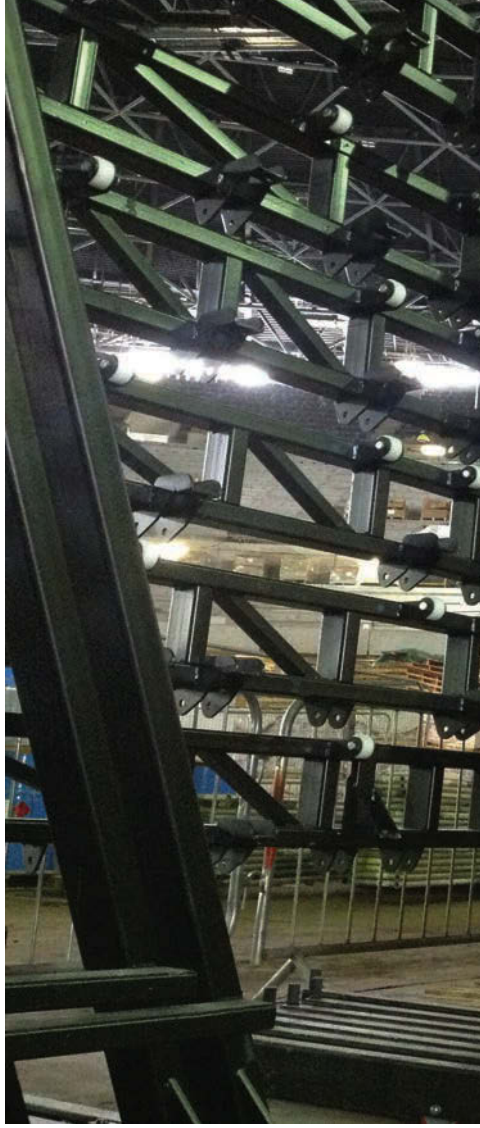
Designed by Foster+Partners for SEC, the owners of the neighbouring Scottish Exhibition Centre, SSE Hydro was created to provide Scotland with an arena able to accommodate the largest music and sporting events. A long time in the making (the original plan for expanding the SEC complex was announced in 2001 and construction of the new building began in early 2011), the result is a venue capable of seating up to 12,000 – the largest of its type in the UK and presently the fifth largest in the world.

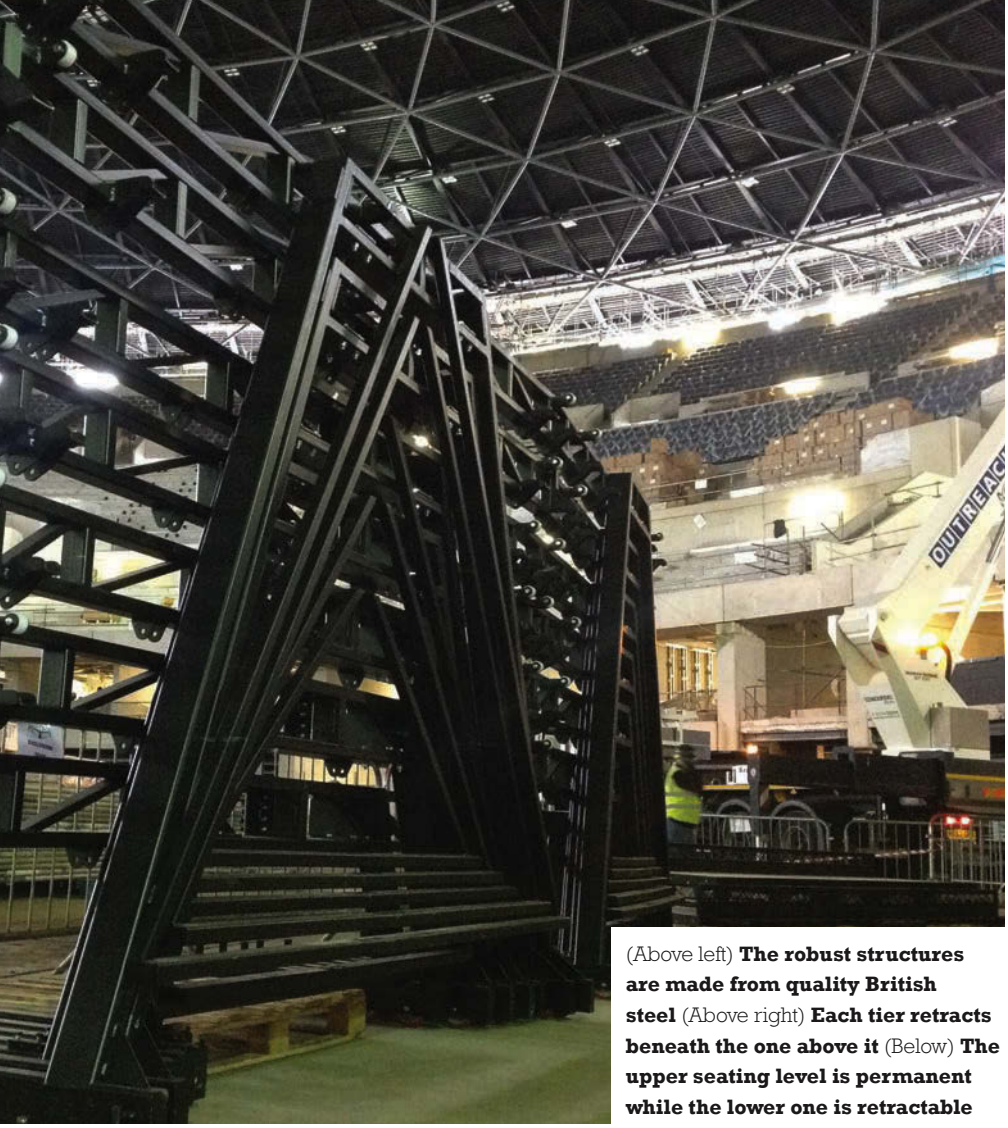
The shape of the building that houses the performance space draws inspiration from ancient Greek and Roman amphitheatres. Its façade is created from translucent pneumatic cushions that enable natural light to illuminate the foyers during the day and form a surface for eye-catching lighting and projection effects to draw audiences to the building at night.

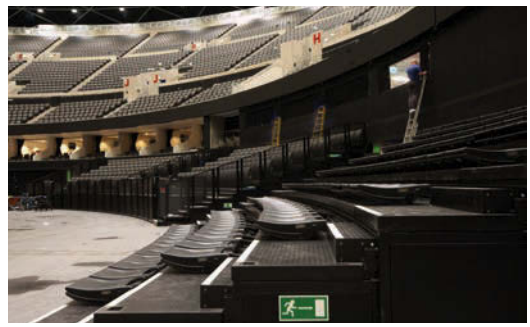
Innovative thinking

As with all buildings of this scale, the creation of SSE Hydro relied on the interaction of hundreds of specialist subcontractors, all working under the main contractor Lend Lease. The intent from all involved was to find the most effective solution to every problem the building presented; in some cases that led them to smaller specialists than they might traditionally have approached. Quality of work rather than business profile was the key.

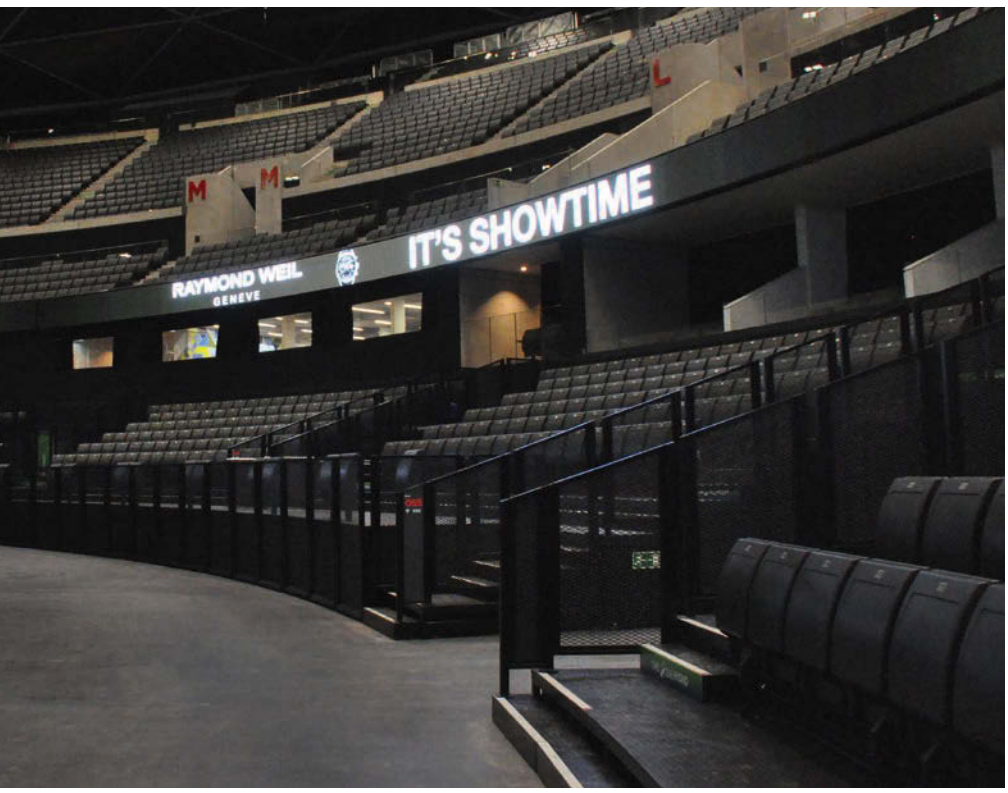
One such supplier was London-based auditorium structure and seating specialist Steeldeck. Foster+Partners' design created a curved performance 'bowl' beneath a 120m clear-span roof, to provide the optimum balance of viewing angle and distance from the stage. The design created a versatile auditorium, with a permanent upper seating level wrapped around a lower floor level intended to be adaptable, offering a flat performance space or additional loose seating, as required. The two areas are linked by raked seating banks; the challenge was that these had to be curved to follow the line of the upper level, yet retractable, able to contract into themselves and then disappear under the upper seating when not required.







(Above left) **The robust structures are made from quality British steel** (Above right) **Each tier retracts beneath the one above it** (Below) **The upper seating level is permanent while the lower one is retractable**



Steeldeck has gained considerable experience in this type of project in recent years, with its versatile APack retractable system first installed in a curved layout at Hampton School in Middlesex. "We took the team from Glasgow to the school, to show them what could be achieved," recalls Steeldeck's Philip Parsons. "I'd arranged with the school that we could get access, but when we arrived there was no one there to operate the controller for the seating. Just when I thought it was going to be an embarrassing disaster, the bursar appeared, greeted me warmly, offered to demonstrate the seating himself and raved about it in front of our guests. He did a far better selling job than I could ever have done!"

Structural integrity

In due course, Steeldeck was awarded the project, immediately finding itself involved in something dramatically bigger – and involving much more sophisticated procedures – than anything the company had worked on before. "Despite this, we approached the project in exactly the same way we always do, working to give the client what they really needed, all built and installed while making sure everything was done right – despite extremely difficult circumstances on site," says Parsons.

This not only meant careful design and engineering, which the company is renowned for, but also proving the system prior to delivery, which involved finding an additional 50,000ft^2 of warehouse space. "We then had to create custom steelwork to support the roof as we removed some pillars to give us enough space to build such large seating units," details Parsons. "That was quite an exercise but it enabled us to check and refine everything away from the chaos of a building site."

What Steeldeck ultimately delivered to Hydro was a set of nine banks of nine-tier-high curved retractables, which surround the performance space and hold around 1,200 seats manufactured

(Above) **Nine-tier retractable unit units are engineered** (below) **to millimetre precision** (Bottom) **SSE Hydro – the largest venue of its type in the UK**

by Figueras International Seating. When not required, the seat backs fold forward in blocks of three or four, and each seating bank is then driven back across the arena's concrete floor, each level retracting beneath the one above with millimetre precision, then rolling back further to store beneath the permanent balcony. Deploying or clearing each unit – the critical link between the venue's different levels – takes just minutes. Once out, it sits solid, free of what Paul Duffy, Hydro's technical manager, calls "the wobble" that some other systems have.

"The feedback we get from promoters is that Glasgow audiences can be a bit rowdier than others," he explains. "But with this system we're confident that there is no play and so there won't be any rocking action."

Solid engineering

As always, the engineering was carried out to the highest standards by Steeldeck, using high-quality British steel. If anything, the structures have been over-engineered to enable them to cope with both expected and unexpected movement that Parsons predicts they will endure at some point in their life. "I'd prefer to over-engineer rather than have something fail late one night when the venue is racing against a deadline to complete a setup," he says.

The care imparted on the Hydro's seating system has not gone unnoticed by others involved with the project. "We've used various systems in various venues for 25 years," Duffy notes, "and we're very happy with this one. The curves presented quite a challenge, but we think Steeldeck has almost broken new ground with this system – it's very solid, yet very flexible. Counterparts from other venues are in awe of it."

Ultimately, of course, all of this effort should go unnoticed by audiences attending the 140 events the Hydro plans to host each year. They should notice the building's dramatic lines and spectacular façade but once inside, the seating should just be a solid, comfortable place from which to enjoy the evening's attraction. The crowd loving every moment of Rod Stewart's inaugural Hydro performance suggests that Steeldeck – along with seat manufacturer Figueras – has achieved exactly that at this new Clydeside landmark. ■

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Role model

The forward-thinking Birmingham Hippodrome continues to upgrade its technology, with energy-efficient LED lighting and flatscreen video boards enhancing its state-of-the-art image

Birmingham Hippodrome is unusual among British performing arts venues. A top-level touring theatre and home to the Birmingham Royal Ballet, it is operated by an independent, not-for-profit trust rather than by a local council or commercial organisation. More unusual still, it operates without annual subsidy from Arts Council England or Birmingham City Council. Perhaps because of that, the theatre needs to operate as efficiently as possible. A top-flight management team, including director of operations Mike Bradford and technical manager Barry Hope, understands that efficient doesn't mean cheap; quite the opposite in fact. The venue leads the way in ensuring that its facilities are as up-to-date as possible, and are operating as efficiently as possible. It was the first theatre in the UK to be certified to ISO 14001, an international standard for Environmental Management Systems, an accreditation that has recently been renewed.

This kind of investment-led thinking is common in big business, less so in the world of the arts. "It seems to make sense to us to keep everything as current, reliable and efficient as possible, taking advantage of the opportunities new technology offers as and when we can – particularly if it directly lowers our running costs," explains Barry Hope, technical manager at the Birmingham Hippodrome. The clean, tidy theatre, operating with calm, quiet efficiency, is a testament to the success of this approach.

Birmingham Hippodrome also tends to think somewhat differently from other organisations when it comes to choosing the way it works with contractors and suppliers, preferring long-term collaboration over short-term assignments. For the past two years, the theatre has opted to work with specialist entertainment electrical contractor Push The Button (PTB) across a range of projects. "Although PTB is technically a contractor, they feel like members of the Hippodrome team," says Hope. "They know the goal, they know the building and we all work out the best solution, then work together to overcome the inevitable teething problems that arise when you're the first to use new technology."

Motion pictures

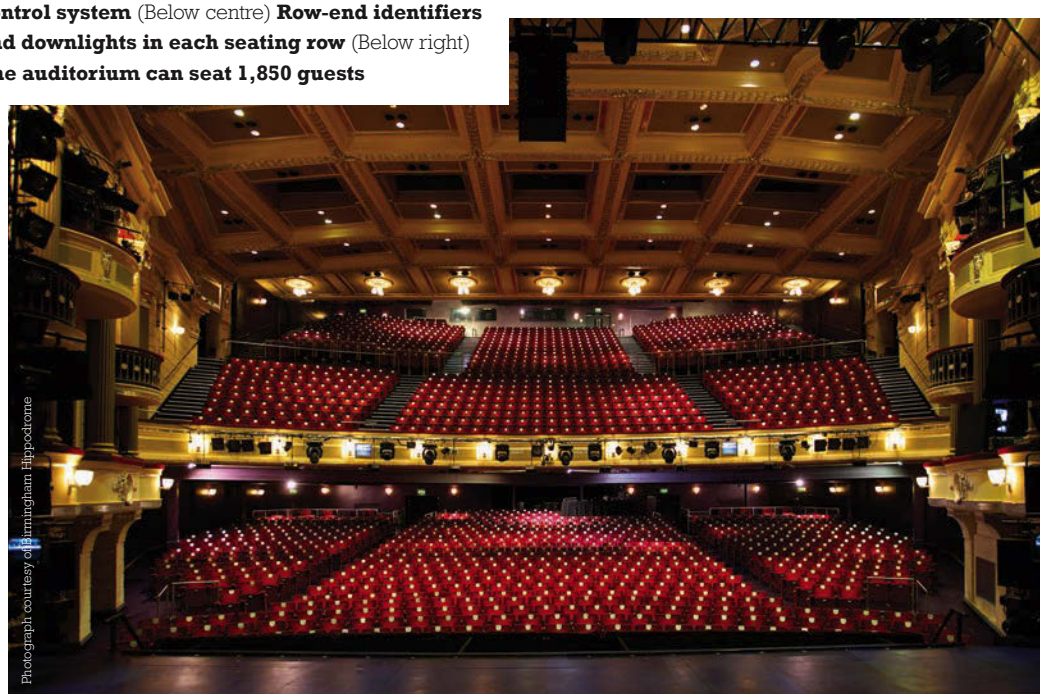
For the most recent upgrades, the venue and PTB also worked closely with Global Design Solutions (GDS), having chosen the GDS ArcSystem as a low-energy, low-running-cost replacement for the theatre's existing tungsten houselight and foyer lighting systems. "This was a great collaboration," Hope notes. "We like to work with people who want to achieve the best results rather than just with contractors and suppliers trying to get the job done as quickly as possible."

The results of the latest round of upgrades to the theatre are visible the moment you enter the spacious main lobby. Instead of the traditional printed posters, visitors are greeted with an array of video screens, with three tall vertical screens along the lobby's side wall, and one super-wide horizontal ribbon screen above the full width of the main entrance doors, reminding those leaving the building what they could be returning

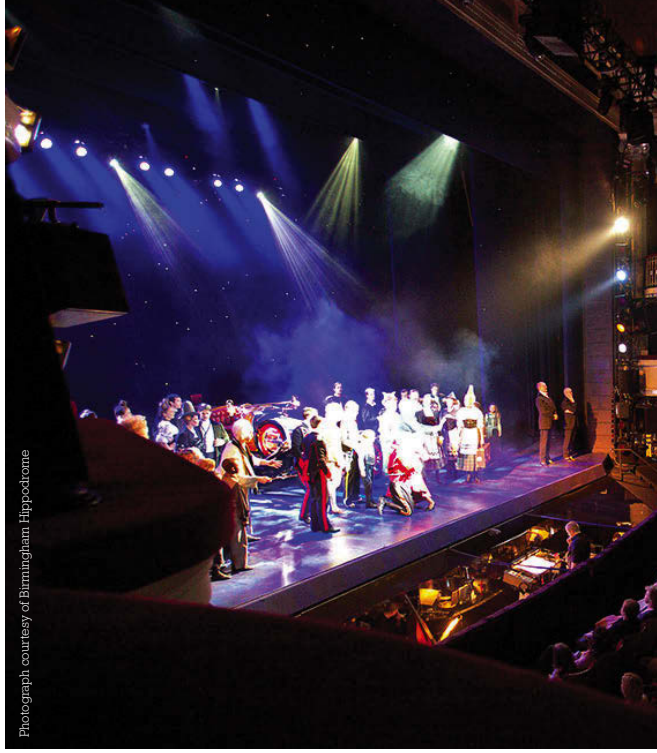
to see. The edgeless LG screens could almost be mistaken for printed material – until they change image or dissolve into moving video. There are additional screens for queue management at the box office and in the bar areas outside the auditorium entrances; these can show promotional material then switch to a stage view for latecomers. Further information display screens are located next to each auditorium door.

PTB installed all of these displays together with the AMX Inspired Signage control system that drives them. This is located in a rack room behind the box office but is accessible from anywhere using the building-wide network. It can easily be controlled by front-of-house staff via an iPad. The hope is that the screens will provide the theatre and the producers of incoming shows with new promotional opportunities. "At the very least, we felt it was time to move on from the hassle and waste of printed posters," Hope explains. "But beyond that, the things you can do once you get past a static image are very exciting. Some producers understand all of this straight away, others don't – but they will, in time."

(Above) **Promotional video screens in the Hippodrome lobby** (Below left) **Pit lift and safety control system** (Below centre) **Row-end identifiers and downlights in each seating row** (Below right) **The auditorium can seat 1,850 guests**



Photograph courtesy of Birmingham Hippodrome



Photograph courtesy of Birmingham Hippodrome

(From left to right) **The main entrance ribbon video screen; Birmingham Hippodrome hosts musicals, pantomime, ballet, opera, drama, dance and comedy performances; GDS Pro 4 Cells and Pro 1 Cells were installed in existing recessed ceiling positions**

Early adopter

Less noticeable to most observers is the new GDS ArcSystem LED lighting in the main lobby area, which uses recessed Arc Pro 1 Cell fittings in 37˚ and 80˚ beam angles controlled with an ArcMesh TX1 wireless system. The versatility of the system, which offers individual control of groups of fixtures, proved itself very early on and in an unexpected way. "There's always a slight concern with adopting new technologies," says Hope. "In our glass-fronted lobby, we were unsure whether an LED system would be bright enough. After it had been up and running for a few weeks, we heard from our HR department that the box-office staff were complaining about headaches. Our fear was that the working light wasn't bright enough, but when we measured it, it turned out to be the opposite: it was too bright. Fortunately we could just turn down the units and the problem was solved."

Plans are currently being made to extend the LED system to the rest of the theatre's expansive foyer areas, but the change has already been implemented inside the theatre itself, where the traditional tungsten house lighting has been replaced with an LED GDS ArcSystem. This was one of the first such systems to be installed, but now countless other venues around the world, including Opera Bastille in Paris, the Oslo National Theatre and the refurbished Liverpool Everyman, have also adopted it. The Hippodrome team was won over by the excellent colour rendering and the smooth, step-free fading all the way down to off, the reduced energy costs and, with no need to replace blown lamps, the lower maintenance costs. The high light output also removes the need for separate cleaners' lights in the auditorium.

The theatre's ArcSystem, including 69 Pro 1 Cells and 17 Pro 4 Cells, was installed in existing recessed ceiling positions, fitted with custom cowls created by PTB to help control glare. Twelve three-arm pendant lights and 44 single-arm pendant lights from the sides of the auditorium were refurbished and fitted with custom GDS LED sources. The system is controlled using a mixture of wired DMX control and wireless control using GDS's powerful ArcMesh system, where each fixture communicates with other nearby fixtures, giving an interconnected web of wireless signals to ensure excellent control coverage, even over large or challenging layouts.

"It seemed sensible to go for the proven reliability of cable where we could," comments PTB's Nick Ewins. "But the ArcMesh system proved invaluable in dealing with those parts of the building where running new control cable would be prohibitively difficult or expensive."

PTB and the Hippodrome staff also used LEDs, driven by GDS Arc power supplies, to create custom row-end identifiers and downlights in each seating row-end panel, even those that hinge open to provide wheelchair positions. The letters and downlights are separately controllable to minimise light levels during a performance, with the houselights also carefully zoned and balanced across the theatre's light-coloured auditorium.

"The system gives us a lot of control," explains Hope. "But we take care of that within our control system; to visiting companies it just appears as a single channel that they

patch to. They don't want to worry about the complexities of houselights, so we made sure they don't have to."

Better backstage

Less readily visible to the audience, but just as important for their enjoyment of a show, the upgrade work has continued behind the scenes with a series of projects that have even seen the theatre replace its entire stage structure to provide a stronger, more even base for touring shows. PTB has replaced the theatre's old dimming system with the well-proven, reliable ETC Sensor 3 racks, complete with some of the new ThruPower modules that can switch between dimmed and non-dim power, enabling them to drive traditional lighting fixtures or automated or LED units.

Since the Hippodrome also plays host to many touring shows that bring in their own dimming systems, PTB has provided improved power facilities on both sides at stage level and on the stage-right gallery. All offer facilities for monitoring load and power consumption, to help the building manage its energy use.

Below the stage, PTB created control systems for the orchestra pit lift and the auditorium seating lift, both incorporating a switchover between primary and back-up drive motors as well as a comprehensive e-stop system. The orchestra pit also required critical attention to ensure that, having attracted an audience, there would actually be a performance for them to enjoy. "A few years ago, our pit suddenly flooded without warning," Hope recalls. "Ever since then there's been water in this area. Tests have shown it's coming from somewhere in Wales! We can only think that the redevelopment around New Street station disturbed an underground stream."

The orchestra pit area was waterproofed, but the Hippodrome team also decided to install a pumping system to move water away from the area. This must not fail, and so PTB was charged with creating fully redundant control and monitoring systems. These control the pumps based on water levels detected by float valves, and are also self-monitoring with an email alert system that informs staff of rising water levels or pump faults.

Broad horizons

Although enjoying the new systems they've put in place over the past two years – particularly the energy savings offered by 20W LED sources in the GDS ArcSystem – the Hippodrome team is not resting on its laurels. Next on the list is adding an LED video wall billboard to the front of the building, to grab the attention of passers-by emerging from the railway station. "The PTB team keep thinking that they're finished here, but then we find something else for them to do," laughs Hope. "We keep bringing them back because they're such a pleasure to work with, and so good at what they do."

PTB and GDS are both also involved in projects at other Birmingham venues, including the refurbishment of the Birmingham Rep theatre, the Library Theatre and the Birmingham ICC. It seems that the Hippodrome's school of ongoing re-invention is proving highly influential. ■

www.gds.uk.com | www.ptb.uk.com

Intelligent interior

A high-tech conference and event space can be effortlessly transformed into multiple configurations using futuristic automated technology

Scheduled to open in May 2014, the Swiss Tech Convention Center is situated on the campus of the École Polytechnique Fédérale de Lausanne (EPFL) in Ecublens, Switzerland. Primarily dedicated to hosting scientific and academic events (conventions, seminars and conferences, etc), it has a total capacity of 3,000, which comprises a 2,205-seat conference room with a 795-seat balcony.

Equipped with the latest in venue reconfiguration technology, the Swiss Tech Convention Center is a truly flexible venue. The auditorium can be automatically reconfigured from a full conference room to exhibition hall or banquet room (flat floor configuration) in just 15 minutes. Each seat is also fitted with a keypad system. Fifteen fully modular meeting rooms also feature on the lower garden level.

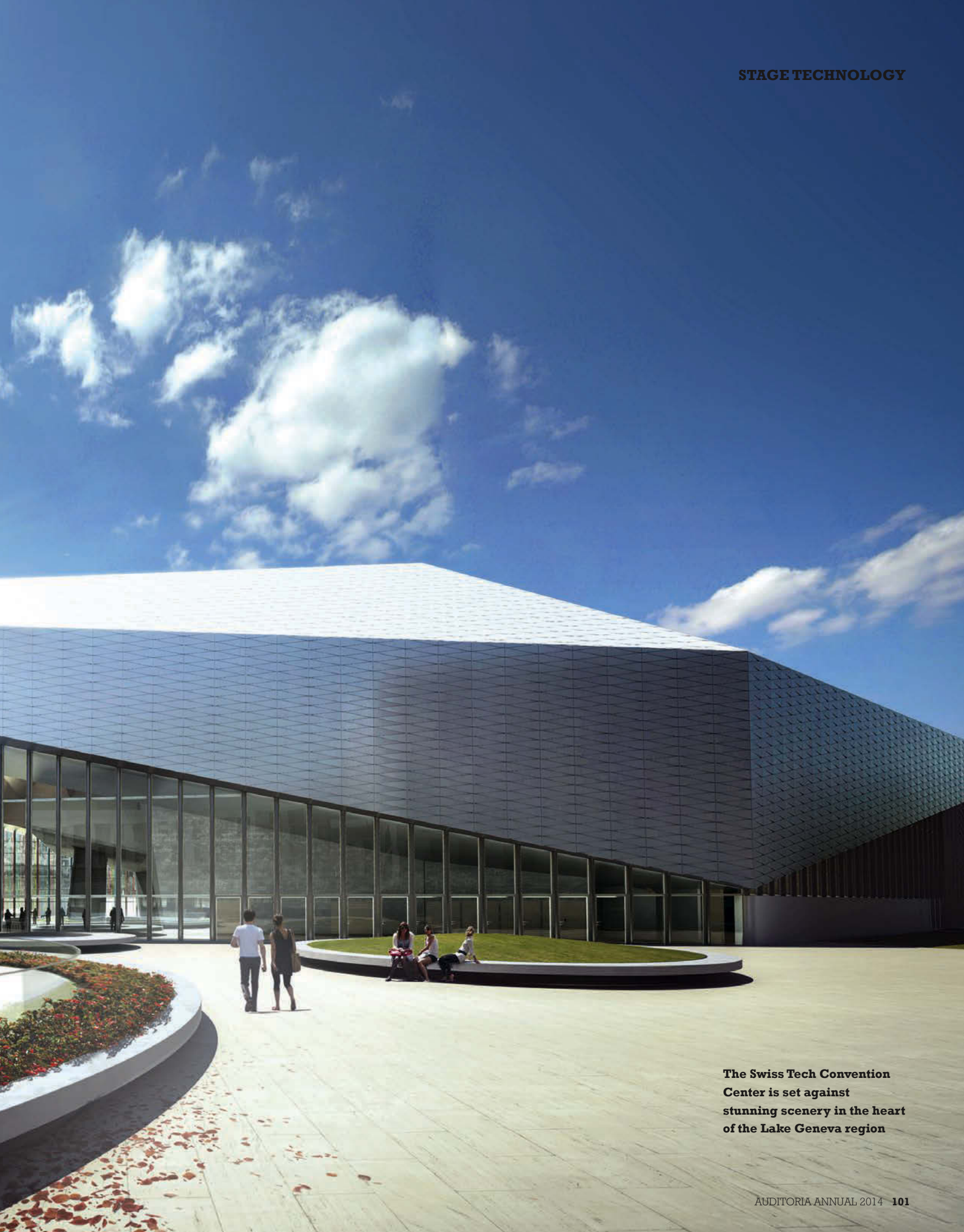
CHF225m (£156m/US$242.7m) was raised for this impressive project through a public-private partnership made up of Credit Suisse Real Estate Fund Living Plus, Credit Suisse Real Estate Fund Hospitality, and HRS Real Estate.

"We are proud to contribute to the development of a futuristic EPFL campus and strengthen Switzerland as a place of training and research," Lucas Meier, fund manager for Credit Suisse Real Estate, told the *Tribune de Genève* in September 2011.

The project is generally credited to have been kickstarted in large part by Patrick Aebischer, president of EPFL, with a call for design submissions in 2006. By 2009, the firm Richter·Dahl Rocha & Associates was selected and the design and planning stages started in earnest. The main design challenge was to create a versatile auditorium that could fit up to 3,000 people at full capacity and could also function as several independent smaller gathering spaces. Since it was expected the main auditorium would not be used at full capacity at all times, it was essential to have a way to automatically adapt the space to fit the needs of concurrent small gatherings, as well as large conferences.

Design innovations

From the exterior, the Swiss Tech Convention Center appears as a simple and elegant structure that maximises the available space in an innovative manner. The Richter·Dahl Rocha design features a very large triangular metal structure cantilevered



The Swiss Tech Convention Center is set against stunning scenery in the heart of the Lake Geneva region

off two reinforced concrete supports in the centre and to the north of the building. This design enables plenty of natural light to enter the building with floor-to-ceiling glass façades on each end, which can be completely obscured when needed. Construction is being managed by HRS Real Estate with the assistance of the civil engineering firm Ingeni.

Within the interior of the building, emphasis was placed on creating flexible space. The project team agreed that the main auditorium had to have the capability to be quickly subdivided into smaller rooms to accommodate a variety of events. Skyfold vertical partitions were therefore installed to enable acoustic separation for the balcony seating. A fully automated high-tech approach to this challenge was central and soon became a key selling point of the project.

After evaluating a number of competing technologies, the Gala Venue technology provided by Gala Systems was chosen as being best suited to the needs of the project. This technology enables seats to be deployed via an automated platform and seat rotation system, which can move seats to an inverted position for storage under the floor when they are not required. This guarantees a perfectly flat floor without any visible cracks or variations in height. Modular walls are deployed, where necessary, to subdivide the space into several independent rooms. The 20-tonne wall situated within the main auditorium can be raised 4m high using Gala's Spiralift technology and provides a complete acoustical and visual separation, enabling concurrent events to be hosted. "The Spiralift technology made all the difference here," says Kenneth Ross, project architect. "It's very reliable – it works every time."

The main lobby leads into a fully modular space that can be converted from an auditorium to a conference room, to an exhibition hall, to a banquet and reception space

The stage is set

When it opens in May 2014, it is anticipated that the Swiss Tech Convention Center will become a very popular conference and event venue, with its futuristic design making it a truly unique and flexible building, capable of accommodating all types of seminars, conferences, and business conventions. In close proximity to Lausanne, hotels, shops, and other infrastructures, it looks set to be the ideal platform for exchanges between delegates from around the world. ■

www.galasystems.com

CONVENTION CONFIGURATION

Overlooking the 2,205-seat auditorium is a 795-seat mezzanine, giving a total capacity of 3,000 seats:

- Total surface area: 2,700m²;
- Auditorium: 1,950m²;
- Stage: 190m²;
- Backstage: 100m²;
- Mezzanine: 620m².

BANQUET & RECEPTION CONFIGURATION

- Auditorium: 2,000m²;
- Main lobby: 1,316m²;
- Maximum banquet capacity: 1,000 people;
- Maximum reception capacity: 2,100 people.

CONFERENCE CONFIGURATION

Using modular walls, the mezzanine can be transformed into a separate auditorium with its own foyer, so can hold several events at the same time.

- Mezzanine foyer: 500m²;
- Enclosed mezzanine conference room: 420m² (456 seats).

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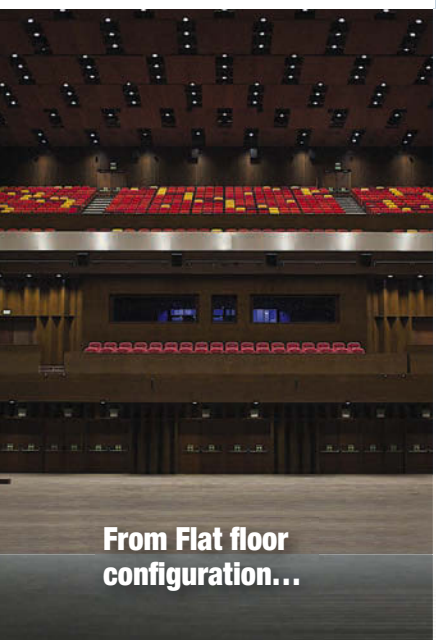
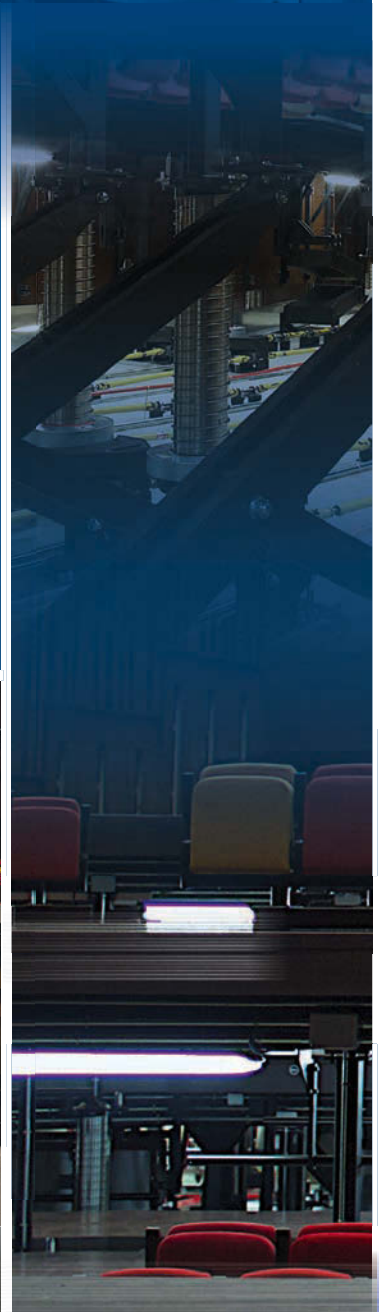
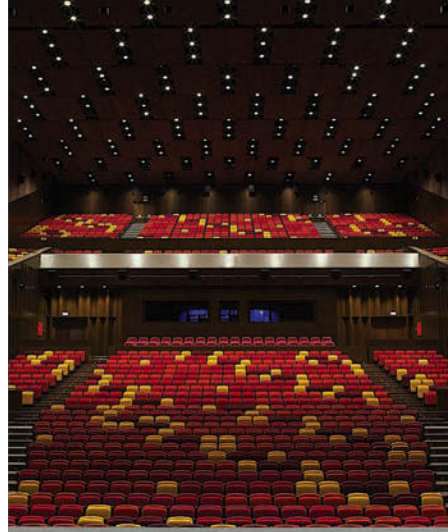


From Flat floor configuration…





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tage secret

A lightweight damping subfloor hidden beneath the stage surface provides comfort for dancers – improving their performance and ensuring their safety

Under the auspices of Manuel Legris, director of the Vienna State Ballet, and the artistic direction of Austrian ballet dancers Eva Petters and Gregor Hatala, the international Ballet Days competition was – once again – a landmark event on Vienna's cultural calendar this year.

The annual competition is an Austrian Dance Council initiative aimed at developing and promoting contemporary dance; each year the event unifies a variety of Austrian and international ballet and dance schools. In June 2013, members of 20 of some of the world's most prestigious dance schools came together to light up the stage of the distinguished Odeon Theatre in Vienna.

To ensure the safety of the performers and in order to support them in achieving complex movements, the main theatre stage was equipped with innovative flooring throughout the competition. With its active foam composite system, Tüchler's Manero Ultra-Lite mobile subfloor provided the dancers with 37% protective damping.

Enhanced performance

Damping flooring systems are usually very difficult to acquire, particularly for temporary applications. The storage and transportation of these heavy materials often seems too difficult for short performances or individual training sessions, while it often takes several hours to install and dismantle the flooring again.

(Above) **The comfortable sprung floor impressed the dancers at the International ÖTR Ballet Days competition**
(Below) **Tüchler's patent for Manero Ultra-Lite**

The United States of America

The Director of the United States Patent and Trademark Office

Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

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David J. Kappos

However the Manero Ultra-Lite sprung floor is different. At 7kg/m^2, its minimal weight and volume make it easier for staff to install, which can also reduce labour and transportation costs by up to 75%. It is also stackable and space efficient, which minimises storage costs.

With a patented interlocking puzzle design, the floor doesn't require adhesives or adhesive tapes for installation and is instantly stable. As such, the Odeon Theatre's 300m^2 main stage floor was installed quickly and effortlessly, and – with the dancers supported by 100% ball reflection – audiences were treated to high-calibre performances, perfectly executed by the young international artists.

"It was a unique experience performing on this special floor," comments Pascal Loussouarn, a dancer from Bruce Taylor's ChoréOnyx dance company in Paris. "It is an ideal surface for contemporary dancers."

"The flooring was extremely comfortable to dance on," agrees Rainer Krenstetter, principal dancer of the Berlin State Ballet. "The sprung floor under the linoleum cushioned us while we were dancing and it was not at all slippery."

Tüchler's Manero Ultra-Lite is also currently meeting the high demands of top-class dancers at the Trinity Laban Conservatoire. Situated southwest of London, this is one of Europe's leading centres for professional training in contemporary dance.

Detailed engineering

The Manero Ultra-Lite subfloor was used with Tuchler's Event top surface at the Odeon Theatre. However, it could also be paired with the company's Drosselmeyer, Confidance or Consor models. There is test data available for the combination of these dance floors with Manero Ultra-Lite subfloor.

This combination was ideal for the Ballet Days competition because, in contrast to traditional sprung floors, the active foam composite system works immediately. This effectively protects the joints of the dancers and also reduces pain caused by direct impact.

It is common for heavy loads such as pallet trolleys or forklifts to be rolled around on a stage, hence Manero Ultra-Lite has been designed to withstand such impact. It can also tolerate sudden, concentrated stresses such as a dropped hammer, while stiletto heels don't leave a mark. What's more the flooring is permanently flame retardant to EN 13501 class Cfl-S1. ■

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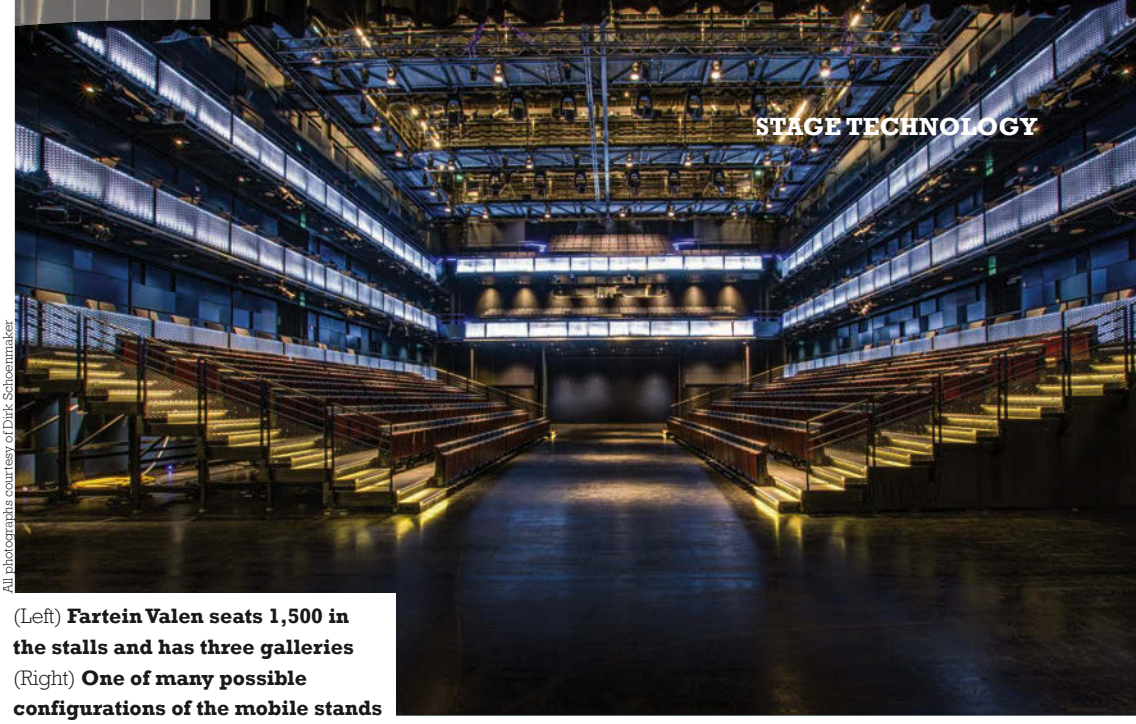
A perfect pair



All photographs courtesy of Dirk Schoenmaker

(Left) **Fartein Valen seats 1,500 in the stalls and has three galleries**
(Right) **One of many possible configurations of the mobile stands**

Despite being visually contrasting, the two halls of Stavanger Konserhus are identical in their technical and acoustic ability to host a variety of outstanding musical events

The original Stavanger Concert Hall Dome was built in 1982. Situated in Bjergsted Park, just outside of Stavanger city centre, the hall was a cultural hub for many years. Recently, the local council wanted to expand the cultural offering in the city and provide a wider variety of events. As a result, a new cultural district has been developed in between the historic dome and the harbour.

At the heart of the new development is the Stavanger Konserthus. Overlooking the fjord and the ocean, the striking concert hall faces the shipping lanes and fishing boats and its architecture is a nod to the regional shipping industry. The new concert hall opened its doors to the public in September 2012.

Realised by Norwegian architect Ratio Architekter, Stavanger Konserthus comprises two buildings – one made of concrete and a contrasting volume made of glass. The red concrete box – Fartein Valen – was designed for the repertoire of symphony orchestras and is thus the new home of the Stavanger Symphony Orchestra. The glass box – Zetlitz – is a multipurpose hall for louder rock, pop or jazz music. The two complimentary houses are acoustically isolated so that a classical concert can be held in one hall while a loud concert takes place simultaneously in the other.

As a part of the project, Waagner-Biro was approached to equip both of the new volumes with advanced stage machinery. This was not the first time the company had dealt with a complex stage system – through years of experience, it has mastered the art of developing and installing technical equipment in opera houses, theatres, music and multipurpose halls that operates quietly, quickly, safely and almost invisibly. Previous projects for Waagner-Biro include the Harpa Concert Hall in Reykjavik, Iceland, the Forum Evolución in Burgos, Spain and, more recently, the new Linz Musiktheater in Austria.

Sound of music

For Fartein Valen, Waagner-Biro paid particular attention to creating a high-quality sound experience. As such, 20 orchestra lifts were arranged in a semi-circle, enabling various configurations for the orchestra podium. The podium lifts – which form a total surface area of 128m² – are capable of supporting a maximum load of 52 tonnes.

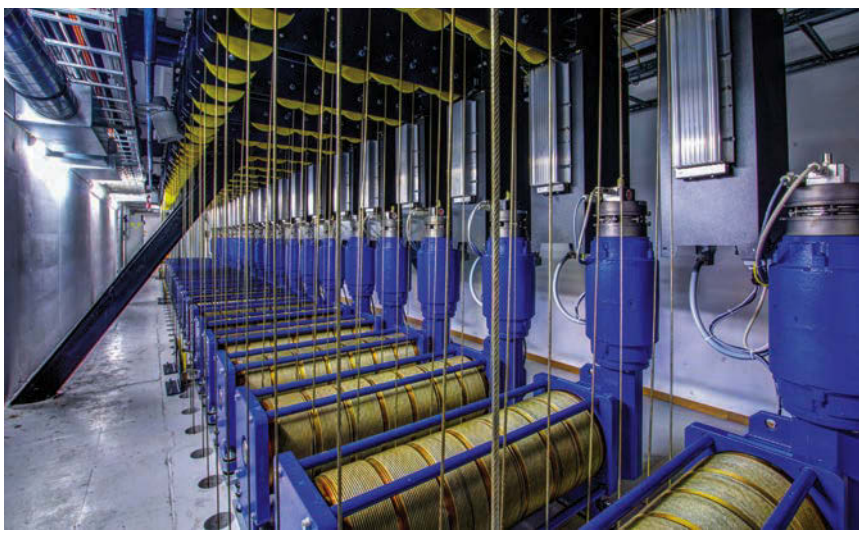
The concert hall roof comprises eight movable elements. With each element weighing up to 30 tonnes, the total weight of the roof construction is approximately 185 tonnes. Furthermore, 11 winches for acoustic reflectors and light trusses have been incorporated into the structure. As a result, both the acoustics and the lighting can be adapted to accommodate various curtain systems that are used for space definition, acoustic adaptation and as a projection canvas. All the motors are invisible as they are situated within the roof construction.

(Above) **The Fartein Valen hall features 20 orchestra lifts arranged in a semi-circle**
(Below) **The state-of-the-art machinery room for the Zetlitz multipurpose hall**

Flexible engineering

The multipurpose Zetlitz building is designed to be very versatile. With a fully equipped platform and orchestra pit, viewers' rank and gallery, it is suitable for plays or musicals. Alternatively, it can be used as a flat hall with a stage for concerts. The hall can also be equipped with seats, as well as a podium for conferences, or can act as a fully level banquet hall.

To ensure that these adaptations work properly, the hall has sophisticated stage equipment in place. Backstage there are 20 scissor-type podiums, which form a total surface area of 180m² and support a load of 88 tonnes. There are six orchestra podiums, which can form an orchestra pit or be used for the expansion of the viewers' parquet. Furthermore, three lifting podiums have been installed to create a temporary, rising level between the parquet and the first gallery, aided by telescope platforms.



With six telescope platform blocks and six chair wagons, it is possible to establish a 330m² level with 494 seats in the hall, within just a few hours. The stand system is a mobile installation to ensure access to the fixed rows of seats in the gallery and the tiers.

The hall's upper machinery includes 48 scenic hoists and 41 moveable chain hoists. Waagner-Biro used two separated CAT V4 computer monitoring systems for mobile control. This state-of-the-art control system was developed by the company for monitoring collisions and overload in the complex roof structure of the concert hall. Moreover, the Austrian company incorporated 205 adjustable axles in both halls (137 axles in the upper machinery, 49 axles in the lower machinery and 19 axles for curtains and banners).

As a result of the state-of-the-art stage equipment, both of the houses that make up the Stavanger Concert Hall are fully capable of hosting a wide variety of music and theatre events with superior sound quality. ■

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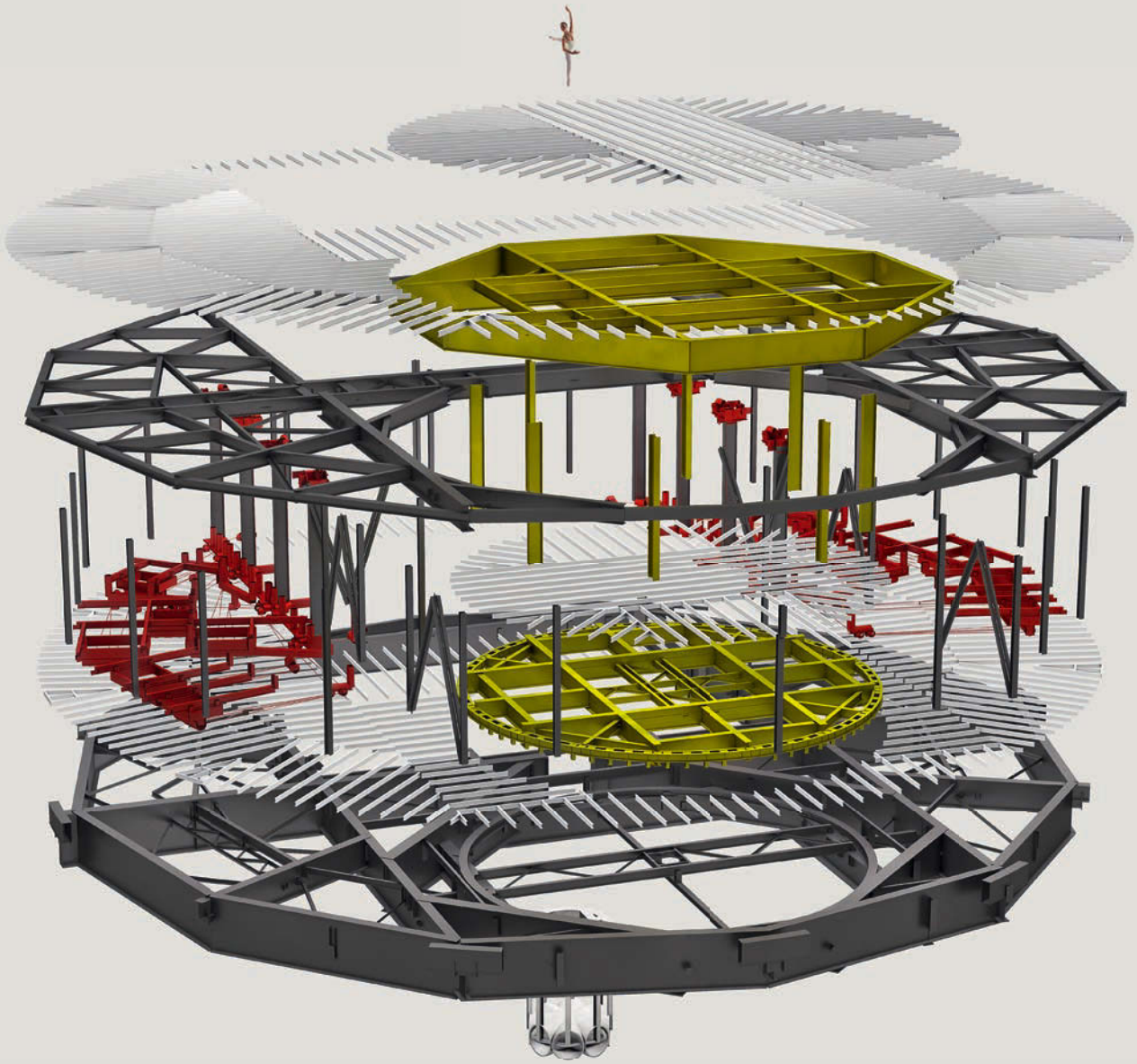
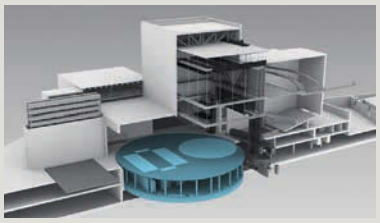




When emotions run high on the leading stages of the world, the background technology must play its role perfectly: In the Music Theatre Linz the 32 metre diameter revolving stage currently being installed is one of the largest and technologically most demanding in the world.

waagner biro

Creative sparks

A highly flexible, open and sustainable building will ensure the continued success of one of the USA's most forward-thinking universities

When the university board at New York's renowned avant-garde institution, The New School, decided to design a new facility, the goal was to create a space reflective of Greenwich Village's reputation as a haven for artists and free thinkers. With an international reputation as a premier school for the arts, The New School had high expectations to fulfil. The ambitious design that resulted is a state-of-the-art, multipurpose, 16-storey building that adds more than 375,000ft^2 to the campus.

The university dates back to the early 20th century – an era when progressive thinkers were making their mark on American society. The institution was first formed in 1919 as The New School for Social Research with the goal of creating an institution for debate and discussion of international affairs, social issues, history and philosophy. Expanding throughout the following decades, the university added courses in art, design, language, anthropology and cultural studies, and dropped part of its name, formally changing to The New School. As with many growing urban universities, the educational spaces were a collection of varied buildings clustered loosely in the city, some leased, all with previous lives as offices, shops and warehouses; the university centre building itself was a remodelled department store.

(Opposite) **The brass-and-glass structure features unique open-walled stairways, which can be seen from the outside** (Below) **The flexible auditorium can be reconfigured to host fashion shows**

Image courtesy of SOM

Open design

Plans were approved in 2010 for the US$353m project, designed by Skidmore, Owings & Merrill (SOM). As the existing building was owned by the university and was not considered to have historical significance, razing of the building was done swiftly. Situated at 65 Fifth Avenue, between 14th and 13th Streets, the project is not only The New School's largest construction project in its 94-year history, but is also possibly one of the most publicly visible building projects in Greenwich Village.

In keeping with both the university's nearly century-old mission of open discourse and Mayor Michael Bloomberg's public health initiatives, SOM designed the building with a great emphasis on 'taking the stairs' in a very conspicuous way. Visible from the street and open to the interior, the glass-walled stairways are intended to promote unstructured interaction among the students. Traffic areas intertwine, stairways weave through the building, while large glass windows and exposed structural elements provide unimpeded views of design studios, gathering spots and academic spaces.

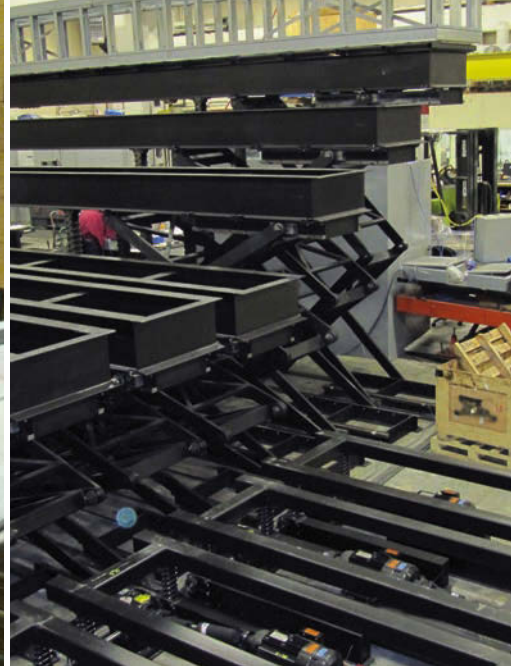
Structured versatility

The entire building is designed for flexibility. The 200,000ft^2 of academic space on the first seven floors – as well as the 600-bed dormitory – were planned to be capable of easy renovation without impact on power, data or lighting. Alongside these innovative building features is an 800-seat, fully convertible auditorium, capable of being completely reconfigured for use as a theatre, lecture hall, fashion runway or performance space within minutes, via a touchscreen interface.

To accomplish this, SOM worked with theatre consultant Fisher Dachs Associates, to devise a scheme in the performance venue that would maximise flexibility in a limited space. Furthermore, technology specialist Serapid was selected to provide innovative engineering solutions. As the company had previously been involved in many other high-profile projects of this type – including the Frank Gehry-designed Louis Vuitton Foundation in Paris and the award-winning Dee and Charles Wyly Theatre in Dallas – Serapid was well placed to assist with this project.

The auditorium's unusual amount of configuration flexibility is achieved via eight centre-stage lifts, 10 off-stage lifts, two motorised

Photograph courtesy of Scott Norsworthy



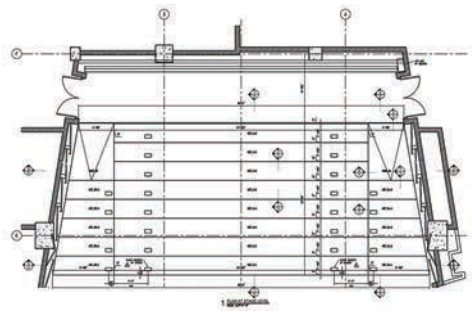
(Above left and right)
Stage risers enhance the auditorium's flexibility (Right)
Stage level technology is intricately planned (Below)
Centre stage features eight independently operating lifts

ramps and seating wagons, all operating separately. "Fitting that many independent stage units into such a small space made for a challenging design," remembers Robert Adams, Serapid's chief engineer. "One of the distinct advantages of Serapid's LinkLift columns is the ability to provide a high-trim capacity lift with minimal deflection. Also, the centre-stage lifts are completely self-guided, allowing for the lifting columns to be placed closely together. When the lifts are in operation, each unit is unaffected by the movement of the next."

Green investment

As progressive thinking is a fundamental value of the university, implementing green building technology was crucial. The recipient of a grant from the New York City Department of Environmental Protection, the structure itself will serve as a teaching tool for sustainable building design. Features such as a green roof, an electrical cogeneration plant, greywater and blackwater treatment technology, and the use of recycled building materials, helped earn the project a gold LEED sustainability rating.

The performance venue design falls in line with this imperative. Serapid LinkLift columns are inherently eco-friendly. The Serapid rigid chain doesn't rely on hydraulic fluids; it is



electro-mechanically powered and runs cleanly with little maintenance. Coupled with the building's capacity for generating as much as 40% of its own electrical energy, the ecological footprint is exceptionally low.

A city celebration

"Serapid's wide-ranging engineering and manufacturing skills, coupled with the expert field personnel as provided by iWeiss, has resulted in a team capable of overcoming the many challenges associated with a project such as The New School," says Bruce Downer, Serapid's senior project manager. "This combined expertise is providing the ultimate in flexible venues as envisioned by Fisher Dachs Associates."

Called "a celebration of the cosmopolitan city" by *The New York Times*, The New School's new university centre is intended to serve as not only a focal point for the institution, but also as an architectural touchstone for the community. Long considered to be the premier presenter for public programming, this new state-of-the-art fully reconfigurable auditorium is an important contribution to The New School's ongoing mission of social engagement. And Serapid is a proud participant in sharing this mission. ■

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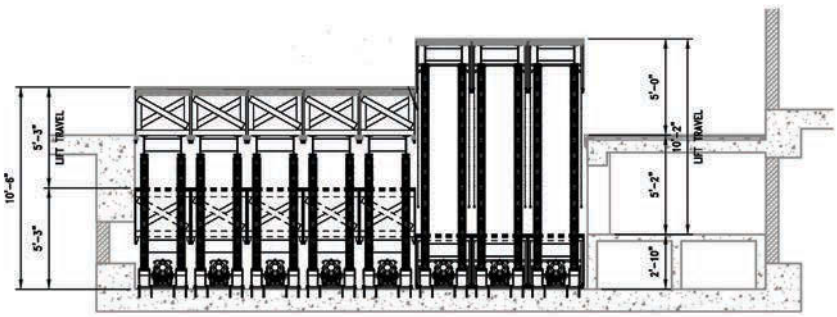

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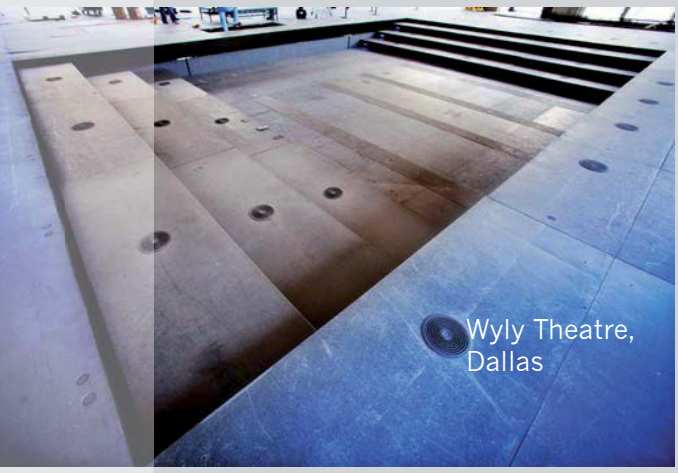
Wyly Theatre, Dallas


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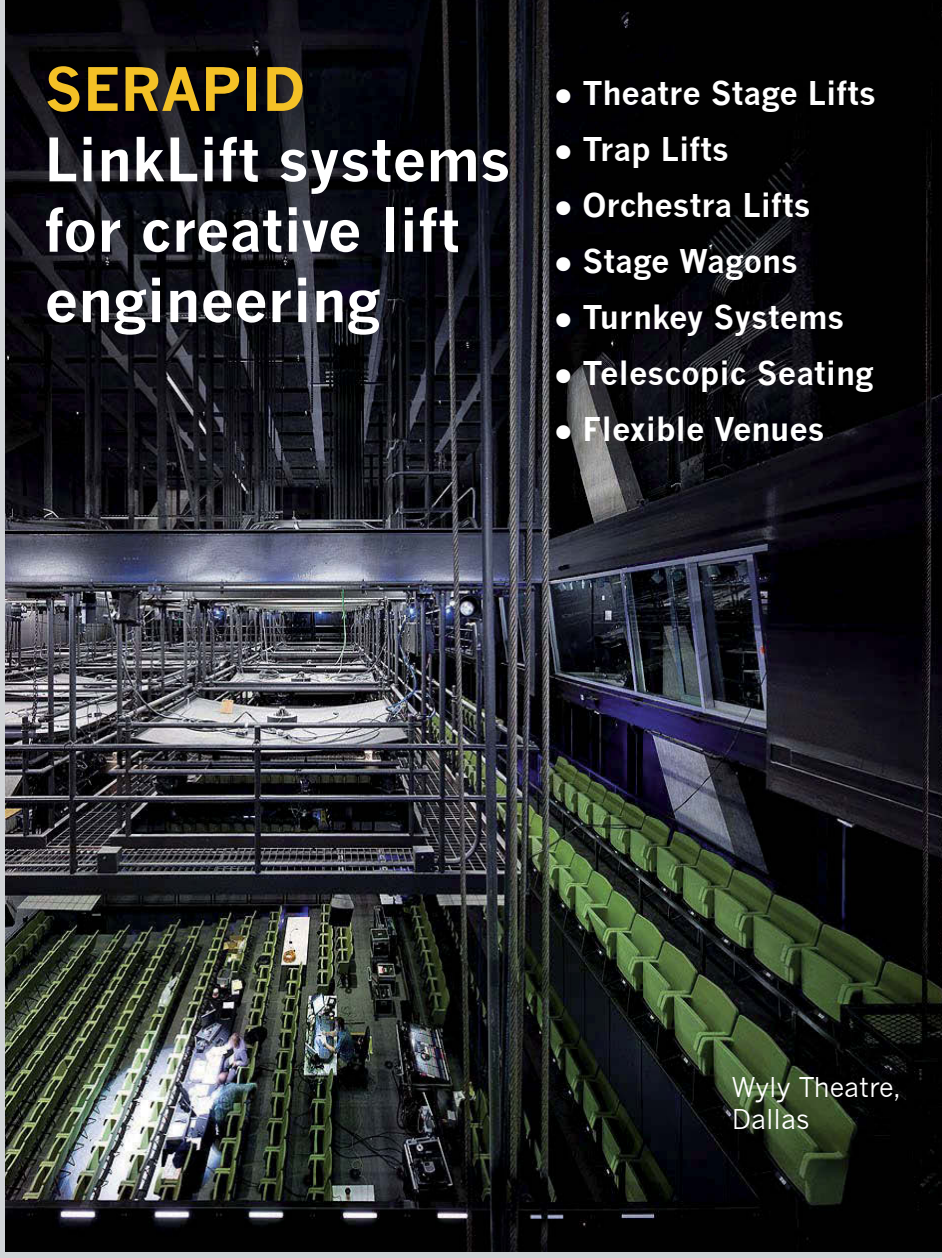
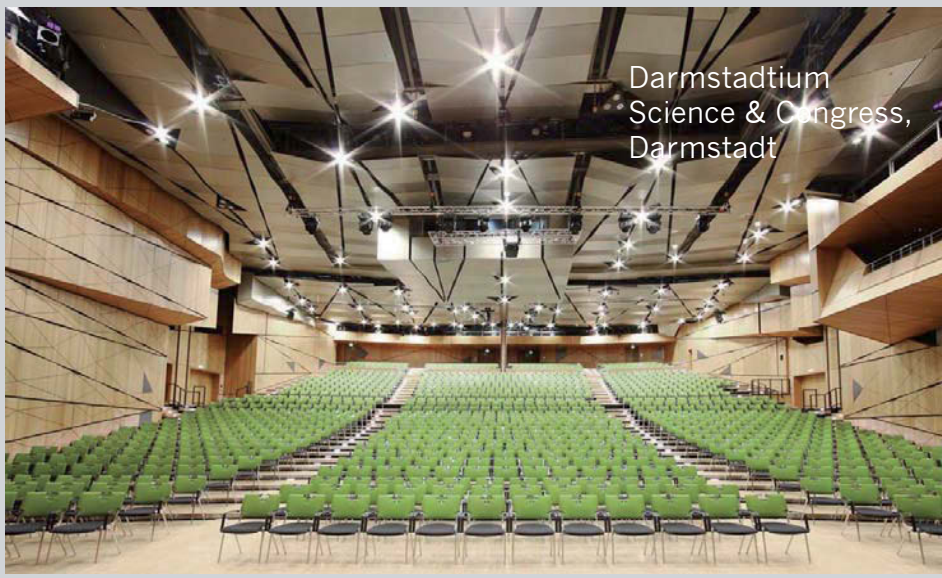

Wyly Theatre, Dallas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Fabric flair

A new cultural centre in Wales is using innovative drapes and curtain materials to create two multipurpose performing arts spaces

Run by Carmarthenshire County Council, Y Ffwrnes (The Furnace) is a new creative and cultural centre for the performing arts, as well as media and community events, in the heart of Llanelli in Wales. The theatre is near the recently completed Odeon Costa cinema and retail development, which is part of the Eastern Gateway, and is the anchor of an ambitious regeneration plan taking place in the town.

Y Ffwrnes features a state-of-the-art auditorium that has been designed to accommodate a broad range of music, drama, dance, theatre, opera and cabaret performances, as well as film screenings, conferences and live gigs. With a capacity of 500 for seated events and 650 for unseated events, the space can be rearranged to cater to various seating formats as required. There is excellent access for people with disabilities, a centrally located box office and a spacious foyer, coupled with modern backstage facilities, all of which makes it one of the best equipped and most energy-efficient theatres of its kind.

The theatre sits next to the Grade II-listed Zion Baptist Chapel and Baptist School and part of the chapel has been renovated to incorporate a 100-seat flexible performance space.

Chris Baldwin of Cambridge-based ACT Consultant Services served as the consultant at the centre of the project's £15m (US$22.6m) development, undertaking all the design and specification work. He called on some of the industry's leading suppliers, including Cooper Controls (for house lighting and combined house/working light system control), Northern Light (audio-visual systems integrator), Stage Technologies (power flying system), MRL Systems (stage engineering) and ShowTex (drapes and soft furnishings). Lorne Stewart was the electrical and mechanical contractor, and the main building contractor was local firm T Richard Jones (Bettws).

ShowTex custom manufactured a variety of stage drapes for Y Ffwrnes's auditorium and the chapel conversion studio theatre. Having worked with ShowTex and theatre equipment contractor MRL Systems on several recent projects, theatre designer Baldwin was confident in ShowTex's ability to deliver a high-quality product.

Masking and movement

The main theatre can be used as either a flat-floor venue or a conventional theatre space, if the stage elevator is lowered and the retractable seating unit is extended. The stage is equipped with a full set of masking drapes including a teaser, a house curtain, five pairs of side-stage legs and over-stage borders, two pairs of cross-stage

All photographs courtesy of Brian Tarr

With the project currently nearing completion, the first performance in the Y Ffwrnes auditorium is due to take place on 28 December 2013

(Above left) **A variety of drapes provide the centre with the flexibility to host different types of performances**
(Above right) **The black box space is ideal for small, intimate productions**

travellers, an upstage cyclorama (white), an RGB LED starcloth and a white front-of-stage gauze.

A motorised draw track enables the house curtain to be operated as an open/close curtain or a raise/lower curtain (using the power flying set). Two manually operated draw tracks were provided for the cross-stage travellers and can be placed as required. The five cross-stage borders and the pairs of side-stage legs are attached to the same power-operated flying sets; the legs are attached to independent bars underneath the main bar. They can be height-adjusted relative to the main bar to provide a range of border heights (6.1m, 6.7m and 7.3m) from the stage floor, with the legs set at the required drop height to the stage.

Colour and movement were vital components in the design of the auditorium house curtain. To complement the contemporary interior of the theatre, the curtain was designed with full-height vertical panels of varying widths in two colours. One reflects the red shade of the warmest seat fabric and the other refers to the proscenium – a dark, almost black, hue. The theme was inspired by the work of Dutch artist Piet Mondrian.

Black magic

To maximise the visual contrast surrounding the performance area, all onstage masking was specified as Ultrablack Goethe Velour in flat panels of fabric to minimise light-catching surfaces. The masking around the cyclorama retains a deep black under the LED lighting, enhancing stage presentation.

ShowTex's Ultrablack Goethe Velour is engineered to be the blackest flame-retardant velour possible. The fabric absorbs more than 99% of incoming light across the visible spectrum. These light, medium and heavyweight theatre fabrics are also the only materials in the world available with Oeko-Tex 100 certification. This is a globally recognised testing and certification system for raw, intermediate and end-product textiles, at all stages of production, that controls the use of harmful substances. These substances include those prohibited or regulated by law, chemicals that are known to be harmful, and parameters that are included as a precautionary measure to safeguard health.

With the theatre's eight mobile airfilm ride seating trucks, complete with removable handrails, multiple configurations are possible, making the venue ideal for conferences, seminars and meetings.

New lease

The studio theatre (Stiwdio Stepni), has been created in what was previously the Sunday school chapel. It it situated on the first floor of the Zion chapel building, which dates back to the mid-19th century. Extensive restoration work has taken place, while retaining the building's original exterior, interior and windows.

Now a highly versatile space, natural light streams through the theatre's high windows on three sides. When a more intimate performance space is required, the light can be obscured with full-height drapes that hang from a continuous track, while two further full-width sets of black masking create an almost square black box. ■

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Touch and go

The operation of complex stage technology applications can be simplified and optimised by adopting the user-friendly control methods seen in modern consumer technology

(Above) **BLE4 axis controller and BLE4-H for hydraulic units**

The Burgtheater (the Austrian national theatre) and the Akademietheater, both in Vienna, are undergoing a technical rehab. In a two-step process, the venues are being equipped with the latest electronic control system from Bosch Rexroth, the SYB 3.0. The projects began mid-2013 and are due for completion in 2014.

The SYB 3.0 is characterised by its structured design, which comprises a drive-unit level, an operation level and a level of embedded controls. The latter are interconnected with a high-speed network that has a data-transfer rate of 1Gbps, and strong real-time behaviour (synchronisation <1µs).

Notably, the new operator panel has a multitouch screen to simplify operation, which is much more user-friendly than the previously used key input system. The operation is also supplemented with joysticks and start buttons via Leap Motion technology. Meanwhile, added software functions are designed to increase the safety and availability of the stage equipment.

The new SCIV control panel enables stage technicians to summon menus through gestures such as swiping and tapping, and enter changes directly on the display. In this way, the operator can, for instance, acquire important information about the lower and upper stage machinery, as well as monitor the scene changes that have already been programmed. Furthermore, the intuitive operation of the unit reduces training costs, as most people are already familiar with this kind of technology from their mobile devices.

Safety first

Although operation of the system is being simplified, equipment will continue to be moved and stopped via extremely reliable electronic control elements that comply with safety integrity level SIL 3 according to DIN EN 61508. The measures prevent operators from starting drives unintentionally or issuing other incorrect commands.

Furthermore, an anti-collision assistant integrated into the control system will be

able to prevent dangerous operational situations when scene changes are being programmed. And with the appropriate rights, the software functions in Rexroth's stage control technology also enable access to diagnostics and remote maintenance via smartphones and tablets, meaning stage technicians will be able to obtain all the information they need remotely.

Design impact

The control panels for the new systems are encased in high-quality aluminium and work silently; even though they are equipped with a high-performance central processing unit (Core i7) they do not require cooling fans. Also, despite their large 22in (55.9cm) displays, the operators' control desks are extremely compact. The control devices can also be fitted with an integrated second display, enabling operators to carry out complex tasks more efficiently.

For the system in the Burgtheater, the unit's embedded controls and operation levels are being replaced, while the existing hydraulic winch and cylinder drive units are retained. On the embedded controls level, a new Master Controller MC and 91 new BLE4-H axis controllers for the hydraulic drive units are being installed and commissioned. On the operation level, a complete set of fixed and mobile SCIV panels will be installed on the right-hand side of the second working gallery.

The rotary and linear hydraulic drive systems are part of a reliable, proven technology that boasts a number of advantages, including minimal noise emissions, high power density, efficient emergency stop behaviour and minimal impact on the machinery, as well as being ergonomically designed.

If the drive-unit level is unchanged – and provided the quality of movement of the existing machinery is good enough – this kind of modernisation could be easily achieved at all kinds of performing arts venues that want to refurbish their technology and upgrade to one of the most advanced control systems available. ■

www.boschrexroth.com

(Top left) **The SYB3.0 stage control system with SCIV multitouch panel (Main) Additional software functions in the SYB 3.0 stage control system increase the safety and availability of stage equipment** (Above and below) **Programming, operation and diagnostics for all control technology aspects at Vienna Burgtheater are performed using Bosch Rexroth SCIV control panels**

Trick of the light

A new, user-friendly DimSwitch lighting system is optimising operations for the English National Opera at London's historic Coliseum Theatre

With an audience capacity of 2,359, the Coliseum is the largest theatre in London. Originally opened in 1904, the landmark building was designed by Frank Matcham (who also designed the London Palladium) for Sir Oswald Stoll, with the ambition of being the largest and finest 'people's palace of entertainment'.

Sitting on the historic St Martin's Lane in Covent Garden, the theatre has had a colourful past. During WWII, it served as a canteen for Air Raid Patrol workers and Winston Churchill gave a speech from its stage. After 1945, it was mainly used for American musicals before becoming a cinema in 1961. In 1968, though, it reopened as The London Coliseum and became home to Sadler's Wells Opera (which became the English National Opera in 1974); the company later bought the freehold of the building. Between 2000 and 2004, the building underwent a complete restoration whereby the auditorium and other public areas were returned to their original Edwardian decoration and new public spaces were created.

The next generation

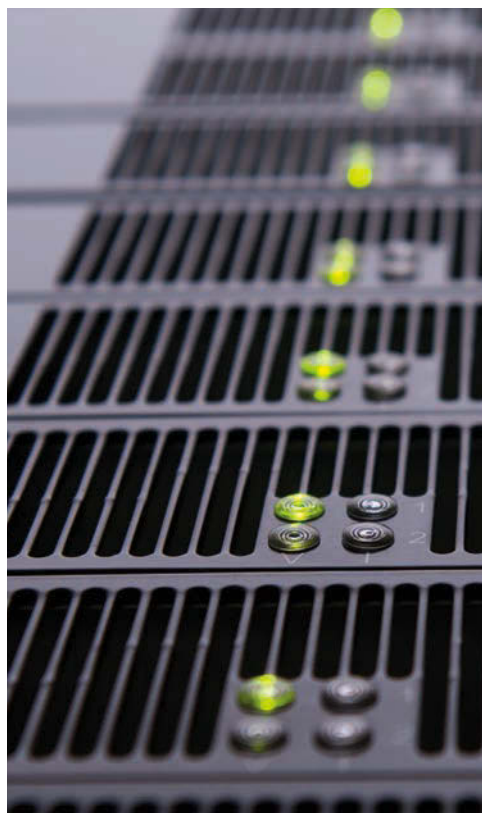
The English National Opera (ENO) has a reputation for innovation and creativity within the arts world, and as part of a series of ongoing improvement projects at its home theatre, the company was looking to replace its dimmable lighting system in early 2013.

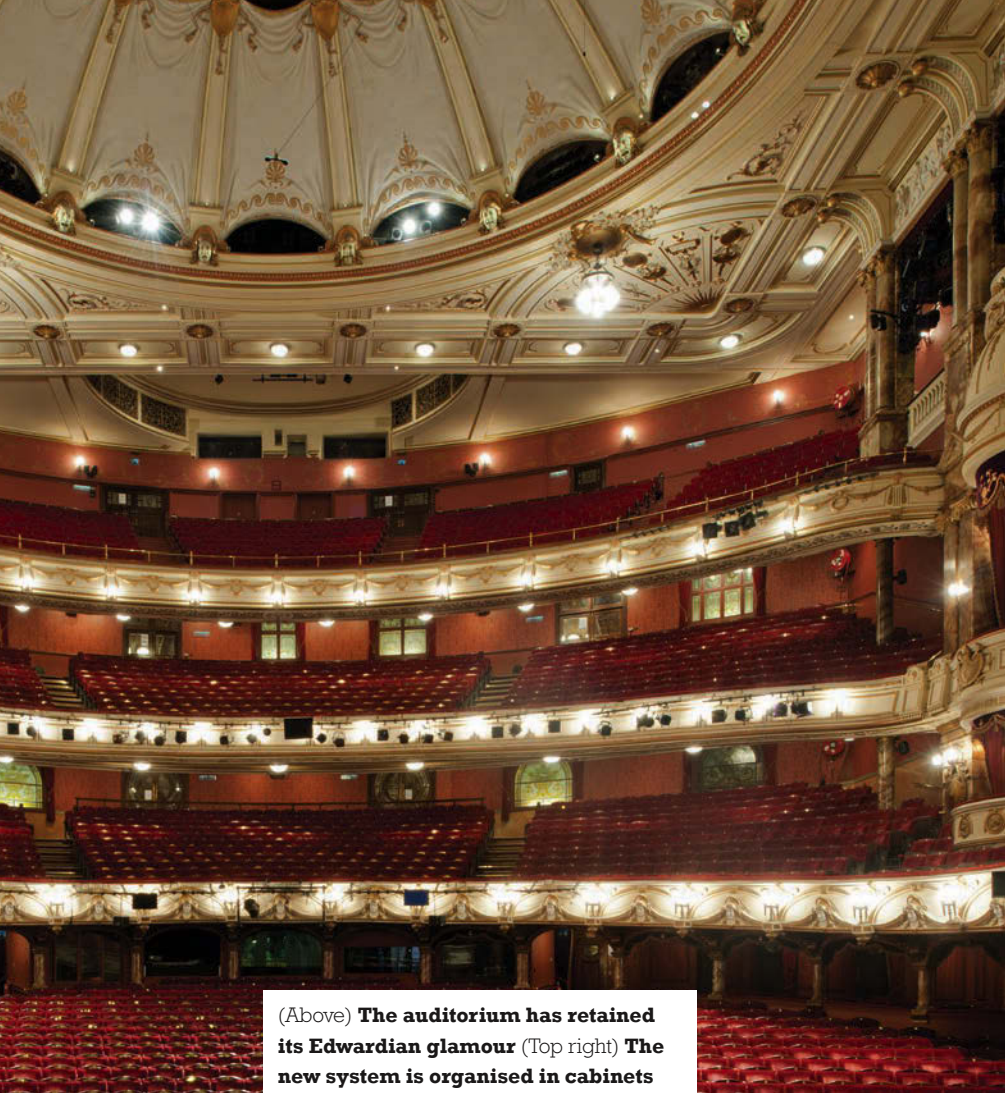
"We had begun detailed research into what was available with regards to our requirements when we just happened to have some of our technicians over at ADB for service training on the ADB WARP/M automated fixture," says Kevin Sleep, head of lighting at ENO. "The ADB systems were on our horizon and the technicians took the opportunity to have a good look at the company's new system; ADB's Raph Janssens provided them with a detailed presentation of the technology and they were very impressed.

"They could see that the system was well thought-out and that it was everything we'd been looking for," Sleep continues. "Also, as we work as a repertory house, we constantly had to swap between dimmable and non-dimmable modules. The EURODIM Twin Tech and ADB's DimSwitch modules would enable us to change modes easily from a control panel or a laptop."

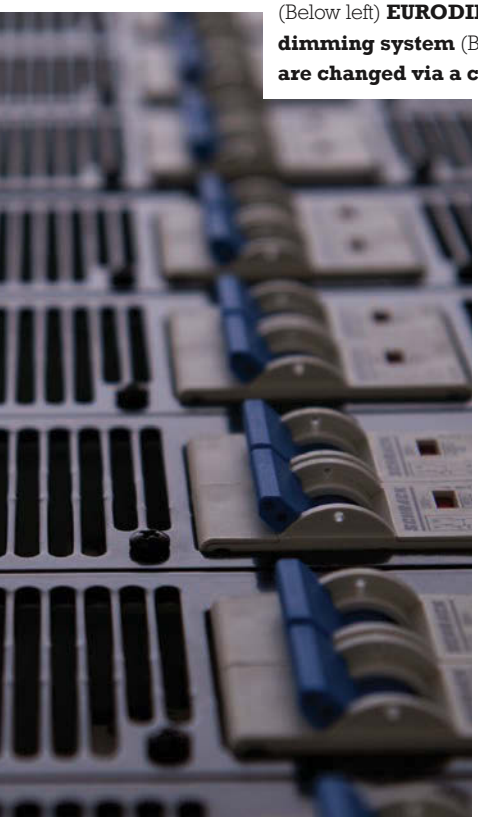
Ric Mountjoy, ENO's lead programmer and project manager of the dimmer replacement with Kevin Sleep, was equally convinced by ADB's demonstration. "We were very impressed with the ADB product and with the conversation that we had with the company with regards to future development and our needs," he says.

Photograph courtesy of London Coliseum





(Above) **The auditorium has retained its Edwardian glamour** (Top right) **The new system is organised in cabinets** (Below left) **EURODIM Twin Tech dimming system** (Below right) **Modes are changed via a control panel**



As a result, ENO asked ADB to provide a new lighting system for the Coliseum, comprising a EURODIM Twin Tech dimming system with dual-mode DimSwitch dimmer modules. Both 223 x 4 x 3kW and 71 x 3 x 5kW DimSwitch modules are stored in 10 cabinets that have been designed to be neat and easily accessible.

Mountjoy believes that the system's flexibility will support further growth and improvements in the future."As each individual module can be either a dimmer or a solid-state relay, we should be able to accommodate any kind of rig that is used in the future," he says. "As part of this project, we've also purchased a large package of moving lights and the Twin Tech dimmers mean we can position them wherever the designers wish – it makes no difference whether they are dimmable or not."

Light entertainment

The installation of the new lighting system at The London Coliseum took place in April 2013, and was carried out by ENO's chosen installer, Push the Button (PTB) through distributor White Light. The innovative DimSwitch software, switchable dimming and switching system, housed in ADB's EURODIM Twin Tech cabinets, replaced the existing dimmer system.

"We have worked with ADB for a long time," adds Bryan Raven of White Light. "We have purchased a lot of ALC4-2 LED cyclorama lights for our rental stock, and they are very popular. Some of our technicians went over to Belgium and they were blown away by the quality of the dimmers."

ADB has previously installed similar systems at several major arts venues around the world, including the Onassis Cultural Center in Athens, Greece; Tianjin Grand Theatre, China; Daehakro Arts Complex, South Korea; Opéra Bastille in Paris, France; Opéra de Lausanne, Switzerland; the New Music Centre in Linz, Austria; and the National Theatre of Bahrain in Oman. ■

www.adblighting.com

Austrian connection

A subtle, innovative system acts as an effective communication tool that enhances the guest experience without detracting from the live performance

Equidistant between Salzburg and Vienna, the Linz Musiktheater was born with a vocation for state-of-the-art technology. With the future in mind, the venue sought the most innovative solutions available and focused on meeting the growing expectations of modern theatre audiences.

When assessing the subtitling system, for example, the theatre managers questioned whether it would be better to limit this service to simply translating the performance, or whether they could turn it into an opportunity to interact with, engage and retain audiences. The crucial question was whether the technology was just a cost, or whether it could actually generate a profit for the theatre.

Given their technological limitations, conventional systems had previously only been used to provide translation for operas or, at most, to make short public announcements. This had restricted their success, as substantial costs were incurred for what amounted to limited use. The Linz theatre was looking for a solution that would retain all the functions of a traditional video-libretto system while also providing an increased level of interaction and flexibility. The venue also required a dynamic technology that would develop and adapt to the growing tastes and expectations of audiences in the future.

The solution needed to be almost invisible – neither intrusive nor annoying – and simultaneously powerful and intuitive. The technology needed to interact with individual spectators, recognising and addressing them personally, each time they visited the theatre (via a connection with the ticketing office).

The Linz Musiktheater wanted to find a system that would enable the venue to connect with its supporters and communicate with audiences of all ages, while respecting their tastes and acknowledging their age groups. The solution also needed to provide an attractive return on the investment and was required to possess advertising, donation, brand-loyalty and merchandising potential.

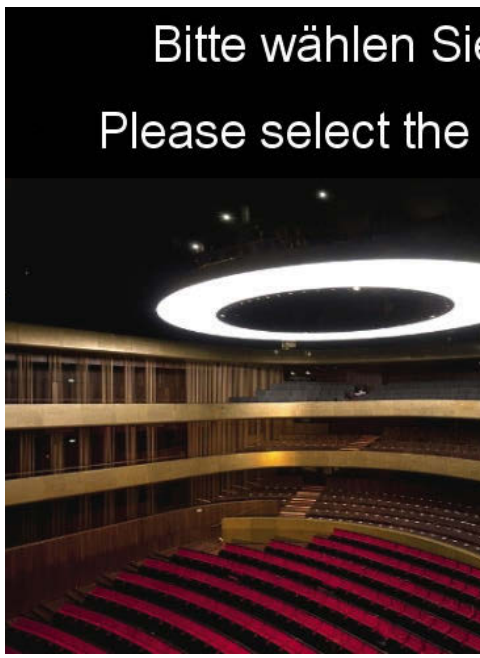
The theatre wanted a discreet but powerful technology that would welcome audiences as they entered the theatre and continue to interact with them throughout their stay, immediately creating a relationship that promoted maximum enjoyment and a unique, engaging experience.

Subtle but strong

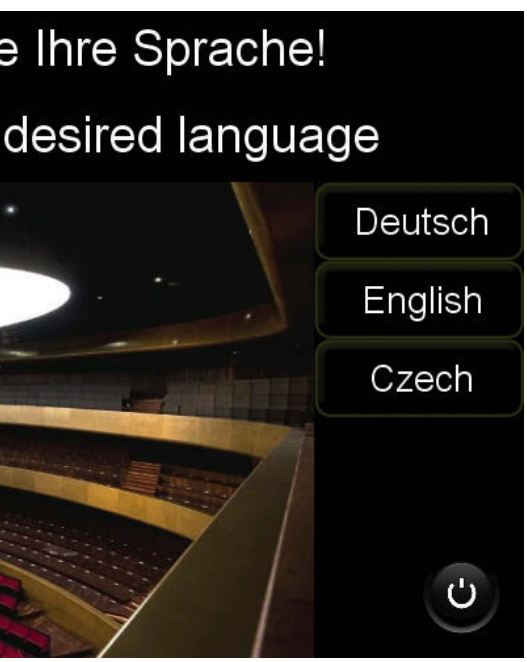
The demands of Europe's most technically advanced theatre were met by the MODE23 technology from Italy and Switzerland-based technology solutions provider Marconi. Internationally patented, the system has been awarded the 'most innovative and business impacting network of the year' by Cisco.

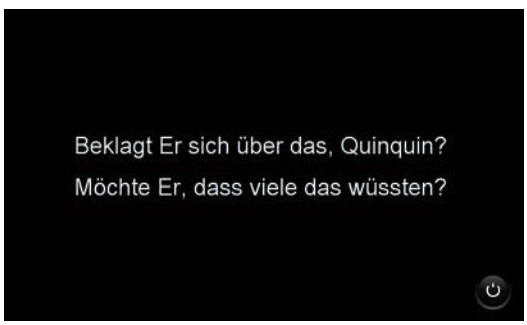
Sophisticated technology has been tiptoeing into artistic venues for a while, revolutionising the industry with a service that adds value to events, both for the public and for the theatre. Marconi works to achieve a high level of integration, without intruding into stalls and balustrades, building on its experience from projects at international theatres involving more than 8,000 operational displays.

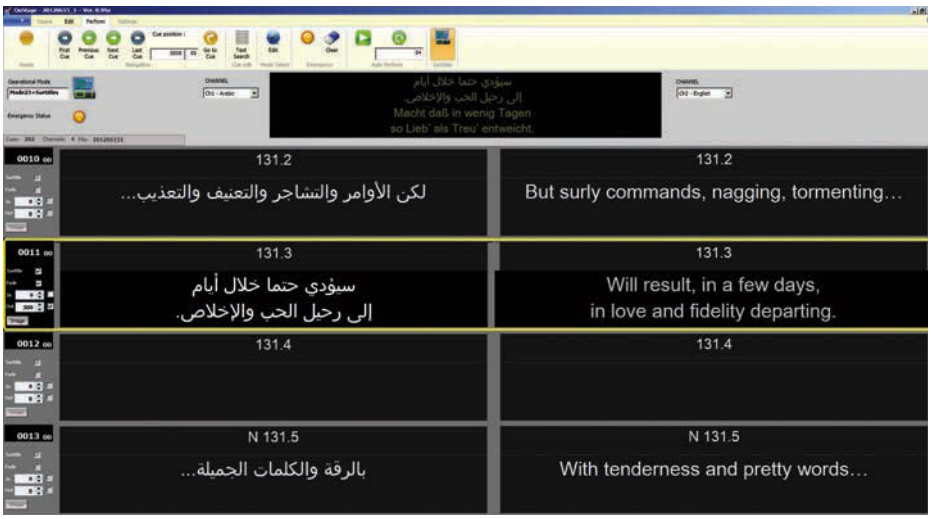
Images courtesy of Musiktheater Linz



(Above) **Screens are subtly integrated into the seat backs** (Below, clockwise from left) **The theatre information service: welcome screen, opera libretto, performer information and restaruant reservations**







Now, every event at the Linz Musiktheater – from opera, to ballet to concerts – is supported by a powerful, discreet, interactive audience service and communication system that is respectful of the decorum and tradition of the theatre. The venue is able to combine its corporate communication services with clever multimedia technology that is specifically designed to enhance live performance.

The information displayed on the touchscreen is controlled entirely by the theatre managers and the marketing office. Operators are able to distinguish between different events (opera, ballet, concert, interval, survey, congress, etc) in order to provide services that are appropriate to the various forms of use, such as video-libretto, access to the bookstore and theatre booking office, bookings, purchases, patron donations, advertising, information, public surveys and individual messaging.

The theatre can also request and receive suggestions and information from the audience in real time, enabling it to respond appropriately, and refine its services and offerings to meet their tastes and expectations.

Once the curtain rises, the system is entirely dedicated to supporting the performance, displaying nothing but the translation of the production in the chosen language. The displays have been designed to ensure that no backlighting is visible in the dark hall, even if more than 1,000 screens are switched on at the same time. Also, in the gallery seats, where there is no view of the stage, guests are able to watch the performance on their personal screens.

The system is supervised by sophisticated management software that controls the operation and state of each individual unit, groups of units and the entire installation, at all times.

(Above) **Onstage software with language management**
(Below) **Theatre management system displaying information in real time**

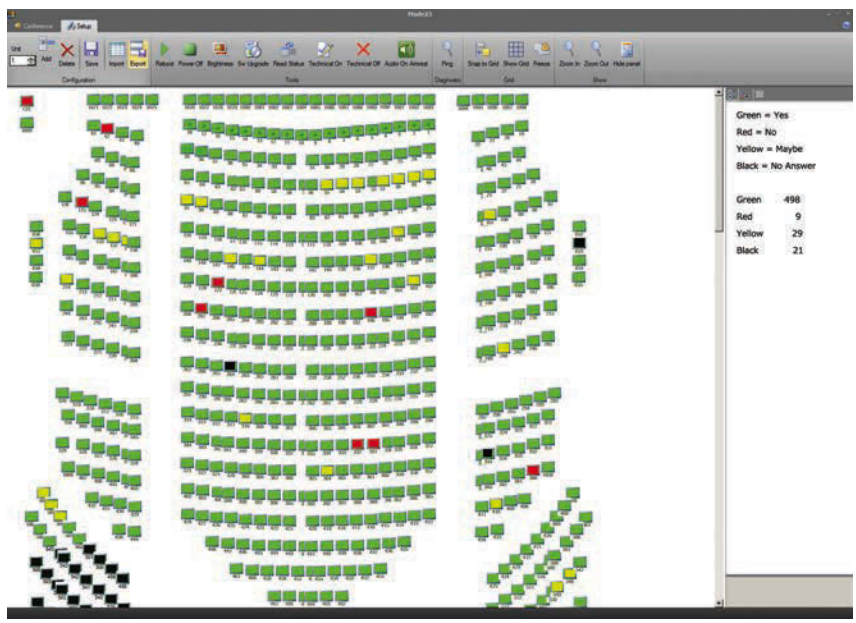
Silent partner

Modern theatres are increasingly looking for solutions that will enable them to interact with, involve and retain their audiences. However, it is important that technologies do not detract from the main event – the live performance. Furthermore, theatres want complete control over what is conveyed to their guests. Effective solutions will provide venues with new sources of revenue, as well as attract new visitors.

The Linz Musiktheater's system will remain a state-of-the-art solution for many years. Its flexibility will enable the technology to evolve, in terms of services and interaction with the audience, in line with the growing and changing needs of the venue and its guests.

Ultimately, the technology enables the theatre to support, inform and serve each spectator in a way that is unique and personalised and it is already becoming a refined marketing and corporate communication tool. So much so, the theatre plans to use the system to its maximum present and future potential. ■

www.radiomarconi.it



Lille Symphony Orchestra inaugurates its new symphony hall in northern France

French overtures

Acoustically designed to revive the experience for audiences, France's new concert auditoria achieve higher levels of acoustic excellence

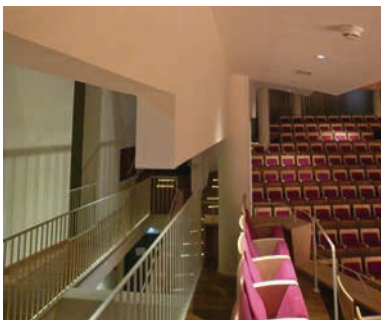
January 2013 saw the official opening of two new concert halls dedicated to symphonic music in France. This was particularly significant in a country where symphony halls are rare and drama theatre tends to culturally dominate the performing arts world. Only four French cities were previously equipped with purpose-designed symphony halls, and only half of them were considered to be acoustically successful by musicians, music lovers and critics.

In the northern city of Lille, the old Palais du Nouveau Siècle was built in the 1970s as a large conference venue. It included a large plenary room – with a seat-count approaching 2,000 – which was used as a rehearsal and concert venue by the Orchestre National de Lille. Despite numerous corrections and modifications to the stage environment, the acoustics were always found to be inappropriate – both for the audience and the musicians on stage. The main problems were the insufficient ceiling height and the fan-shaped geometry, which was far too wide.

Rather than renovating this fundamentally problematic room, it was decided that a completely new hall was required. The result is the new Auditorium du Nouveau Siècle, an 1,800-seat room built within the shell of the old one. Two new parallel sidewalls were constructed, reducing the average width from 38 to 29m and there are now two levels of side balconies, of which the soffits provide the essential – and previously non-existent – early lateral reflections. The old ceiling, which was acoustically shaped for speech rather than music, was dismantled and replaced by

Bordeaux Symphony Orchestra rehearses for the first time in its new auditorium

(Above and below) **The view from the choir balcony shows the intimacy of the space, while the floating side balconies – with integrated reflectors – enhance resonance volume and early reflections**



a coffered ceiling set more than 2m higher than the older one. The French architect Pierre Louis Carlier, in collaboration with Kahle Acoustics, imagined and further developed this concept until its completion this year.

The first concert in the new auditorium welcomed international soloist Vadim Repin in Shostakovich's first violin concerto. He praised the new venue as being one of the best concert halls in Europe. Since then, the orchestra and its chief conductor Jean Claude Casadesus have been continuously delighted with the acoustics of their new home.

City centrepiece

In Bordeaux, a new auditorium designed in collaboration with Michel Pétuaud-Létang (4A Architectes, Bordeaux) and Michel Cova (Ducks Scéno) has opened as the new home of the Orchestre National Bordeaux Aquitaine.

Situated in the heart of the historical city centre, the site had to accommodate a seven-storey parking facility underneath and three levels of luxury apartments on top of the auditorium to help finance the project. In addition to an evident sound insulation challenge, the superposition created a very large constraint for the design of the concert hall, as the ceiling height could not exceed 16m. In order to develop sufficiently rich reverberation and obtain the required acoustic volume for 1,440 seats, extra reverberant space was created behind the three levels of side balconies. While the very wide side volumes thus help to envelop the reverberation, the floating balconies restrain the room width and provide efficient early lateral reflections.

Specifically designed curved shapes were developed for the undersides of the balconies as optimised reflectors. The concave surfaces are precisely calculated to concentrate the sound they receive in a focal point well above the audience and then spread it to the entire width of the parterre floor. This type of controlled acoustic diffusion is a first in concert hall design.

The auditorium in Bordeaux is also designed to create a strong feeling of intimacy and sees the audience in close proximity to the musicians. With the farthest row of seats being fewer than 24m away from the stage, the audience literally surrounds the orchestra on all sides and the conductor is situated in the centre of the room. The result is a perfect hybrid of the traditional vineyard and shoebox shapes.

The first concert in the recently named Henri Dutilleux auditorium was directed by Austrian conductor Hans Graf and welcomed French cellist Anne Gastinel in *Tout un monde lointain*, a piece by Henri Dutilleux. Both guest artists were very enthusiastic about the richness of

tones and the great clarity of the acoustics, both for the audience and for those on stage. The music critics in attendance unanimously agreed, praising the acoustic achievement of the French-sounding symphony hall.

Obstacles overcome

As the famous French conductor Jean-Claude Casadesus would say, the two new auditoria are their orchestras' new musical instruments. The acoustic characteristics of the new spaces contribute to shape their new signature sounds.

Interestingly, neither project originated from a political decision made in favour of investing in culture and music. Approval was only achieved after years of perseverance on the part of the orchestras and their subscribers. In the meantime, the orchestras were forced to play in acoustically inadequate spaces – initially planned as temporary solutions – which gradually discouraged their music-loving audience.

Both projects were built on very tight budgets: €14m (US$18.6m) in Lille and €28m (US$37.3m) in Bordeaux. This didn't hinder the success of either auditoria however. They are each huge acoustic successes acclaimed by orchestras and audiences alike. ■

(Above left) **The new Auditorium du Nouveau Siècle can seat up to 1'800 people**
(Above right) **Two levels of side balconies provide crucial lateral reflections in the new symphony hall in Lille**

www.kahle.be

Sounding ovation

Suitable for a wide variety of performances, the new sound system at the Hollywood Bowl in Los Angeles provides powerful and refined sound in a challenging acoustic environment

Fred Vogler, the principal sound designer and mixer at the Hollywood Bowl, was blown away when he first listened to the venue's new L-Acoustics K1 sound system. Vogler has seen a steady evolution in the quality of sound at the Bowl since he began working there in 2003 but he says the K1 installation – which was completed in time for the 2013 summer season – is a big leap forward for the iconic venue in the Hollywood Hills.

"I knew it would make a difference but it was a greater advance than I'd expected," he enthuses. "I was dumbfounded when we first put it up. The high resolution gave me chills. It was superior to the old rig in every respect; the frequency response was tighter in the low end and smoother at the top and there was a wider sound stage – the sound just seemed to disperse in a way that made it seem huge."

The Hollywood Bowl is no ordinary venue and any sound system faces major hurdles before finding acceptance. For a start, it has to satisfy the demands of the sophisticated classical music audience. The sheer size of the Bowl is another challenge; a huge natural amphitheatre in the Hollywood Hills, it accommodates 17,400 patrons, stretching 450ft deep from front to back, with seating that slopes up nearly 110ft from the stage. In addition, there's the ambient noise emanating from helicopters overhead, as well as cars on the nearby expressway.

As a result, the Bowl's sound system has to be both powerful and refined. Vogler says K1 is both of these things, and more. He compares working with it to steering a high-performance car. "I can make a half-decibel change and people notice," he says. "Subtle changes are necessary as a result of temperature and humidity issues. The system really responds. It jumps on the slightest adjustments and you feel it instantly. I'm 75m away during concerts and I hear it clearly."

Sound evolution

Vogler is in no doubt that the Bowl's system – which features K1 line arrays driven by a DiGiCo SD7 digital console – is the best in the world. But getting so close to perfection didn't happen overnight; it has been an evolutionary process since Vogler's arrival in 2003, when he suggested changing the conventional loudspeaker cluster to a more modern line array system.

The LA Philharmonic installed a V-DOSC system from L-Acoustics in time for the 2004 season – the new rig coincided with a complete rebuild of the Bowl's shell, which also improved acoustic sound quality. Since then, the Bowl has been accorded Best Major Outdoor Concert Venue in the Pollstar Concert Industry Awards nine years in a row.

But Vogler felt there had been advances in line array technology since L-Acoustics introduced V-DOSC in 1993. A number of manufacturers were in competition and he didn't want to assume that the L-Acoustics K1 rig was necessarily the best. He helped arrange a two-day trial between three leading brands, with each manufacturer bringing its own amplification and two 10-element arrays. The sound was addressed only to the lower Bowl

All photographs courtesy of Amy Tierney/Thrive Images

The Hollywood Bowl is home to the Los Angeles Philharmonic orchestra


L-ACOUSTICS

seating area. As a control, the old V-DOSC lower Bowl system was included in the experiment.

The test featured live performers to reflect the eclectic mix of music heard at the venue, with both a string quartet and a jazz vocalist and piano accompaniment involved. During the performances, a single mix engineer switched between the four systems on the same console. "There was a unanimous decision," says Vogler. "The listening committee felt that the L-Acoustics' K1 was the best."

Having decided on the system, the Hollywood Bowl called upon L-Acoustics' US head of application for touring, Scott Sugden, to spearhead the designs. Sugden worked with Vogler and the L-Acoustics applications team in France to create a system that was smaller than the previous V-DOSC rig by six enclosures per side. The main left/right array comprises 16 K1 three-way, four KARA two-way and four K1-SB subwoofer enclosures flown per side, augmented by a centre cluster of eight KARA cabinets for front seating areas, and 16 SB28 subwoofers and eight ARC IIs for the deck system.

Technical progress

The superiority in sound quality compared to the previous V-DOSC is the result of several technical improvements, Sugden notes. But there are three principal advances.

The first is that K1 is a much stronger system mechanically than V-DOSC. "K1 is capable of suspending arrays that are 50% longer," he explains. "In the past, we could hang an array of up to 16 enclosures. We can now increase that to 24. The stronger rigging system also means we can tilt them up and down more than we could before."

The second major step forward is that K1 possesses much greater sound pressure level

(Above left and right) **The new K1 system provides clear, balanced and powerful sound** (Below) **L-Acoustics' Scott Sugden** (Bottom) **Hollywood Bowl's principal sound designer Fred Volger**

(SPL) and bandwidth. "It can go about 3dB louder and much lower, down to 35Hz," details Sugden. "This range is fantastic for the LA Philharmonic, as almost everything it does is produced from the main array and not from an auxiliary subwoofer. It provides the audience with more natural sound as it's coming from one place rather than being split into multiple sources. It makes a real difference when you're sitting 400 or 500ft away as you get a more coherent sound."

Thirdly, there is increased polar stability, which ensures that the sound in front of the speakers and the sound off to the side are the same. "It's difficult to make sure that 'axis' and 'off axis' sound the same, but we've achieved it," Sugden says. And polar stability also helps to achieve good directivity. When sound is produced off to the extreme sides, it cancels out well." The result of all the changes is the "cleanest palette possible" for the sound engineers. "They get out of it what they put in; if the mix is good, it sounds good, but you can now also hear it if the drums or guitar don't sound right."

Audiences have responded with rapt attention. "It's an outdoor venue so they're often eating and drinking, but I have been awestruck by how well behaved they've been for classical shows," says Vogler. "They're sitting there listening intently, not walking around. I've never seen that before at the Bowl. We've seen more standing ovations than ever before and the reviewers have been highly complimentary."

Following the LA Philharmonic's performance of Mahler's *2nd Symphony* on 9 July, under the baton of Michael Tilson Thomas, the *LA Times* confirmed Vogler's perception. After praising the K1's sound, the newspaper's music critic Mark Swed wrote, "I sensed an audience listening intently, which isn't commonly the case at the Bowl."

Armed with his new bag of tricks, Vogler is enjoying his job more than ever before. "I can't believe I have this system," he grins. "I don't know how you could make the sound better. I thought it was really good before but now I really know what 'really good' sounds like!" ■

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Rising stars

The complex Star PAC required advanced technological solutions, while the PNU's performance theatres achieve optimum on-stage acoustics with customised acoustical shells

Image courtesy of Aedas

(Main) **The 5,100-seat auditorium has a horseshoe configuration for intimacy** (Left) **Star PAC is a multipurpose building with a unique shape** (Below left) **Speaker cluster hung on JRC motorised speaker hoist, and Austrian portal header curtain** (Below right) **The motorised multiline drum hoists for stage rigging**

One of the most impressive features of Singapore's multifunctional Star Performing Arts Centre (Star PAC) is its flexible 5,100-seat auditorium, which is versatile enough to serve as a major production venue six days a week, while also meeting the broadcast requirements of anchor tenant New Creation Church. The futuristic Star PAC complex also includes an outdoor amphitheatre with full projection capabilities and a multipurpose function hall that can facilitate several events at the same time.

Designed by Aedas in Hong Kong and Singapore, with Artec Consultants (now Arup) as the auditorium planner, the facility's architectural concept saw very few walls positioned perpendicular to the ground. Indeed, Star PAC was one of J. R. Clancy's most complex projects to date.

Clancy project manager Bridget Cox lived in Singapore for much of 2011 to supervise the critical upfront coordination phase of the project. When she was promoted to director of project management in 2012, she continued to oversee the project coordination with Clancy's manufacturing operations in New York, while Robert Degenkolb took over in Singapore.

"We put our Project Quality Assurance Plan (PQAP) to work from day one," says Cox. "PQAP gets the whole team on the same page, so we're all clear on the requirements of each phase of the project. This was particularly important for a project of this magnitude, where many different contractors and tradespeople were involved."

"Clancy opened an office in Asia three years ago to support this project," adds Degenkolb, director of J. R. Clancy (Singapore). "It required strict compliance with Singapore's Codes of Practice and Regulation Standards."

Technical treatment

For the main production space, J. R. Clancy provided and installed 59 motorised multiline drum hoists, 35 BGV-C1 compliant variable speed chain hoists, and 15 fixed speed chain motors over the audience seating area. Furthermore, a single stage lift and 72 removable stage trap platforms enable the production team to quickly reconfigure the stage, and meet both production and broadcast requirements. Three high-capacity speaker cluster hoists and a 26m-wide custom Austrian hoist complete the equipment in the auditorium.

A rolling gantry system designed by Artec Consultants enables direct placement of the 35 variable speed chain motors anywhere over the stage between the motorised lift lines. "The system provides both theatrical and arena rigging support for the stage area, and enables the user to rig more than a tonne on each motorised line set," Degenkolb explains. "At the same time, one can integrate custom broadcast support equipment, such as a four-tonne video wall between fly bars."

The entire motorised stage engineering system is controlled by Clancy's new SceneControl 5600 Rigging Control System. The SceneControl 5600 features redundant parallel processors and motion control software. In a new configuration for Clancy, a secondary SceneControl 5300 console provides the staff with a back up control option that they can use in tandem with the SC5600, in various compact locations around the venue. The second console enables the user

Image courtesy of AeDas

to share control of the 124 networked axes. A secure network server stores show files and configurations and enables the user to reconfigure the stage quickly to meet varying production requirements.

The big screen

For the 400-seat outdoor amphitheatre, Clancy installed a motorised pivot bracket to support a 13 x 24ft, 3,500 lb LCD screen. "The screen can rotate 270˚ around a large, leaning column," notes Cox. "It's fully functional while it's rotating – they can simulcast while it's in motion."

To protect the control system, the Clancy team designed and built a custom stainless steel, outdoor-rated enclosure. "Singapore gets a lot of monsoons with extremely high winds," explains Cox. "Our equipment and operating system will be protected from high wind, rain, heat, and humidity."

"The logistics were an incredible challenge as all of the equipment was installed between the third and tenth storeys of this entirely above-ground project," adds Degenkolb. "The design team did an amazing job of integrating the production spaces into the venue design."

(Above left) **The Star PAC's 400-seat outdoor amphitheatre with LCD screen** (Above right) **PNU's larger theatre has a vernacular colour palette** (Below left) **PNU's Diva shells are similar to the one at Indiana Wesleyan University in the USA**

Desert bloom

Another complex project has recently been completed at the world's largest university campus for women – Princess Nora Bint Abdulrahman University (PNU) – in Riyadh, Saudi Arabia. Designed to accommodate up to 50,000 students in 15 departments, PNU covers more than 8,000,000m² (three square miles).

The university's conference centre features two performance theatres – one with 2,800 seats and one with 1,200. Both theatres are equipped with a Diva acoustical shell from Wenger Corporation and rigging systems from J. R. Clancy.

"We were asked to design two multipurpose venues capable of hosting anything – from opera, to symphony, to dance, to theatre – and that's what we did," says Michael Burgoyne, principal theatre consultant with the Minneapolis office of Schuler Shook. "The Diva is a really solid product that's engineered well and it's very affordable for what it offers – a standardised product with various options. It's the perfect place to start because we can customise its finishes and options."

The larger hall's Diva shell has a red oak veneer; its full configuration consists of a dozen 32ft 0.5in (9.8m) towers and four ceiling panels. The smaller hall's Diva shell, painted warm silver, comprises nine 29ft 3in (8.9m) towers and three ceiling panels.

According to Burgoyne, the Diva product literature enabled the project's key players to understand its operation and benefits, regardless of whether they were familiar with acoustic products. The team included primary contractor Saudi Oger, sub-contractor First Gulf Company, installer Hoac, acoustician Acousystem Liban, architect/engineer Dar Al-Handasah and its partner, design architects Perkins + Will.

Burgoyne considers Wenger and Clancy as industry standards for shells and rigging. As further reassurance on this remote project, on-site installers from both companies performed the installation and user training.

"Our confidence in these two established partners took a lot of worry off our shoulders," Burgoyne concludes. "Although both companies were tasked with incredibly tight deadlines, we had no quality concerns about the end result." ■

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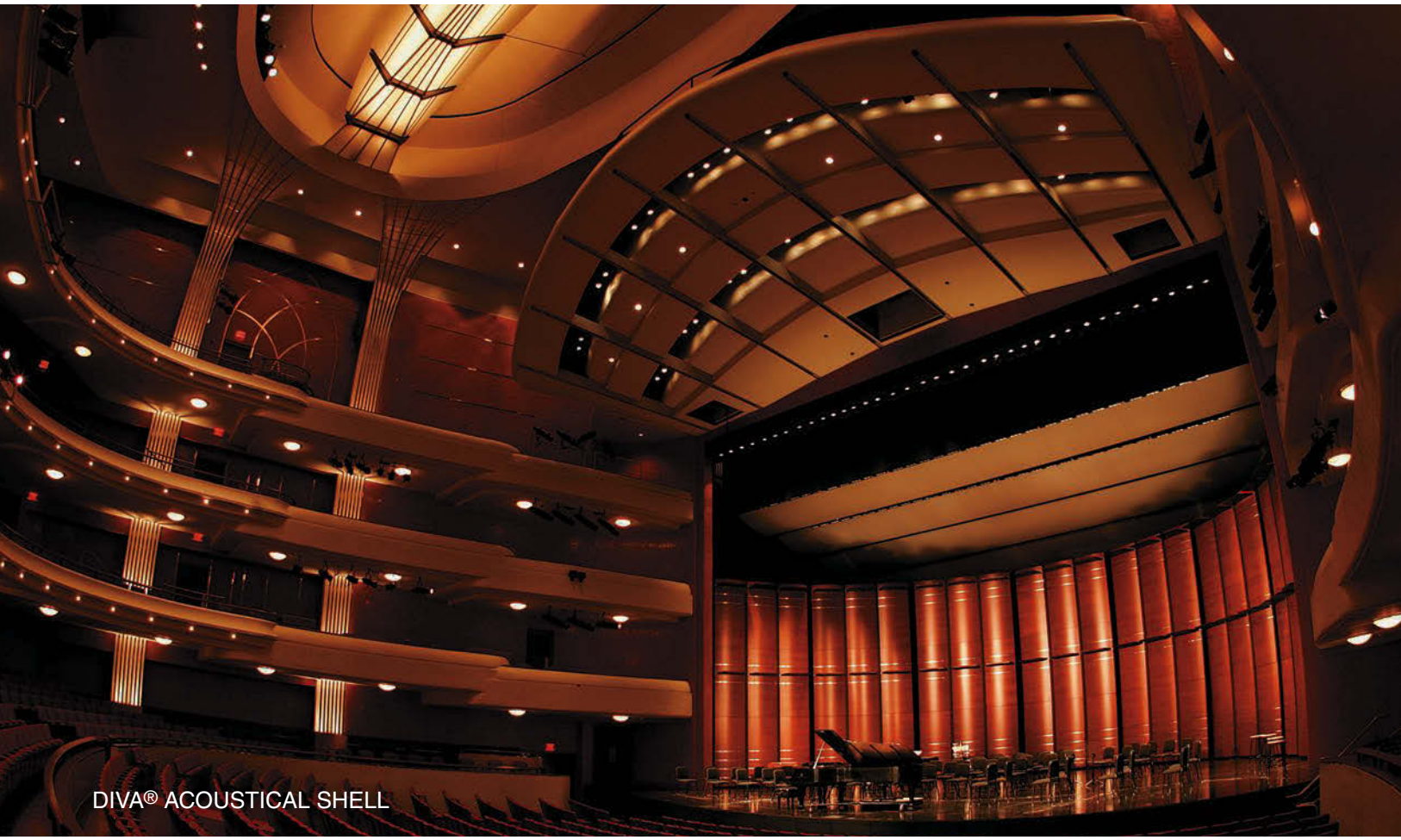

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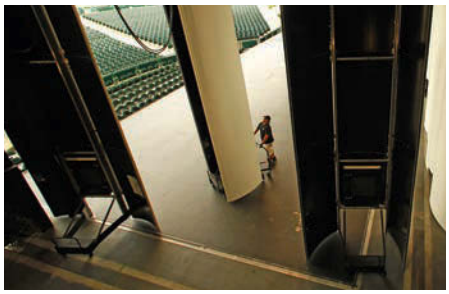

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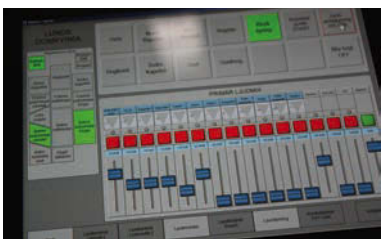
Audio revival

A smart sound system installed in Sweden's Lund Cathedral is enabling the historic building to meet the demanding requirements of a modern church

(Above) **The cavernous Lund Cathedral has long proved a challenge in respect of attaining adequate sound reinforcement** (Opposite) **In normal use, Lund Cathedral seats 1,100** (Below) **The entire system is under digital control and distribution and can also be accessed via iPad remote control**



The Lunds Domkyrka (Lund Cathedral) has fascinated visitors since the 12th century. Although it is an active church in which daily services and ceremonies are conducted, it is also one of Sweden's most visited buildings, boasting more than 700,000 visits a year. Additionally, it's one of the most important Romanesque cathedrals in Scandinavia, with some sections dating back to 1145. The altar in the baptism chapel, in fact, was inaugurated in 1146 and the 78 oak choir stalls in the high chancel have been in place since the 14th century.

Planning for the future

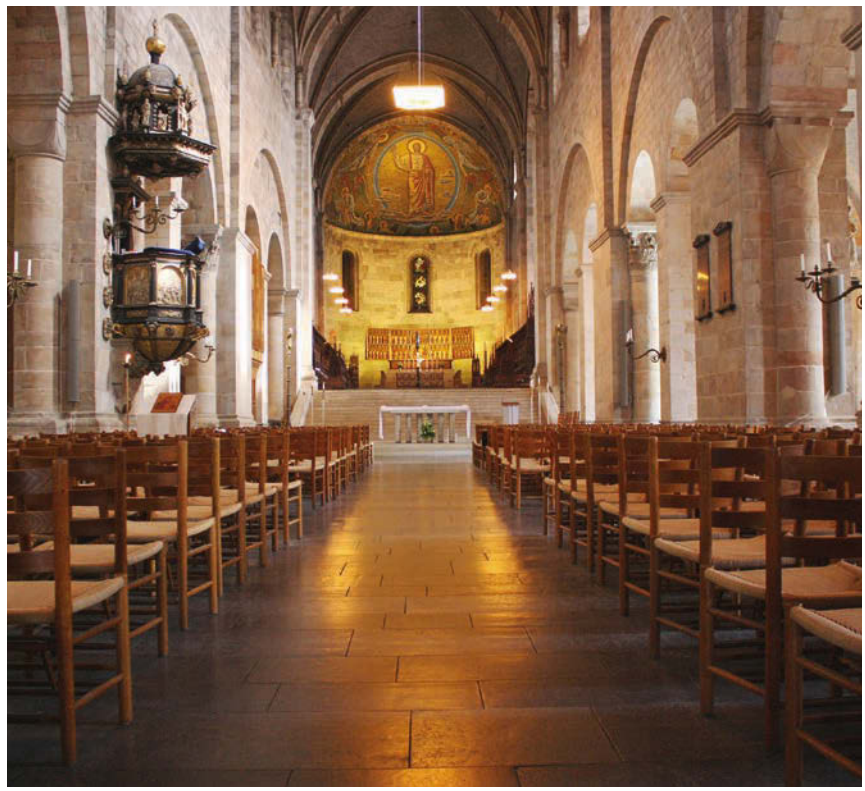
In 2009, Swedish acoustics expert Artifon was asked to design a new sound reinforcement system for the cathedral that would meet the building's growing requirements. Sound is becoming increasingly important in the modern Swedish church. Although there has been minimal investment in sound systems in the past, cathedrals, especially, are keen to experiment with new forms of ceremony. Furthermore, as previous cathedral projects in the Swedish cities of Skara and Visby have shown, any solution would also need to blend in tactfully with the building's historic architecture.

As a result of extensive calculations made using CATT-Acoustic software, the Artifon team was able to select the most appropriate loudspeakers and place them accordingly. The equipment had to be suitable for daily ceremonies as well as other events held at the cathedral. It was particularly important to have loudspeaker coverage at the altars so that the priests, speakers and choristers in these areas could monitor the sound. Furthermore, to address monitoring for single participants in distant locations, in-ear systems were incorporated. All the systems eventually came on line in 2011.

Demanding acoustics

The reverberation time in Lund Cathedral is approximately four seconds at mid-range frequencies. Previously this meant that voices were not carried clearly across the large area. However, the average STI (speech transmission index) value with the new sound system exceeds 0.6 – unusually high for a cathedral of this size.

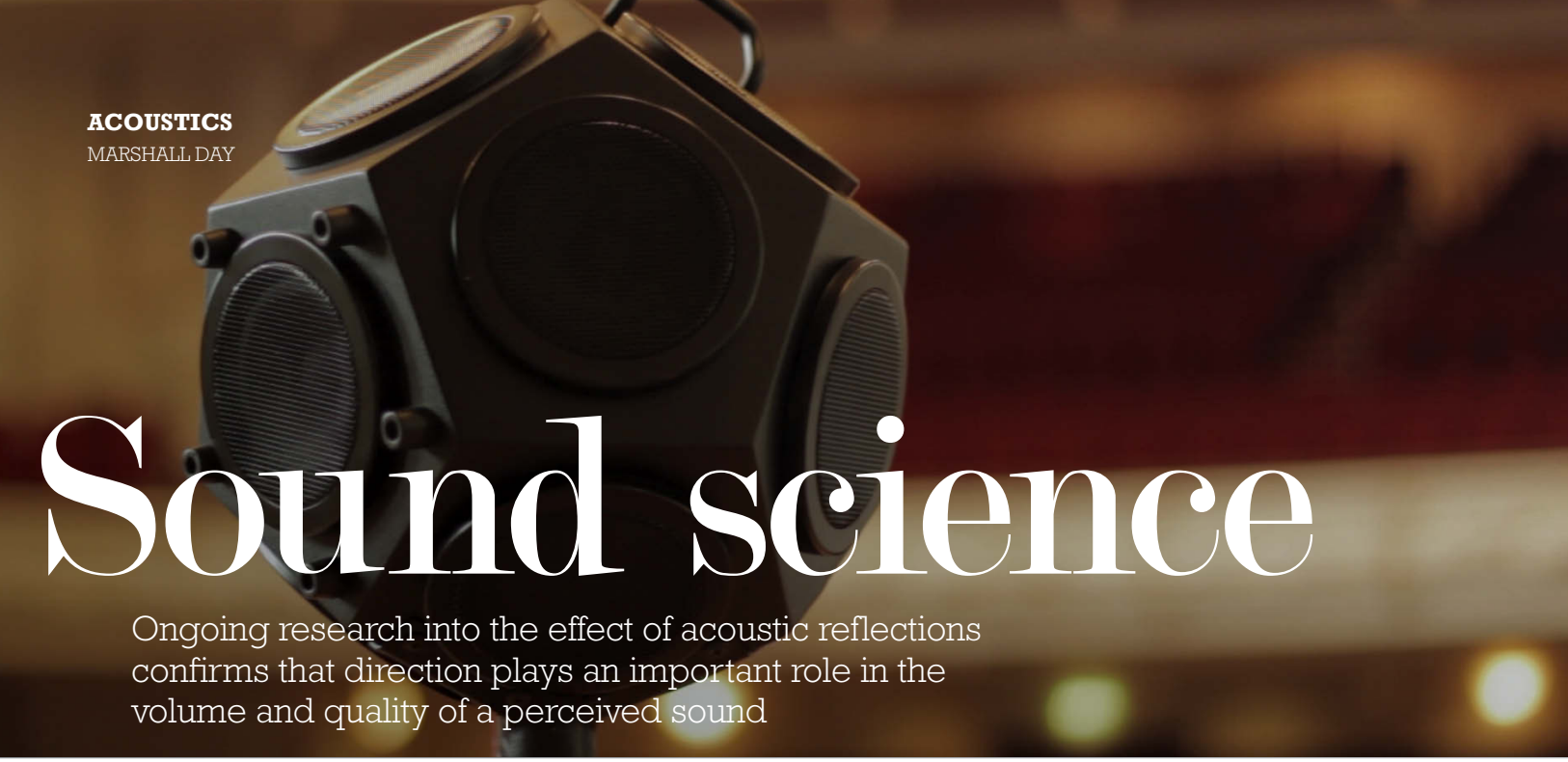
"The system is controlled with wireless tablet devices," reveals Johan de Sousa Mestre,



Artifon's senior consultant. "It is very discreet but achieves excellent sound quality. We knew that even the tallest column speakers would not be able to direct sound further than 20m adequately, so we used digital directivity-controlled column speakers as fill systems further down the church. This meant that the column height of the main speakers could be lowered to about 2m, which in turn reduced costs and visual interference.

"The project taught us a lot about the modern needs of churches," de Sousa Mestre adds. "Sound systems have to be optimised for music and must also provide a natural localisation of sound in relation to a speaker. We have since used the experience gained here to help us with projects at Växjö Cathedral in Sweden and the new Knarvik Kirke in Norway." ■

www.artifon.com



Sound science

Ongoing research into the effect of acoustic reflections confirms that direction plays an important role in the volume and quality of a perceived sound

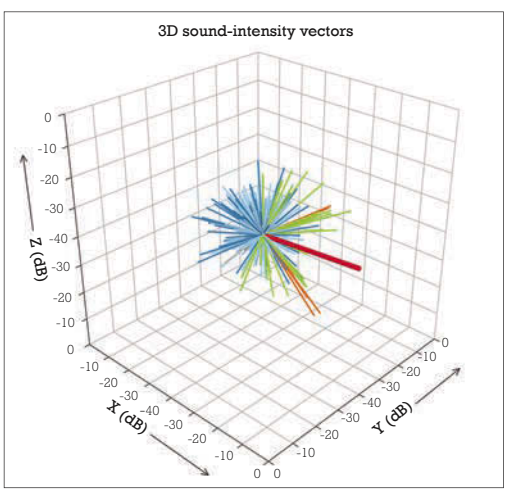
Although many great concert halls were built prior to 1900, by the middle of the 20th century auditorium design had not progressed much beyond the estimation of reverberation time. However, the craft of understanding and analysing the acoustics of performing spaces has greatly developed in more recent times.

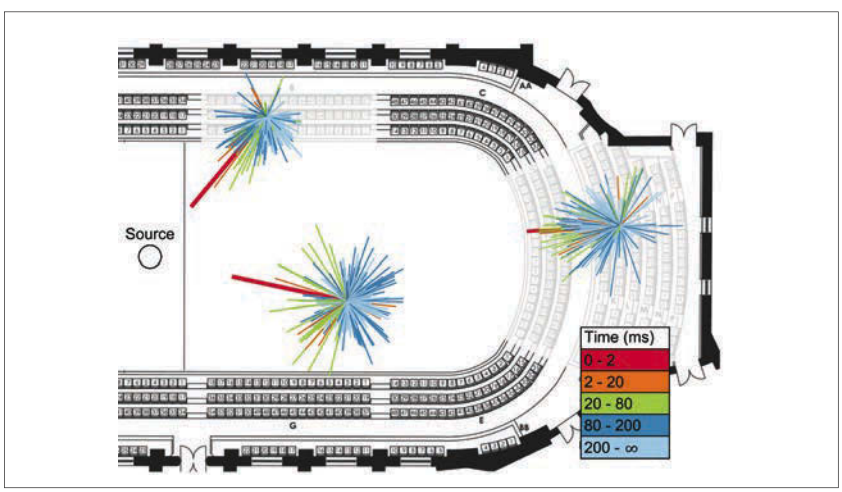
The sound in any concert hall comprises the direct sound generated by the performers and reflections of this sound as it travels throughout the interior of the auditorium. It is now widely accepted that it is not just the timing and the strength of the reflections, but also the direction, that influence the extent a listener is immersed in the sound of a performance.

In 1952, Rolf Thiele, a researcher in Germany, realised that reverberation time did not explain everything in terms of how a room sounds. He proposed a technique for measuring and visualising the directional distribution of reflections as 'hedgehog patterns'. The length and angle of each line corresponds to the strength and direction of each reflection compared to the direct sound.

In the late 1960s, while reviewing various designs for the Christchurch Town Hall, Harold Marshall investigated the effect of room shape on acoustical quality and discovered that early lateral reflections, associated with narrow, rectangular halls, were important in providing a sense of space. This effect was further investigated and quantified by Marshall in collaboration with Michael Barron in 1981. Spatial impression is now recognised as an important characteristic of good-sounding concert halls, and is a key consideration in room design and analysis.

(Above) **Multidirectional loudspeaker** (Opposite) **Tetrahedral microphone array used for 3D measurements** (Below left) **IRIS plot showing strength, direction and arrival time of a reflected sound** (Below right) **plots measured in the Auckland Town Hall showing variation of reflections at different locations**





Advanced measurement

The acoustical characteristics of a room are traditionally determined using single-channel impulse-response measurements, which yield information about sound reflections in terms of time and strength – but not direction. Although researchers have developed 3D impulse-response measurement systems in the past, these use custom, expensive or impractical equipment. However, the IRIS measurement system, developed by Marshall Day Acoustics, enables 3D impulse responses to be captured and analysed through a commercially available tetrahedral microphone array and a calibrated USB audio interface.

The IRIS plot is at the heart of the system. Sound reflections arriving at the microphone array are represented as a series of coloured spikes; the length and direction of each spike of the hedgehog correspond to the reflection strength and direction. Spikes are coloured according to when the reflections arrive. The plot can be used to relate sound rays to physical features of the room, observe the directional distribution of early and late sound energy and identify surfaces causing problematic reflections. The graphical nature of the IRIS plot enables easy comparison between different seats in a room.

Numerical magnitude, time and direction information may be obtained for a comprehensive analysis of individual reflections. A standard impulse response waveform is provided to allow calculation of standard room acoustic parameters according to ISO 3382.

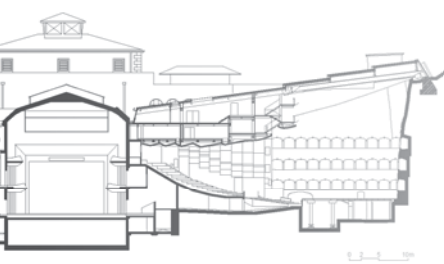
Putting spatial analysis into the hands of acousticians around the world, IRIS is considered to be a breakthrough in real-world acoustics. ■

www.marshallday.com

Extraordinary acoustics

Renovations to the Felsenreitschule Salzburg have seen the stunning historical hall enhanced with modern amenities and state-of-the-art acoustics

(Main) **The Felsenreitschule has a capacity for 1,438 audience members**
(Below) **The modernised configuration of the hall**



The Felsenreitschule in Salzburg is an extraordinary opera house. The stage's rear wall is a rock with three walkways carved in behind arcade columns. In the 17th century, the Bishop of Salzburg had his master builder, Fischer von Erlach, build this impressive venue for hunting animals and exercising horses. Since theatre director Max Reinhardt discovered the venue in the 1920s, generations of conductors, musicians and theatre directors have been fascinated by the individual character of the large stage. The Salzburg Festival had already been using the venue for major theatre productions for 20 years when Herbert von Karajan realised it could also host opera and concert performances.

Originally the building didn't have a roof, but the inevitable Salzburg summer rain forced the festival management to build a canopy for the audience. Major renovation works in the 1970s extended this asset to the stage area, in the form of an extendable foil roof. Thus, the venue could be used as an open-air stage or as a roofed opera house. Since the foil roof was not suitable for bearing the weight of snow, it was necessary to open it up in late autumn and just let the winter snow cover the stage.

The venue's acoustics have also been modernised over the years, with the last major works in 2006 seeing improvements in the upper audience area as the balconies were removed and replaced with a smooth raking of seats. Despite its huge 20,000m^3 volume, the hall's acoustical performance has earned it quite a reputation.

In 2010, the organisers of the Salzburg Festival decided to install a roof that could remain closed

in the winter. Furthermore, they felt that the stage scenery and lighting should be improved. The architects of Halle1 in Salzburg proposed a sophisticated solution with telescopic beams bearing movable roof elements. The acoustical disadvantages of the new lighting bridges and the resulting increase in the hall's volume to about 23,000m³ – double the volume of a traditional opera house – would be compensated by a new wall and ceiling structure enclosing the audience.

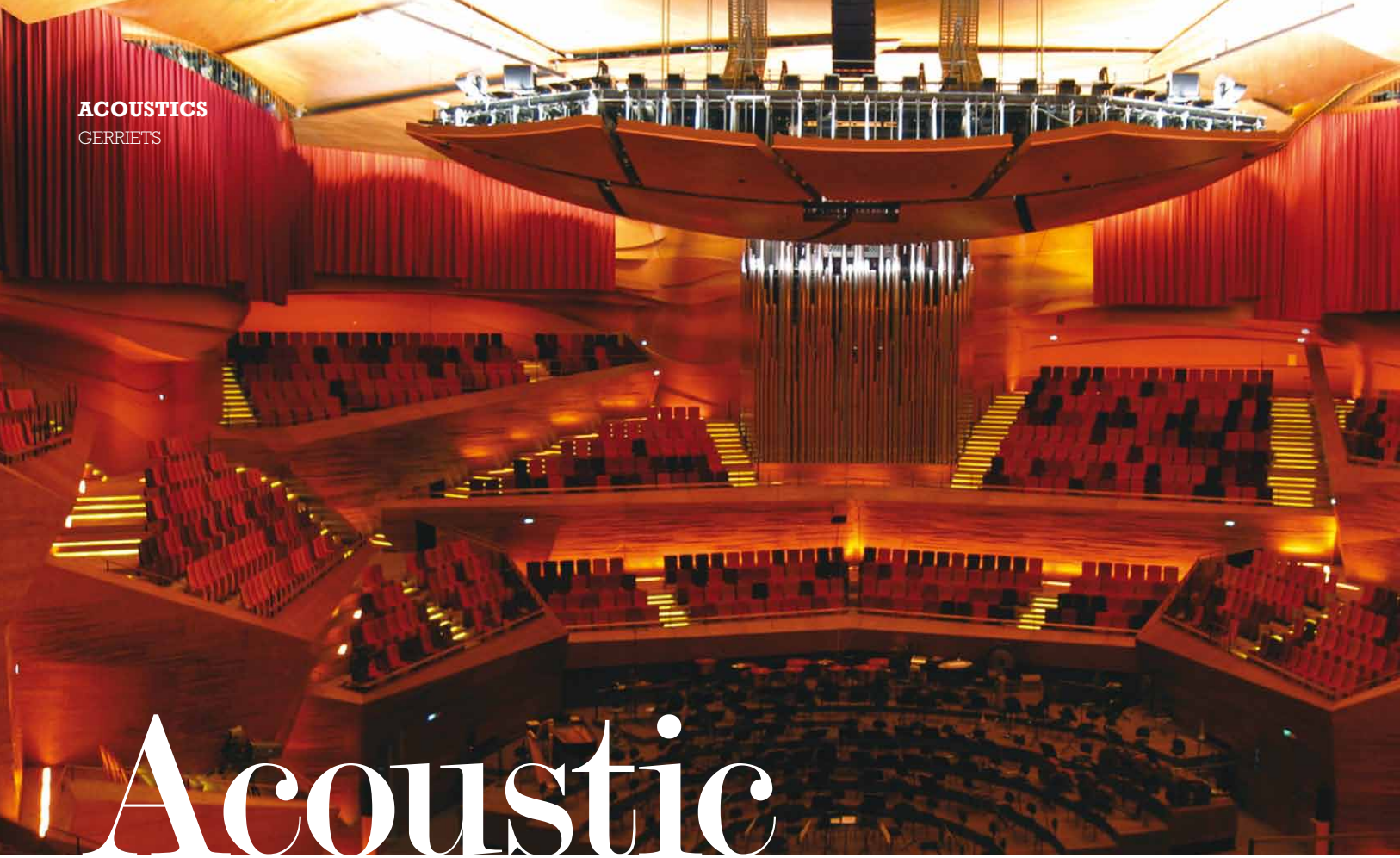
Specialised sound

In addition to supporting the volume of the singers and orchestras, the acoustics needed to envelop the audience, merging individual orchestra instruments into an ensemble, without affecting the music's clarity or transparency. Based on several multichannel acoustical measurements in the occupied and unoccupied hall, Müller-BBM created an acoustical computer model. With this and numerous laboratory measurements, the absorption and sound-directing properties of all new surfaces in the hall were defined and optimised.

To adjust the acoustics for individual productions, Müller-BBM also installed Vivace, an electro-acoustic room-enhancement system that enables the acoustics to be supplemented with additional sound, as required. This way, excellent acoustics are guaranteed to complement the top-class artistic performances at the Salzburg Festival. ■

www.muellerbbm.com

The stage is 40m wide and 25m deep



Acoustic palette

Innovative textiles and absorption techniques can be exploited to meet the sound requirements of multipurpose performance facilities

(Main) **The acoustic curtains in Copenhagen's Koncerthuset facilitate acoustic excellence at a variety of performances** (Opposite) **Acoustically effective partition curtains in Caja Magica, Madrid**

In the current architectural environment, good acoustical design is not a luxury – it is a necessity. Acoustics impact everything, from employee productivity in an office to performance quality in auditoria, arenas and concert halls.

While the science behind sound is well understood, applying that science to create the desired acoustical performance within a specific space is a complex task. There is no single acoustical solution that can be universally applied; each environment offers its own unique set of challenges and, therefore, a custom solution should always be considered.

To meet this challenge, Gerriets has developed a new range of fabrics and products specifically to enhance room and facility acoustics. Specially tested for sound absorption, reflectance, transmission and isolation, the Gerriets Acoustics collection has been designed to meet the creative needs of acoustic consultants and architects.

The collection includes an innovative multipurpose fabric called Innovent, which provides 100% blackout. This features a foam-coated inner layer for sound absorption as well as a silver-coated outer layer that reflects both light and solar energy when used in front of a window. Gerriets has also developed a fabric called Sound Curtain, which can reduce or isolate up to 18db of sound between two spaces.

Absorption advances

Modern performance venues are often required to host different genres of music – so there could be a rock concert one evening and a classical concert the next. The ongoing challenge is to adjust the acoustics of the venue accordingly. The reverberation time (the time it takes for

a sound to diminish) in a given hall should be approximately half as long for a rock concert as for a symphonic concert, and because the bass sound levels are louder at amplified music concerts, it is important that these frequencies are dampened acoustically.

Fabrics have proved to be very effective at absorbing higher frequencies, but they are less successful with mid to low frequencies. Recently Gerriets partnered with Niels W Adelman-Larsen in launching a new technology that uses an inflatable membrane absorption technique to alter the reverberation time of mid to low frequencies. Adelman-Larsen, who himself is a former professional jazz and rock drummer in addition to being an acoustical engineer, performed some of the first scientific studies on recommended acoustics for amplified music.

"The beauty of the system is that in permanent installations the system can be switched on or off at the push of a button," Adelman-Larsen details. "The acoustics of a room can be dramatically altered to suit different styles of music."

There is also another version of the system available that uses pre-inflated membranes, which is ideal for temporary applications, such as events and concerts, that would benefit from enhanced room acoustics. The pre-inflated version is lightweight and easy to install, so it is suitable for a variety of venues that need to improve their acoustic environment. ■

www.gerriets.com

Sound effect

A challenging renovation project required innovative thinking and sophisticated technical engineering – with excellent acoustical results

Similar to many modernisation projects, the renovation of Vancouver's Queen Elizabeth Theatre was a lengthy process. The acoustical assessment and design began as far back as 1994, and the completed building didn't open until November 2009. That period saw three complete designs of the renovation – each fraught with financial challenges, requiring innovative design responses.

Much of the project was driven by acoustical design requirements. Working in the prevailing Canadian environment – where the performing arts are chronically underfunded – the acoustical recommendations and their architectural implementation had to be far more cost effective than others elsewhere. Compounding these challenges was a scheduling disaster half way through construction. Hazardous materials on the site, in the form of lead dust, had to be removed, forcing a major redesign so that the project could be completed before Vancouver's 2010 Winter Olympics.

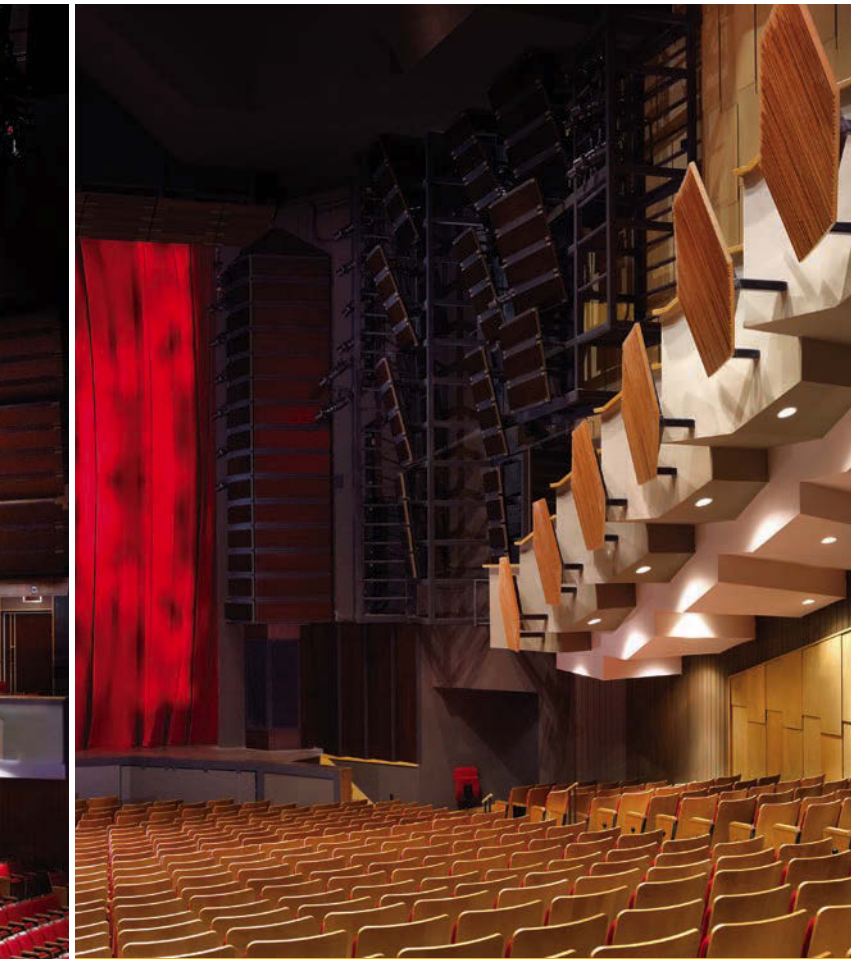
An unusual challenge

Much of the focus in terms of the acoustics was on the needs of the Vancouver Opera. To ensure optimum sound, modern opera house design typically limits the number of seats to 2,000 or fewer, which simply wasn't an option for the Queen Elizabeth Theatre renovation. Opera only occupies the room 30% of the time. For the rest of the year, popular music acts are booked and they can fill a lot more than 2,000 seats. Most acoustical engineers would never set out to build an opera house this big. However, Aercoustics had no other choice.

The acoustics of the Queen Elizabeth Theatre have long been lamented. Typical of the post-war era, the sound was very dry and the theatre had a very poor spatial quality. Furthermore, the sound wasn't loud enough, the theatre lacked warmth, the ventilation system was very noisy and there was a lot of sound transfer with the adjacent Playhouse Theatre. The only thing the Queen Elizabeth Theatre had going for it was acoustical clarity, and, if anything, too much of it.

The first renovation design, completed in the late 1990s, attempted to fix the building without removing the ceiling. This design fell victim to financial shortages and was put on hold for more than six years.

In the second design, the existing ceiling was removed and two new balconies added (making a total of three). The design also incorporated more modern concepts with regards to acoustic reflection. In a room that is too large acoustically (typically more than 2,000 seats), it is possible to



compensate with strategically located reflecting surfaces. In addition, if those reflectors direct sound to arrive at listeners from the sides, an overly wide room can be made to sound more like the well-loved, narrow shoebox-shaped rooms of the 19th century. Ultimately, the sound will have a better spatial quality.

Two design precedents were employed: large lateral reflectors in the ceiling space, similar to the Christchurch Town Hall in New Zealand; and terraced seating at orchestra level, inspired by the Berlin Philharmonie. However, as these are both concert halls, which are fundamentally different to a proscenium arch theatre, such as the Queen Elizabeth, there was certainly an element of risk involved.

Construction work on the building began in the summer of 2006. Work was planned in phases during the months when the theatre was less frequently in use. In that first summer, the building was literally cut in two. This was to prevent structure-borne noise between the two theatres housed in the building. The next summer the ceiling was removed and a new ventilation system was installed.

Creative solutions

Half way through the summer of 2007, the lead-dust disaster struck. Not only was this a serious safety concern, it meant that the room had to be redesigned, and rather quickly, as construction was due to re-commence in May 2008. The two new balconies had to be removed from the design, as did the terraced seating levels that would provide the critical lateral reflections.

Fortunately, at this point, Aercoustics discovered a new software tool, originally intended to optimise lighting in energy-efficient buildings. While it is usually extremely difficult to work out the optimum location and orientation for a reflector in three dimensions, the new software enabled Aercoustics to calculate the direction and coverage of reflections in real time.

A system of reflectors was designed to direct the sound so that it would arrive at the listeners from the sides, sooner than it otherwise would. Using the sophisticated software, the tilt on many of the reflectors has been optimised to within less than one degree. The reflectors improve volume, intimacy and, most of all, spatial impression.

"What has transpired as a result of Aercoustics Engineering's work is, in my estimation, a minor miracle," says James Wright, general director of the Vancouver Opera. "We are delighted and – more importantly – the audience is thrilled." ■

www.aercoustics.com

(From left to right) **The acoustic modifications have made the large room feel intimate; acoustic reflectors direct the sound in towards the audience; the theatre has 2,765 standard seats and 16 wheelchair spaces**

Photographs courtesy of Lisa Logan

Culture hub

A state-of-the-art performing arts complex is uniting the community and growing the arts in Canada's largest city

The centrepiece of a US$1bn urban renewal project in downtown Toronto is a performing arts complex for the Regent Park neighbourhood. Daniels Spectrum brings together community-based arts and cultural groups, and provides multiple stages, with rehearsal and learning space.

"All the principles we apply when designing professional theatres are in evidence here, to give these groups the best environment for their work," says Donald Schmitt, principal with Diamond Schmitt Architects – the Toronto-based firm behind the Mariinsky II opera/ballet house in St Petersburg, Russia (2013), and Montreal's Maison Symphonique (2012).

The three-storey, 60,000ft^2 facility anchors a key intersection of the revitalised community and announces itself with a transparent entry court and performance space café that meet the street. Multicoloured accent panels inspired by the flags of the world are set against custom-formed white metal panels and a syncopated rhythm of recessed windows.

The ground floor is dedicated to performance. The main 6,000ft^2 Ada Slaight Hall has state-of-the-art theatre equipment, resilient flooring, a lighting grid, A/V booth, projection facilities and retractable seating for 310, with additional floor seating that brings capacity to 400 spectators. Working with Jaffe Holden Acoustics and Fisher Dachs Associates for theatre design, the architects configured the hall for utmost flexibility.

The space is divisible into three rooms with STC-rated folding partitions and a full-height catwalk that extends the length of the room. Custom-shaped glass-reinforced gypsum acoustic reflectors beneath the catwalk and sound absorption panels on the walls permit a full range of programming – from concerts and theatre, to film screenings, lectures and parties – to occur simultaneously.

(Above) **The facility connects with the street through an open performance café**
(Below) **Rehearsals benefit from the state-of-the-art theatre equipment**

Connecting people

A generous lobby space was part of the plan. "It was our objective to facilitate interaction among the tenants, students and the public and to make the centre a vibrant crossroads for the community", explains Schmitt. Very wide corridors act as a gallery, impromptu performance space and a public piazza that facilitates connection among users.

The three lobby entrances to the Ada Slaight Hall have sound and light locks. Similarly, three access points lead from the hall to an adjacent courtyard that adds 4,000ft^2 of outdoor performance space with a stage platform.

Paintbox Bistro offers dining and socialising in a fun, welcoming environment, with a connection to the arts through performance spaces and live music

Daniels Spectrum is home to seven resident groups who all participated in the design phase to determine the exact requirements of their customised space. The Aki Studio Theatre for Native Earth Performing Arts is a 120-seat black box theatre with dressing rooms, a backstage area and a separate ticket booth and street entrance.

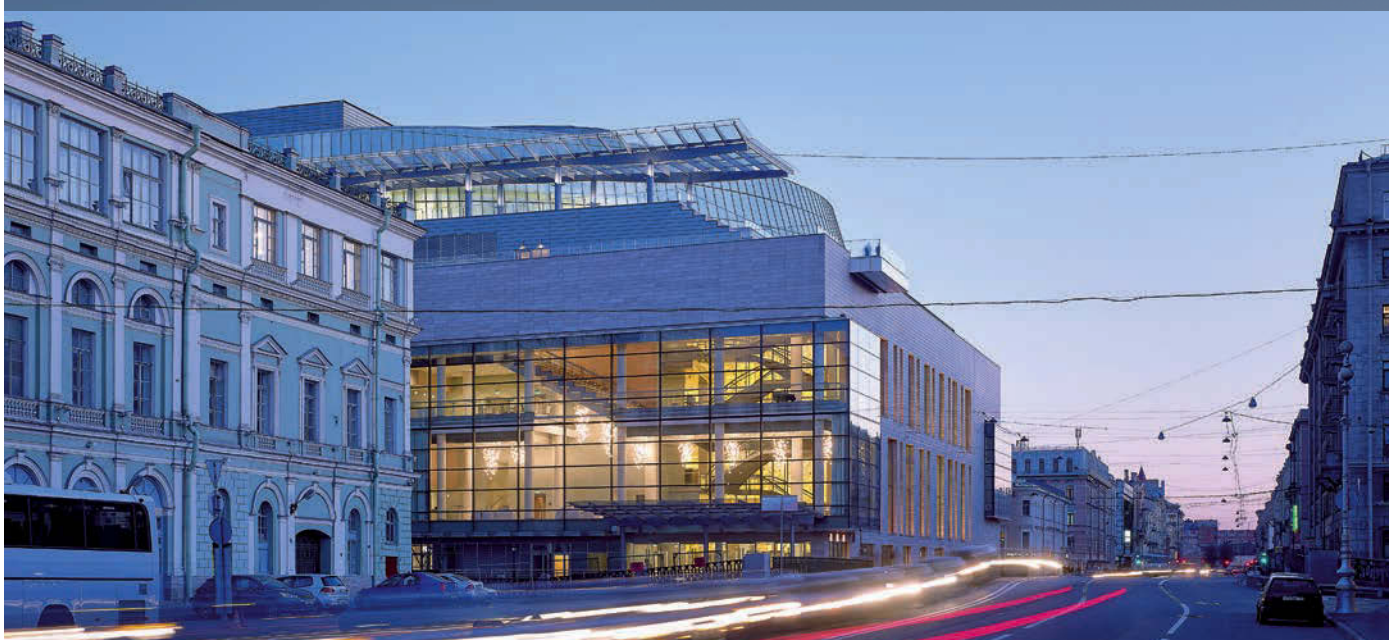
Also located on the ground floor is a performance space and two rehearsal rooms for COBA – Collective of Black Artists, for African dance and drumming. Each of their three dance studios has fully sprung floors, mirrors and bars and acoustic treatment in the walls and ceiling.

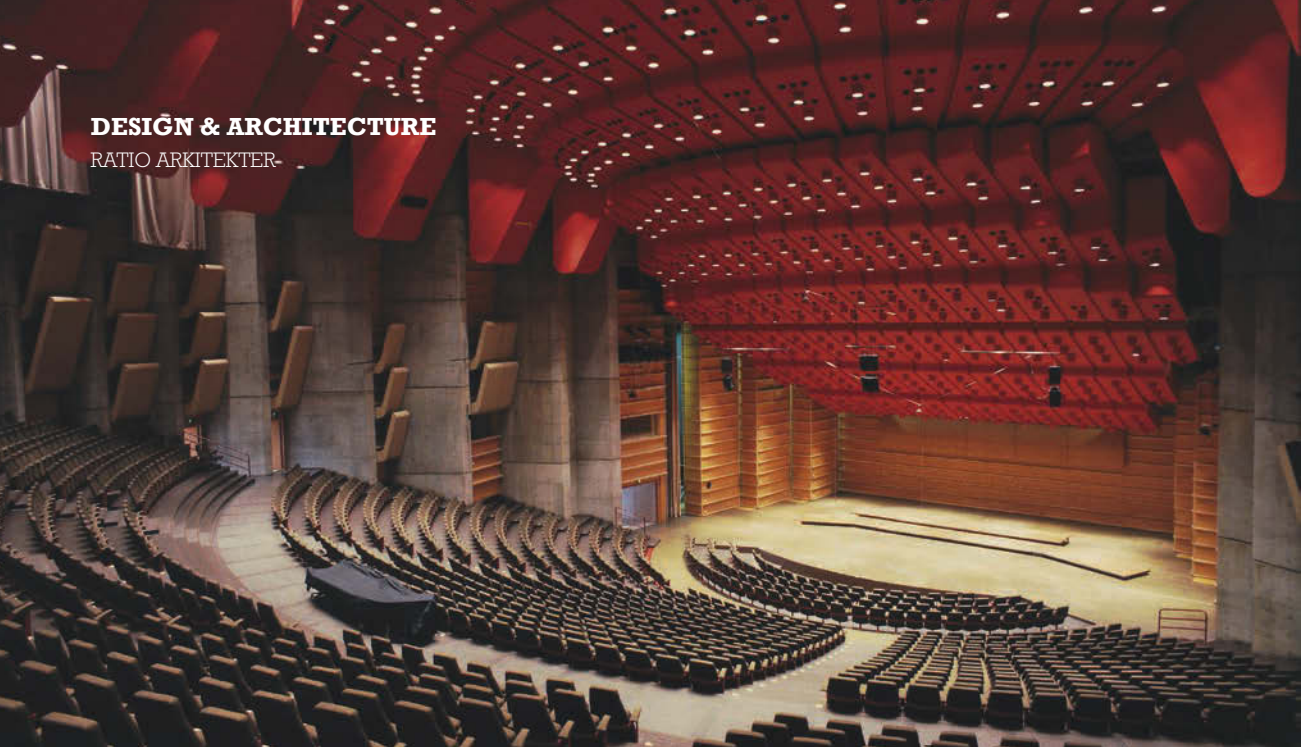
The second floor is dedicated to arts-based learning programmes. The music school, which previously operated from a row house with no soundproofing, now has six sound-isolated studios and a music education room. The third floor houses the Centre for Social Innovation, an incubator programme that provides collaborative office space for social and arts entrepreneurs.

Daniels Spectrum connects to the 24-storey Paintbox condominium, which shares the same multicoloured scheme on its exterior. A social enterprise restaurant, Paintbox Bistro, has a performance stage and a large catering kitchen that serves the arts facility.

The US$30m arts and cultural centre is considered to be a vital part of a major renewal in the area. "Daniels Spectrum is alive with enthusiasm and an exuberant expression of the performing arts," adds Schmitt. "It has created a new culture destination in Toronto." ■

www.dsai.ca





Respectful restoration

Bergen is the largest city on Norway's west coast and is home to 270,000 people. With a long and proud cultural heritage – the composer Edvard Grieg was born and composed some of his most famous pieces there – the city is visited by hundreds of thousands of tourists every year.

Bergen is also famous for its annual music festival, Festspillene. At the centre of this event is the Grieghallen, a 1978 brutalist-style concert hall with a 1,530-seat auditorium. The venue has a sculptured concrete profile and a unique lobby that takes the form of an elevated glass and Corten steel cage, lit by hundreds of incandescent bulbs hung from the ceiling.

The main hall is constructed in concrete and oiled pine, with an enormous red metal ceiling that gives the space a unique presence. The building has overcome much scepticism in this proud historic city over the years and has carved a place in everyone's hearts.

The renewal of a prized concert hall in Bergen must strike a balance between modern requirements and the historical importance of the building's architecture

Delicate operation

A refurbishment of the hall will include both technical upgrades and architecture renewal. The architect is Ratio arkitekter in collaboration with Origo arkitektgruppe, with stage engineering by UK-based Theatre Projects. The building engineering is by HVAC while Norway-based COWI is responsible for the electricity. All the stage machinery, sound and light systems, and most of the electricity in the lobby and the hall will be changed. The architecture renewal will involve both restoration and conservation, particularly the façades. It is thought that previous renovations didn't respect the original scheme and did not provide the comfort and quality expected in such a high-profile building.

This new renovation started in 2013 and will continue into 2014. The work must be performed over the summer months so it doesn't interfere with the hall's normal programme. The Grieghallen will get a larger orchestra pit that will meet contemporary standards, and all the seats will be replaced, together with the mixing position and lighting. The number of seats will increase, so the sound and light locks must be widened.

In the lobby the original lighting will be kept, but the light bulbs will be modernised. This will be supplemented with monument lighting on the concrete pillars that dominate the building. The new carpets will be closer to the original design than those used in previous renewals.

Balancing act

The biggest challenge is to modernise the building enough so that it meets the expectations of contemporary guests while respecting the strong architectural statement of the Danish architect, Knud Munk. As such, the original, almost raw-material effect will be retained where it does not oppose modern needs, and new features will be careful interpretations of brutalist architecture. Some of the refurbishment elements from the 1980s and 1990s will also be replaced.

Another great challenge is to cater for modern cabling and technical installations, which cannot fit into the raw construction. Here, the idea is to create light encasements that are clearly new installations – not simply trying to copy the solid concrete or bare steel – and are obvious in their function as technical equipment.

State-of-the-art technical installations will continue to keep the Grieghallen at the forefront of Norway's cultural scene, and the hall's excellent acoustics will be retained or even enhanced, where possible. This is especially true in the lobby area, which is used for a range of events, from banquets and conferences to acoustic gigs and amplified concerts. ■

(Far left) **The stage measures approximately 1,000m²** (Above) **The Grieghallen has been the home of the Bergen Philharmonic Orchestra since 1978** (Inset) **The hall has a sculptured concrete façade**

www.ratioark.no

Cross-culture collaboration

London's Barbican Centre has upgraded its flying system to a technically advanced solution from the Netherlands. The result? Enhanced flexibility and improved safety for performers

(Right) **The Barbican Theatre can seat 1,156 guests** (Below) **Work on the grid floor** (Opposite top) **Installation of the winch foundation** (Opposite bottom) **The new lamel grid floor**

Following in the footsteps of the Royal National Theatre in London and the Royal Shakespeare Company in Stratford-upon-Avon, London's Barbican Centre has recently looked across the sea to the land of windmills, dikes and wooden shoes for innovation and high-tech theatre equipment. The Barbican is now the third British arts venue to choose Dutch company Trekwerk to refurbish its theatre technology, specifically choosing a synchro-motor theatre winch called the SynchroDisk.

Photograph courtesy of Lee Mawdsley

The Barbican Centre, which opened in 1982, is Europe's largest multipurpose venue for art, music, theatre, dance, film and creative learning events. The venue has a concert hall, three cinemas, several conference suites, two galleries, a conservatory, three restaurants, a library, two exhibition halls and, of course, the Barbican Theatre – all of which benefited from a major refurbishment in 2007.

As an internationally renowned venue for such a wide range of arts, the Barbican is under increasing pressure to provide cutting-edge technology. This year it was decided that the 1,156-seat theatre required a technical update in order to maintain its prestigious reputation. As such, the theatre's flying system and its supporting steelwork were removed, the existing galleries were modified and a new flying system – including the supporting structure and controls – was installed.

Ultimately, the city of London chose Trekwerk as a result of the company's track record for delivering high-specification, high-quality systems to theatres and concert halls. Also, with attention to health and safety increasing in the entertainment industry, the

company works to provide systems that meet international safety standards, including SIL3.

Trekwerk has worked on a wide variety of international projects – from the refurbishment of small, local venues, to the design and construction of complete theatre buildings. The company provides a range of resources including steelworks, design, software and development. Since all required elements are developed and produced in its two factories in the Netherlands, there is a minimal need for external support, enabling the company to create customised, balanced solutions.

Technical overhaul

More than 50 tonnes of original steelwork was removed to make way for the new system at the Barbican Theatre. The new lamel grid floor was developed to facilitate easy access to the steel wires underneath while providing a suitable surface for 20 SynchroPoints. A custom-designed fly bar has also been developed to suit the individual needs of the theatre.

The new installation comprises 77 SynchroDisks, 20 SynchroPoints and 12 chain hoists, all programmable with the TNM control system. There are also 10 rear stage hoists and a completely new rolling beam system, while alterations to the existing galleries include a new service bridge and newly designed fly bars made from alloy extrusion.

Out of respect for British high-context culture, Trekwerk decided to work with a UK-based CDM coordinator, to attend to all British procedures. What the British possess in politeness and tact, the Dutch match in honesty and directness – and sometimes a little help is required in bridging the gap! ■

www.trekwerk.com | www.clockworkautomation.co.uk

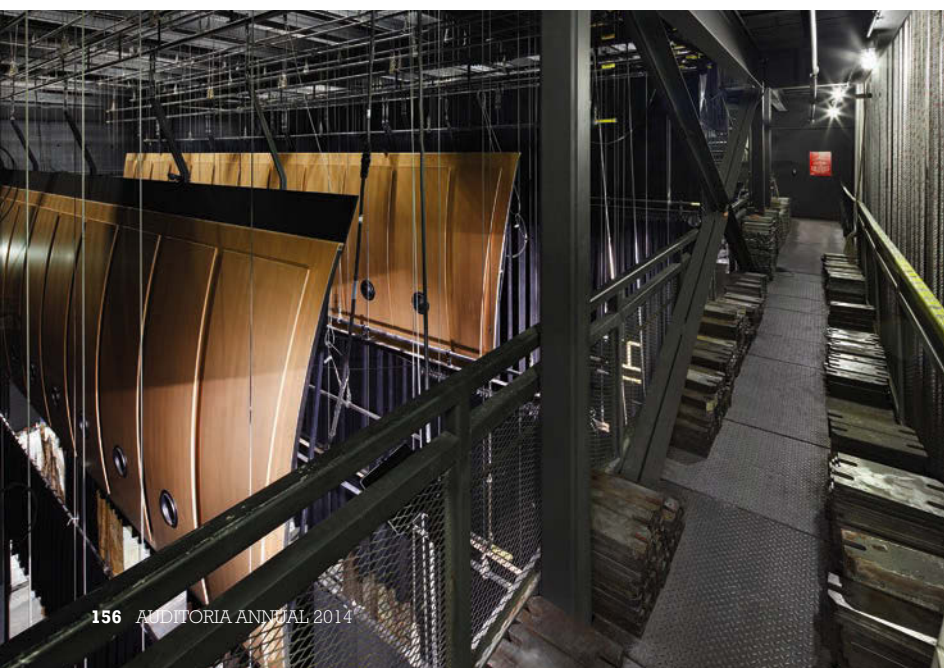
Joined-up thinking

In addition to the usual challenges presented by a theatre restoration, the Paramount Theatre project proved to be a valuable lesson in cooperation, coordination and integration

(Above) **Custom line shaft winches with self-paging cable reels occupy an unused space above the audience chamber** (Below) **SECOA custom designed the rigging to fly another vendor's orchestra shell ceilings** (Right) **A view of the lambrequin main curtain with elaborate gold appliques, flanked by lambrequin apse curtains with pleated jabots** (Far right) **The historic Paramount theatre marquee**

Every theatre construction project is an intricate interplay of people, plans, technologies, products and specifications. Customisation adds another layer of complexity. Throw in a historic venue and you have all the makings for a disaster – and greatness. The challenge is to ensure that myriad parts and players all work together, within the physical, financial and time constraints of the project.

The recent renovation of the Paramount Theatre in Cedar Rapids, Iowa, USA, presented all of these challenges and more, requiring the integration of new products from multiple vendors, replication of existing components, and interfacing of 21st century technology with 1920s architecture – all while preserving the venue's historic integrity.



Tall order

Space is always an issue; new equipment must occupy space that didn't previously exist, or fit in a much smaller footprint. The Paramount, a venue originally designed for vaudeville, was no exception. Coordination between the speciality and construction trades was trying, with groups fighting over mere inches. For SECOA, the greatest challenge lay in conveying to colleagues the give-and-take required to integrate modern rigging, lighting, platforming, orchestra lifts and acoustic systems with plumbing, HVAC, electrical and fire suppression.

The team's problem-solving and integration skills were tested daily. Tasked with providing a hoist for a 5,000 lb forestage acoustic canopy, it needed to devise a path for the lifting cables through historic plaster. Failure would have been disastrous. The team was able to locate the lifting hoists for the canopy above the audience chamber in an unused attic area; taking advantage of additional unused space, a custom-tracking 7,500 lb-capacity storage hoist was created to safely store the acoustic canopy along with storage carts in the fly loft behind the regular line sets.

Pieces of the past

Perhaps the most visually stunning element of the renovation is the new drapery, including more than a dozen swagged lambrequin curtains, each different in size, shape as well as pattern. The originals were long gone and previous renovations had lost much of the detail. Reproducing them entailed a painstaking,

11-step process in which designs were copied from photographs and tattered remnants, then transferred to the new fabric. To fit the curtains into the theatre's varying archways, individual curved bars were fabricated for each space. The magnificent 13 x 44ft Austrian main curtain was hung on the original frame, with each piece hanging in a specific position.

Lessons learned

Success in complex renovation projects requires close coordination and excellent communication at every turn. In the case of the Paramount, the teams' respect for one another, ability to innovate and willingness to work together resulted in a very successful project and the creation of a stunning restoration in which all are very proud to have played a part. ■

www.secoa.com

Magic carpet

Innovative floor lifts and a sophisticated control system provide event producers at the EICC with the flexibility to achieve a wide range of room configurations

(Above) **Four raked sections facing a centre stage** (Opposite) **Mechanical floor lifts with built-in risers** (Below) **The Lennox Suite in tiered cabaret configuration**

The Edinburgh International Conference Centre (EICC) is used by both the private and public sectors for conferences, exhibitions and social events. The original building opened in 1995 but in spring 2013 the EICC started a new chapter, following the opening of the state-of-the-art Lennox Suite.

The expanded space increases the EICC's hosting capabilities by using a bespoke, flexible system that reconfigures the room into various setups according to the needs of the organiser. These include a raked auditorium for 2,000 people, a flat floor for exhibitions, tiered banqueting for up to 1,400 guests and an arena with room for 1,400 spectators.

Ground work

In the project's early days, Gala Systems provided venue consultants The Right Solution with a proposal scheme for the floor. Consultants Theatre Projects also worked with the design team to define the project requirements for the Lennox Suite. Working for Sir Robert McAlpine, Delstar Engineering – part of the Stage Technologies Group – secured a prominent role in the design of this project in October 2009. Delstar developed the brief into a cutting-edge engineering solution that enabled the venue to reconfigure the floor as needed.

Delstar created innovative floor lifts, revolves and risers to cover a nominal floor area of 30 x 51m, which would achieve the flexibility required by the venue. The company supplied the mechanical design, build and installation of the Lennox Suite's floor lifts, for which Stage Technologies provided the control system. It is the lifts – some of which are 30m long– that enable staff to adapt the suite to various needs.

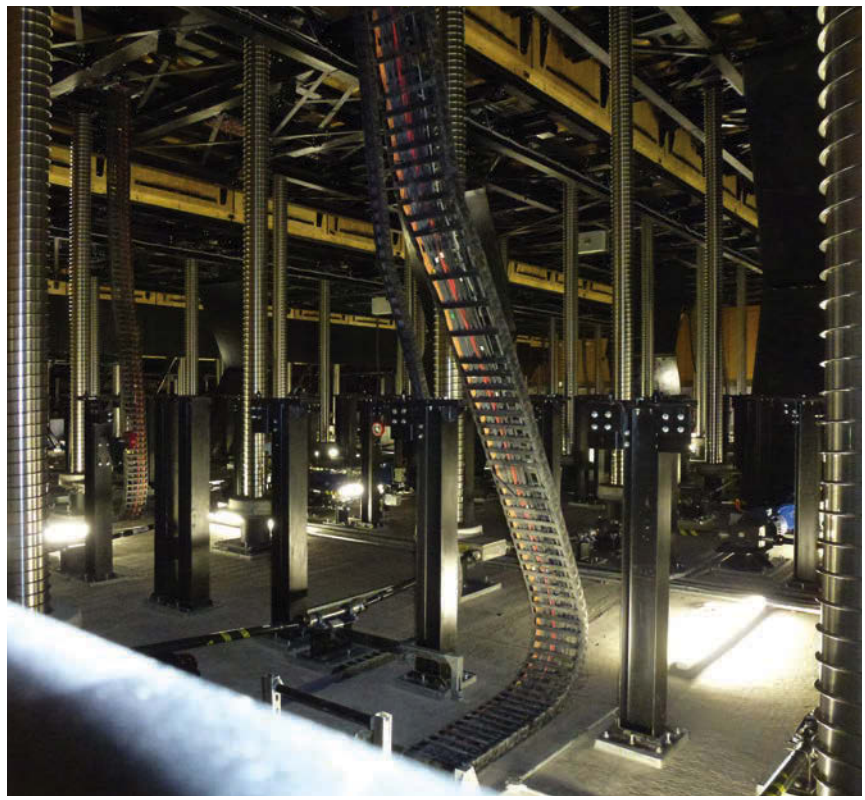
In order to accommodate different floor configurations, the lifts have risers built into the platforms. Some are elevated by screw jacks although most employ the Gala HD9 Spiralift system. Twelve of the central lifts also have a revolve facility to enable an arena mode for events that require in-the-round audience seating.

Of the configurations, the flat-floor mode is especially suited to heavy-duty events such as exhibitions. Cabaret-style or dining events for delegates are also feasible, and include full stage facilities. Larger conferences can be accommodated via the auditorium mode, which allows for 2,000 seated audience members and

stage facilities, while in the double auditorium setup, multiple raked sections face a central stage. The acoustic walls can also be deployed to split the floor area into three separate spaces, to suit either multiple or smaller single events. Each configuration uses the fully carpeted floor, with power sockets located in strategically placed floor traps. A variety of staircases and railings complement the various configurations. Depending on the desired mode, it takes two staff 10 to 25 minutes to reconfigure the floor.

In addition to the floor lifts, Stage Technologies also provided three Preset Station operating panels outfitted with eChameleon automation software, eight motion control cabinets (MCCs) and one motion control rack to optimise operation of the floor lifts. ■

www.stagetech.com



High-wire acts

Creative vision and complex rigging technology combine to create the illusion of flight for props and performers

(Below) **The Ahoy Rotterdam arena was built in 1970 and has a capacity for 15,000 people** (Opposite) **Dutch singers Marco Borsato, Roel van Velzen, Paskal Jakobsen and Jeroen van Koningsbrugge sat around the flying piano bar**

Friends Of Amstel (Vrienden van Amstel) is an annual event comprising seven or eight evening shows in the Ahoy Rotterdam arena in the Netherlands. The event often attracts more than 100,000 people and sees Dutch hip-hop artists and rock bands performing alongside well-known pop and folk singers in a one-of-a-kind musical celebration.

The 2013 show, which took place in January, was the event's 15th anniversary, so the organisers wanted the performances to be more spectacular than ever before. As such, ZFX Europe (operated by Frontline Rigging) was asked to create a complex rigging solution that would enable the performers to 'fly'. Furthermore, the rigging expert was asked to facilitate a flying piano bar, which was to take flight above the audience carrying four singers, who would all be sat around it.

Four single-wire eZ-Hoists (performer flying winches) were used to create realistic movements for the flying performers. The experience and expertise of ZFX Europe's directors and operators ensured the movements matched the visions of the artistic directors.

As the flying piano bar had to travel above the audience, a 180m-long eZ-Track system with several curves was used. Two automated eZ-Trolley units, together with two BGV-C1 chain hoists, were employed to transport and lift the structure. Although the piano bar was rigged on only two chain hoists underneath the trolleys, it was very stable and this gave the artists confidence in its safety. A 180m cable loom was used to feed the light, sound, video and camera equipment onboard the piano bar. The flying time would be between five and eight minutes, depending on the spectators' choice of songs for the artists to perform 'in flight'.

Flying colours

In addition to facilitating the flying piano bar, the eZ-Trolley system was used to transport several flying objects last season. These included hot air balloons (for *The Nutcracker*), carpets (*Aladdin*), cars (for trade shows) and several LED screens (for festivals and television shows). The objects were moved by the system either in a straight line or on a curved track.

Because all automation equipment is controlled by the same system, it is simple to combine any number of trolleys, winches, track flying systems, hoists and/or turntables and lifts together, and operate them from one desk with a single operator. This means that creative directors can realise their elaborate visions without incurring huge labour costs. ■

www.zfxflying.com

Pride of place

Customised seating makes a creative and cultural statement at Malaysia's Istana Budaya and the Ciudad de Oviedo in Spain

(Above) **The City of Oviedo auditorium is 2,500m²** (Below) **The architecture of the Istana Budaya is inspired by Asian culture** (Opposite) **Lotus flower symbolism on the seats**

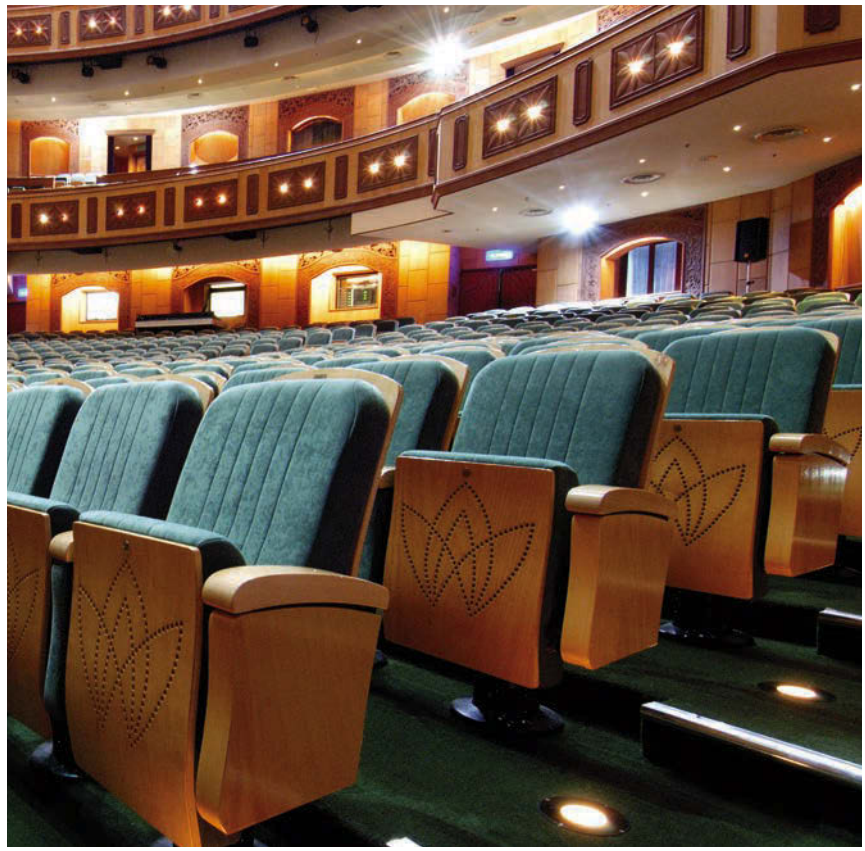
In terms of sophistication, the Istana Budaya (Palace of Culture) in Kuala Lumpur, Malaysia, is on a par with London's Royal Albert Hall. Established in 1999, it was the first theatre in Asia to be equipped with state-of-the-art stage equipment. The iconic theatre and music venue was designed by local architect Muhammad Kamar Ya'akub who wanted to share the magnificence of traditional Malay symbols and architecture with the rest of the world. As such, marble from Malaysia's Langkawi islands can be seen, along with local tropical wood, underneath the turquoise folds of the roof. There are also flower and leaf motifs on carpets and doors, as well as on the 1,412 seats of the auditorium.

The theatre's armchairs were provided by Ezcaray Internacional and were designed to integrate with the spirit of Istana Budaya. For example, the wooden seat panels feature a lotus motif, formed of 165 perforations. A symbol of purity in Asian culture, many deities in Asian religions are depicted as sitting on this flower.

This was the first Asian project for the modest Spanish seating manufacturer, which was founded as a cooperative in 1955. "We never imagined that one day we would install our chairs so far away from the mountains of Ezcaray," says Pablo Arnaiz, an 85-year-old former associate of the company. When Arnaiz worked at the factory in the village of Ezcaray between 1960 and 1980, the expansion of the small business was unexpected, with the 16 founder members focused on local opportunities. Apart from being businessmen, they were also designers, carpenters, upholsterers and woodcutters (the mountains surrounding the village are covered with beech forest).

Close to home

Ezcaray Internacional has previously collaborated with Spanish architect Santiago Calatrava to provide seating for the Auditorio de Tenerife in the Canary Islands, Spain, as well as the Milwaukee Art Museum in Wisconsin, USA. In 2011, a third collaboration saw the company involved in an €80m (US$109m) project in Oviedo, a city in northern Spain. Santiago Calatrava envisioned a very specific type of chair for the new venue, with a design that needed to incorporate marble and glass. Several prototypes were designed and created in order to fulfil the architect's special requirements.



As it happened, the City of Oviedo had a more conservative idea and decided on a wooden finish. "We started to develop a glass and marble chair called 'Kunst', but we had to stop due to pressure from the decision-makers," remembers Alfredo Llado, prototype manager for Ezcaray Internacional. The City of Oviedo Conference and Exhibition Centre seats 2,144 spectators and is one of the largest venues of its kind in Spain. Sadly, the economic crisis means this is probably one of the last projects of its size in the country.

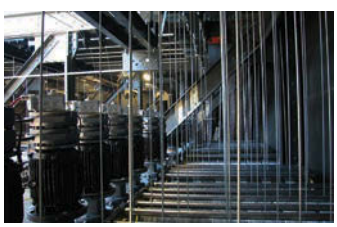
Ezcaray Internactional prides itself in providing arts venues with seating that is tailored to the specific needs and characteristics of a city or country. Yet there is also a need to make quality seating more affordable for countries suffering in the recession, hence the company has also developed a new budget range of seats. ■

www.ezcarayinternacional.es

Safety in numbers

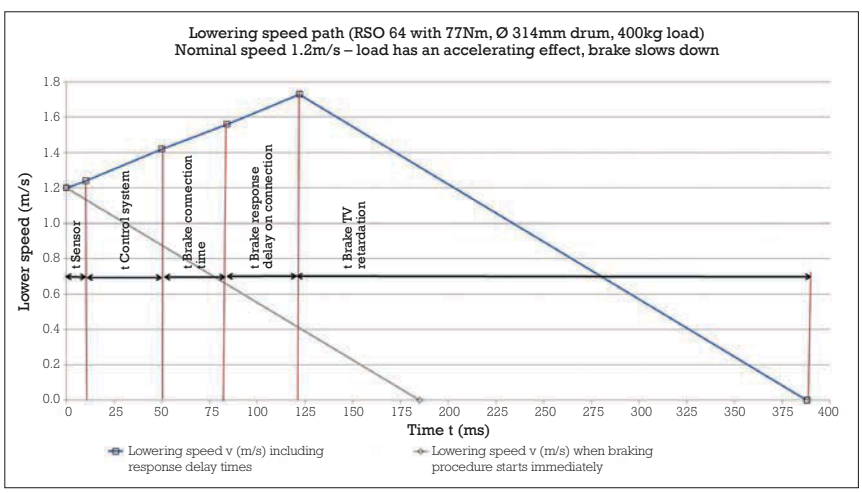
To ensure safe and reliable operation, the design and dimensioning of safety brakes in stage technology systems must be carefully calculated

(Below) **Proper safety brakes can prevent system crashes** (Bottom) **The idealised and actual breaking path of a stage winch** (Right) **Load testing**



In stage technology systems it is essential that the safety brakes are able to hold the attached loads and stop the drives safely in the event of an emergency or power failure. Drives must also be stopped as quickly as possible to prevent damage and, more importantly, injury. Safety brakes are the stage system's only mechanical protection, so if they are designed or dimensioned incorrectly, serious problems can occur.

Safety brakes for stage systems are often engineered as hoist brakes, with their design influenced by a number of factors including acceleration, mass moment of inertia, safety and stopping distance, as well as forces resulting from nominal and load torques. This dimensioning is sufficient for the standard operation of modern controlled drives. The control unit specifies the position of the load and the drive moves it – according to the control parameters – to the stopping position. At this point, the safety brake system takes over the load.



Design considerations

Safety brakes are generally only subjected to static loads – that is, the load is taken while it is not moving. In this situation the brakes perform as expected. However, it must be remembered that the static load is not the maximum possible load; the dynamic load, which results from braking during movement, is greater.

The two brake circuits must be able to slow down and stop the maximum load safely, which has to be achieved quickly and without exceeding the mandatory stopping distance. During design, the mass ratios, maximum rotational speed values, speeds, transmission ratios and torques resulting from nominal torques and load torques must therefore be taken into consideration.

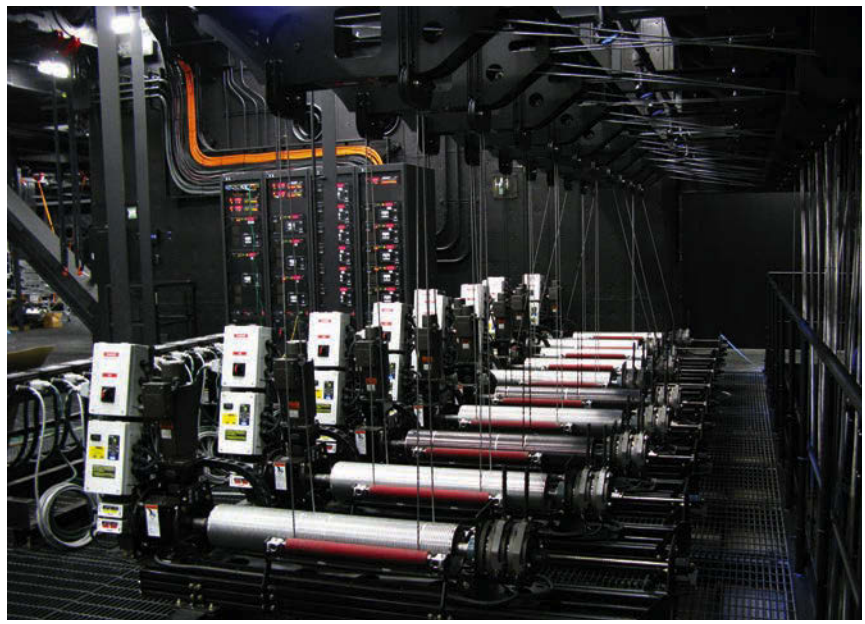
Incidents involving the overloading of safety brakes in the driveline most often occur when there is an emergency stop and either the load crashes or exceeds the maximum stopping distance before finally coming to a halt. The malfunction is often blamed on the brake itself or the safety brake supplier, but in most cases this blame is unfounded and incorrect. Most often the incident is the result of the incorrect assessment of the speed of descent of the load, whereby the value taken into account has been the speed at the point of power failure, and the response times, connection times and switching times of the electrical components and the safety brake have been disregarded. Until the control unit responds by engaging the brakes, the load will accelerate the de-energised drive to speeds substantially higher than those anticipated. The speed of the brake shaft increases and the maximum permitted sliding speed on the friction lining is exceeded.

Research carried out by Mayr power transmission has shown that safety brakes quickly become overloaded under these

circumstances. As a result, the stopping distance may be much longer and if the brake is not able to slow the load before it reaches the stopping point, crashes can occur as a consequence.

To prevent such incidents occurring, it is vital to consider the connection and switching times during the dimensioning process. These include sensor acquisition times, control system processing times, brake application times and response delay after applying the brake. It is also important to consider the actual speed of descent of the load and the sliding speed on the friction lining. A brake system that has been designed with these factors in mind will be able to stop the maximum load quickly and safely. Electromagnetic safety brakes are not obsolete. On the contrary, when dimensioned correctly they are lifesavers in stage applications. ■

www.mayr.com



Photograph courtesy of Jeff Goldberg/Esto/Carnegie Hall

Instant connection

By embracing and exploiting mobile technology, arts venues can interact with patrons like never before

(Main) **Carnegie Hall uses an iPad app to manage operations**
(Opposite) **Mobile ticket purchasing via iPhone app**
(Below) **Sydney Symphony Orchestra's app provides live broadcast streaming**

According to Morgan Stanley Research, internet-connected mobile devices such as smartphones and tablet computers will exceed the usage of personal computers by 2014. Although this may just sound like another statistic about rapid technology changes over time, the implications of this shift are profoundly affecting how patrons participate in arts, cultural and entertainment events. A vital question facing all arts venues is how to better communicate with their customers by taking advantage of the unique 'always-on-always-with-you' aspects of mobile.

Mobiles enable venues to have a more continual dialogue and they are changing the face of venue operations. "We are in a pivotal moment for technology and the arts," suggests Kristin Tigart, vice president of the Tessitura Network. "Mobile adoption has overtaken previous communication channels more rapidly than even the internet did in the 2000s. Mobile is the web these days."

Mobile for venue management

As a result of this technological shift, many venues are using mobile tools to operate more efficiently and provide better service to customers, regardless of their location. Birmingham Hippodrome and Carnegie Hall have Tessitura-integrated iPad applications for digital house management, which enable them to provide effective on-the-spot customer service all over the venue. The Wales Millennium Centre uses a Tessitura-integrated mobile app for redeeming restaurant gift vouchers, which enables staff to quickly and easily process transactions at any sales point.

For staff on the move, Tessitura has developed Tessitura Mobile, CRM on the go – a mobile tool that enables patron information look-up/capture whenever and wherever it is needed.

Customer connection

On the customer-facing side of mobile, the Brooklyn Academy of Music recently conducted a cost-effective digital campaign for its three-day music festival and discovered that the mobile conversion rate outpaced the venue's website.

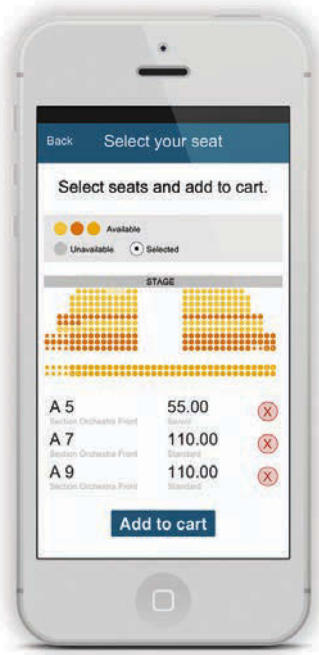
The Sydney Symphony Orchestra, meanwhile, is taking advantage of TN Mobile Plus – the Tessitura Network's pre-built, hosted mobile solution – to communicate effectively with customers and offer enhanced engagement via stimulating content. Patrons can buy tickets, search event calendars, view mobile-ready media and access live broadcast performances from their mobile phones.

Thoughtful design

Internationally recognised author and digital product leader Luke Wroblewski recently spoke at the Global Tessitura Learning and Community Conference and commented that mobile devices – unlike traditional personal computers – are always on and always accessible. Patrons can make purchases or promote events at the exact moment of inspiration. Wroblewski advised that venues need to be aware of the potential limitations of their mobile apps if they want to avoid customer frustration. For example, how difficult is it for a patron to recover a forgotten password on the mobile site? Up to 90% of customer service enquiries are due to a forgotten password, noted Wroblewski, and many customers abandoned their virtual shopping carts as a result. When designing for mobile, he advised that venues do not just shrink web content for a smaller screen, and to take advantage of the unique benefits that mobile devices provide, including location detection, multi-touch and cameras.

Where might venues head next with mobile customer experiences? Certainly, customer engagement – which drives interest, and interest drives revenue – will occur on all sized screens. The desire for personalised consumer interaction, content viewing and purchases on-the-go will continue, so the need for flexible systems such as Tessitura will increase. The future for business-facing mobile applications is vast; with the widespread usage of mobile devices in daily interaction, the proliferation of sophisticated mobile business applications is certain to grow. Venues with the technology, tools and talent to participate will be the venues that continue to thrive. ■

www.tessituranetwork.com



BACKSTAGE
EMMA POMFRET

Q&A

Projection designer Jon Driscoll explains how a once-niche visual technique is rapidly gaining ground

How did you get into projection design? I have always loved theatre lighting and cinematography. I studied theatre lighting design at Croydon College of Art and slipped into theatre design; I looked after scenic projections at the National Theatre. Then I did an MA in Cinematography at the National Film and Television School, and when I graduated in 2002, the whole niche market [projection design] was just developing. I dragged my heels a bit – I wanted to make short films. But it grew and grew, and then I thought, I should stop fighting this. You don't find your niche very often.

What are your highlights so far? *Brief Encounter* [for Kneehigh, 2008; now touring Australia] had some lovely effects – sleight-of-hand things where characters walk into the screen and they're in the film itself. And the illusions in *Ghost* (pictured right) were good; we did quite a bit of projecting onto vapours – I can't tell you how… it's a trade secret – but we were good at making apparitions.

How has the technology come on? The LED screens in *Ghost* wouldn't have been possible years ago. Those are stealth LED screens; semi-transparent so you can have people in between. Most of the time we put analogue content through modern technology. The craft of theatre design hasn't really changed. You still have scenic artists rendering beautiful backcloths and we need to complement that.

Has projection found its place in the industry? We've had to fight for recognition. Projection is thought of as a service industry, but that's changing. One of the first awards for Outstanding Projection Design is from New York's Drama Desk. Often projection is tagged along with scenic design but that really upsets the scenic designers! [Jon and Rob Howell won the 2012 Drama Desk Award for Outstanding Set Design for *Ghost*.]

How do you put new technology into old theatres? You have to tiptoe around to make it possible. It's an old-fashioned business, and there's no infrastructure in old theatres. The balconies vibrate because of the weight of people, so if people in the circle start tapping their feet, it vibrates the imagery. Then there's no provision for running cables, and normally nowhere clean to put the computers. We set up a mini TV studio… often we end up under the stage.

So, do you have any favourite venues? I like the Royal Albert Hall [where he designed *Phantom of the Opera*'s 25th anniversary show]. It's epic and beautiful. And the Theatre Royal, Drury Lane has space. When putting on a West End show, you need to be creative but you can be prohibited by schedules and backstage space. For *Charlie and the Chocolate Factory* (pictured top), we had a green screen set up during production.

What's next? *Stephen Ward* [an Andrew Lloyd Webber musical]; I'm going to enjoy that. We're experimenting with projecting onto fluid fabrics. And *Ghost* is opening in Korea. Amazing! It's the perfect place for it; the technological hub of the world. We're impressed by how serious they are. ■

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