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auditoria

10th Anniversary Edition

Annual 2013

Festival of light

How Busan Cinema Center has brought glitz and glamour to a culture-loving South Korean city

Inside:

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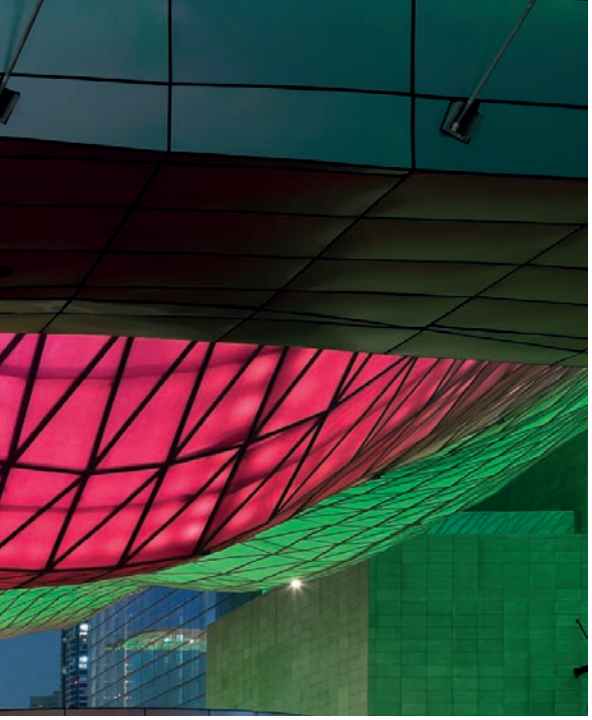


foreword

Seven words in particular stood out for me among the 65,000 or so within this 2013 edition of *Auditoria*: "If the arts don't change, they'll die." And contained within that stark warning from Theatre Projects' David Staples (p6) is, I believe, our *raison d'être*. Maybe that's why this latest annual is the most successful we've ever published: the arts appear to be taking heed and this 10th anniversary issue reflects that, packed as it is with ways to ensure entertainment venues stay ahead of the curve.

Performers will of course always top the bill when it comes to conveying the vision of any playwright, director or composer, but the importance of the technical aspects of auditoria is something that shouldn't be overlooked. The stage has battled long and hard against the technical wizardry and verisimilitude of film and TV – and arguably even radio at one time, too. In recent years, though, the performing arts realm has even had to battle for hearts and minds with the pervasiveness and 'cool' of new media encroaching via smartphones and tablets into its once secure territory. As you will read, facilities around the world are not giving up the ghost. Far from it, in fact…

Over the following 205 pages you will discover how performance spaces, old and new, are not only embracing the latest that technology has to offer but are integrating it for the benefit of the live experience. Klaus Obermaier's *Rites* – a modern digital take on Stravinsky's *The Rite of Spring* – is one of the 'coolest' examples I've seen of this in recent years, despite the 3D specs making me look anything but cool. One can only assume that immersive productions such as these will proliferate in the future as well as advance in wonderment and innovation.

You will also read about successful operations. Whether it's the Star Performing Arts Centre in Singapore (p32) or the Royal Opera House Muscat Oman (p60), the ingredients to achieve success are not dissimilar. We know that diverse repertoires will attract the widest potential demographic. We appreciate now more than ever how embracing social media and new technologies intelligently can increase the awareness of the arts among new (and younger) audiences. Venues such as the still-under-construction Everyman Theatre in Liverpool (p54) that are given new leases of life with greater levels of comfort, more refined culinary offerings and enhanced interactivity can add to our enjoyment of a cultural night out – and a venue's bottom line. Inventive pricing and marketing strategies, meanwhile, have the potential to ensure we return time and time again. And where multi-use is viable, we've learned to maximise the commercial potential of our assets. The really ambitious projects, such as Herzog & de Meuron's Elbphilharmonie (p24), can even be the hub of much wider-scale regeneration efforts (Hamburg's soon-to-be-completed multi-use concert hall will be home to the NDR Symphony but is also the fulcrum of the enormous HafenCity construction plans).

However large or small your next project, I am certain you'll find plenty of inspiration within these pages. But perhaps also bear in mind the advice of Nicholas Hytner, director of the National Theatre in England: "Make sure that the work appeals to a wide variety of people; make sure that the ticket prices appeal to a wide variety of people; and try to make sure that as much as possible of it is good." Enjoy the read!

Nick Bradley
Editor

Photograph courtesy of Anthony Devlin/PA Images

Photograph courtesy of Anthony Devlin/PA Images

Photograph courtesy of Tony Marshall/PA Images

Photograph courtesy of Morry Gash/PA Images

Auditoria loved...

... the London 2012 Olympic Games Opening Ceremony

Entertaining, patriotic, quirky, or perhaps even confusing, the London 2012 Olympics Opening Ceremony, 'Isles of Wonder', nevertheless got the world talking. Featuring Rowan Atkinson's *Mr Bean*, David Beckham, Sir Kenneth Brannagh as Isambard Kingdom Brunel, Daniel Craig in his James Bond role and even Her Majesty The Queen, Oscar-winning film director Danny Boyle transported audiences through a series of historic, symbolic and modern settings that represented the cultural changes and revolutions of British society – the theme being 'this is for everyone'. "We wanted the show to reflect the intimacy that is built into the architecture of the Olympic Stadium," Boyle said of the £27 million spectacular. "We wanted the audience to really feel involved and ultimately we wanted to give everyone a good laugh."

One of the most stunning scenes of the production was when Britain's traditional green and pleasant land peeled away to the powerful beat of clamorous drums to reveal seven 100ft smoking chimneys emerging from the earth below. Having been concealed in 3.5m pits beneath the stage, the fabric chimneys were inflated by high-powered fans and lifted by winches to emerge through trap doors in the stage floor.

An aerial cable-net system consisted of 14 radial cables attached to the stadium roof, which met at a central hub. Each carried two trolleys that could run independently to move scenery and performers around and lower them onto the stage. In addition to the chimneys, the rigging system later supported an 18m-tall 'Voldemort' [Harry Potter's nemesis] puppet, which was animated by puppeteers under the stage using rods, as well as 32 Mary Poppins characters who 'flew' into the stadium.

To create the illusion of the 100ft molten steel river, amber LED lights were lit in sequence, with pyrotechnic smoke and dry ice used to create the industrial effect. The steel 'flowed' into a 39ft diameter trough to form an aluminium ring, which was then hoisted by the aerial cable-net system to join four other rings – also flown in on cables – to form the Olympic emblem 328ft above the stadium.

A particularly impressive element of the ceremony was the digital illusion that made the 70,800-strong stadium audience appear as 'pixels', an effect achieved using advanced digital 'paddles' that each contained nine full-colour LED squares. The waterproof tablet paddles were attached to a recyclable plastic holder on the back of each seat, while cables connected the tablets to a central computer system. Remotely controlled, the 10in electronic paddles transmitted choreographed LED light effects, which combined to form a sea of colour that flowed seamlessly around the stadium.

More than 27 million UK viewers tuned into Boyle's performance, with more than a billion people estimated to have watched worldwide. Fortunately for everyone involved, everything turned out more than all right on the night. ■

EMMA POMFRET

10 Perfect

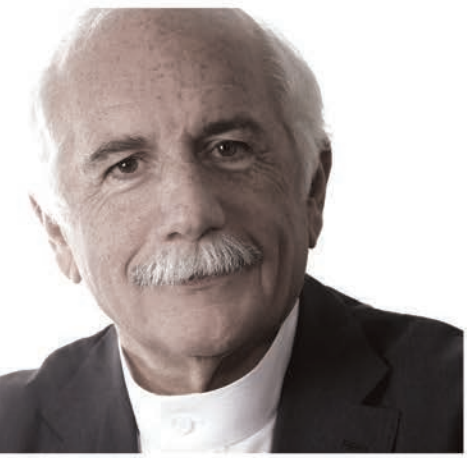
As we celebrate our 10th anniversary, *Auditoria* takes a cultural journey back and forth with the people who have shaped the performing arts venues, technologies and the patron experience over the course of the past decade











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Artistic director
Jude Kelly

In 2011, on the 60th anniversary of the Festival of Britain and London's Festival Hall, Jude Kelly felt a moment of deep satisfaction. "People were able to express how much they loved and understood the site. They acknowledged that what we'd been trying to do for the past five years made sense." What she'd been attempting since her arrival six years earlier as artistic director of the Southbank Centre was to reconnect with the location's history.

"It's a festival site – there to explore and showcase the imagination of the many in a sort of curated eclecticism," she reflects. Last year's Festival of the World boasted international art, music, sculpture and food all around the site – a neat fit with London's Olympic summer. It personified Kelly's artistic outlook: universal, transformative and global.

"Arts events are becoming genuinely global," she adds. "There's an acceleration and a confidence happening. World culture doesn't fall under the category of 'exotic' any more."

Box-office heavyweights

Another of her coups is partnering with the Simón Bolívar Youth Orchestra, conducted by Gustavo Dudamel. Around 60,000 people caught the Venezuelans' increasingly ambitious Southbank residencies in 2009. In 2012, Sounds Venezuela featured five sold-out concerts across four days, transforming the Royal Festival Hall into a nucleo – the music community centre at the heart of El Sistema, the Venezuelan education project that produced the youth orchestra.

Role: Artistic director of London's Southbank Centre

Claim to fame: She's shaped some of the UK's cutting-edge artistic spaces, including Battersea Arts Centre and the West Yorkshire Playhouse, where she was founding director

Right here, right now: Kelly currently hosts four orchestras and 14 artists in residence at the Royal Festival Hall, Queen Elizabeth Hall and Hayward Gallery

"When I first came here, I strongly believed you have to get to the root of the passion of the artforms we care about, so I was looking for examples of where the energy of classical music was going to re-emerge. In doing that, I met with El Sistema."

Kelly says securing box office heavyweights such as Dudamel or Daniel Barenboim is less about competition with other venues than about creative programming. "Between us all we're capable of thinking, 'How do we work with artists on risk-taking and devising special projects?' Today it's about the big experience."

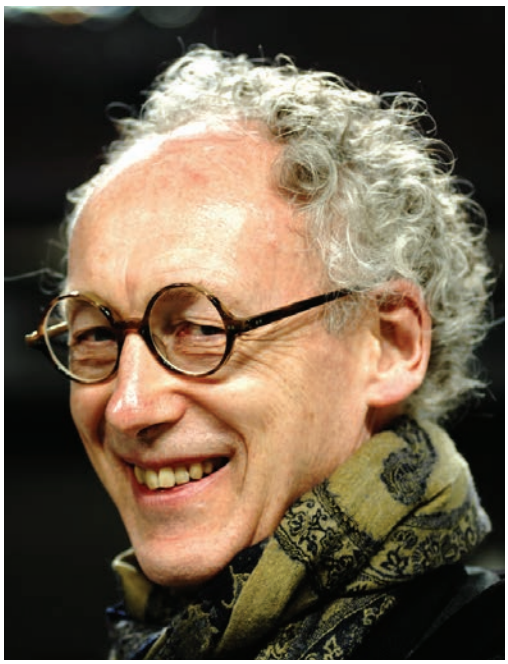
Nurturing the larger artistic landscape remains a huge personal motivation for Kelly. After putting the West Yorkshire Playhouse on the map, she founded Metal – artistic lab spaces in Liverpool and Southend that allow artists to experiment. "As an artistic thinker you have to feel you can apply your ideas-making outside an institutional framework. You're trying to create the future, not just sit in the present."

Kelly presides over 21 acres of artistic and revenue potential at the Southbank Centre. "We put on 1,000 ticketed events and another 1,000 that are free – 50% of our work being free is a lot," she notes. "The more we do, the more we can demonstrate this also brings us revenue. People stay and eat, drink and shop; it's good for us financially as well as for artistic reasons."

In the past decade, sponsorship has become embedded in the arts. "There's a more relaxed approach to corporate patronage," Kelly agrees, though she'd like to see it go further. "Art transforms people's lives and I would look to sponsorship to help in the distribution of the arts to more people, not in just holding up the jewels in the crown for the few." ■

Southbank Centre is the largest single-run arts centre in the world

Entertainment architect
Mark Fisher



"You're not designing for the roadies; you're designing so people walk into the stadium and go, 'F***ing hell! What's that?'"

Mark Fisher is in the business of creating extraordinary memories. "Big rock shows will never stop," he says. "It's a tribal thing but most of all it's a memory."

Audiences have amazing memories of countless Fisher shows from The Rolling Stones' *A Bigger Bang* tour to Roger Waters' touring arena version of *The Wall* (featuring a 73m HD wall). Among the tools of his trade, video has changed the most over the past decade. "We did the first really big, 50m-wide LED video screen with U2 in 1997 [the Irish band's *PopMart* tour]. I doubt anyone then knew that LED was coming. The paradigm shifts happen quickly."

Right now LED video is being miniaturised to maximise audience participation, whether it's the 'wands' at the London 2012 ceremonies, Coldplay's flashing wristbands or LED 'medallions' – like wearing an iPad around your neck, which Fisher tested for the Beijing Olympics opening ceremony four years ago.

The hitch before this kind of freestanding LED tech rolls out is money. "It's reliant on the price coming down, similar to the problem with 3D glasses. How do you get them all back off the audience at the end of the night? Or are they cheap enough that you don't bother?"

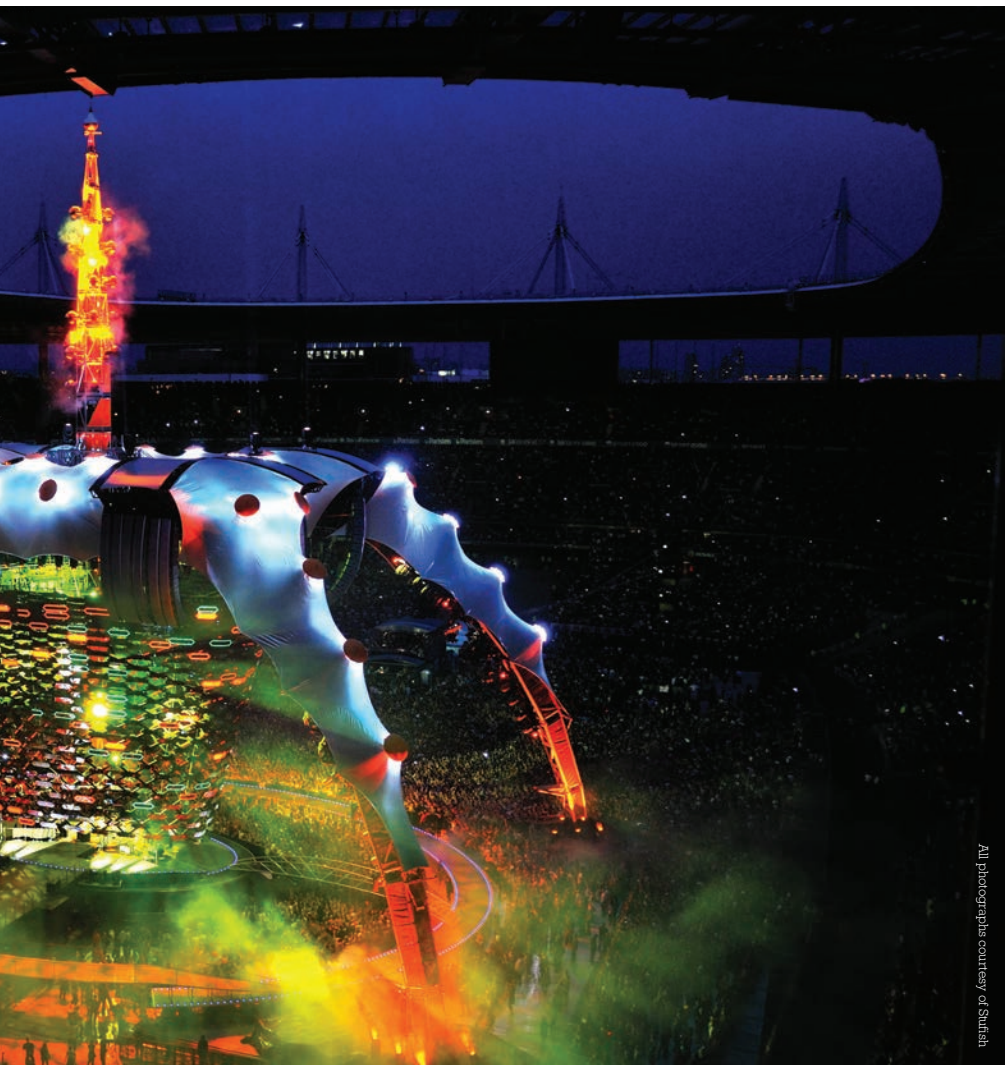
Role: Architect Mark Fisher is the founder of Stufish, which specialises in shows and installations for the biggest names in entertainment and sport

Claim to fame: Has worked with Pink Floyd, U2, The Rolling Stones and Cirque du Soleil

Did you know?: Fisher was chief designer for the Beijing Olympics ceremonies and created the Golden Atrium at Wynn Macau

Visioneer

As an entertainment architect, Fisher solves artistic problems and realises artists' visions. One staggering example of his craft is the Claw structure he created for U2's latest *360°* tour, with 112 shows in three years grossing US$700 million. "The U2 folk wanted to find a way of making a more intimate outdoor show. Willie Williams [tour director] and I came up with the notion of a small stage at one end but in the



All photographs courtesy of Stufish

round. The question was, how do you construct a roof that people can see through, that produces enough structure to hold everything up?"

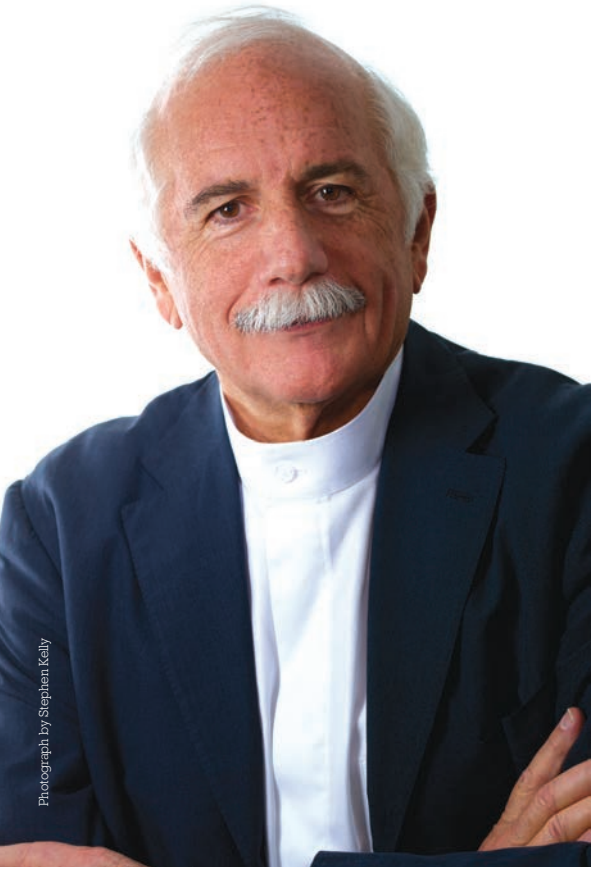
Fisher designed the 29,000ft^2 Claw – the largest ever stage rig constructed for a concert tour. Hovering above the stage, the steel structure packed a sound system in each of its 'legs' and supported a 54-ton, 500,000-pixel, cylindrical video screen. "The big gesture is the import thing," he says. "You're not designing for the roadies; you're designing so people walk into the stadium and go, 'F***ing hell! What's that?'"

Reflecting on the Noughties, Fisher derived his greatest professional satisfaction designing *KÀ* for Cirque du Soleil. The epic Las Vegas show, running since 2004, is a rites of passage story, seen through man's evolution from water to land. To achieve the phenomenally complex sets – including sand, rolling seas, cliff faces, forests, a city – Fisher removed the single stage and flew multiple stages into a large hole. *The Los Angeles Times* called it "the most technologically advanced production in the history of western theatre". So what was the biggest challenge? "Getting it to work!" Fisher laughs. "No one had ever built anything like that. We had the best people in North America working on it but the thing still opened three months late and cost many millions of dollars more."

KÀ, the Beijing Olympics ceremonies and U2 360° are Fisher's top three projects. "They express very different parts of the world I'm interested in. The main thing for me is that the audience sees them and immediately gets what they are and why it's interesting."

As a veteran of 30 years bringing rock and roll mega-tours to fans, one imagines Fisher has had a *Spinal Tap* moment or two. "No, it's all been sweetness and light from the beginning of my career to the end," he smiles. "My lips are sealed." ■

(Main image) **U2's the 'Claw'. A 360° production helped increase the capacity of concerts by up to 25%, leading to attendance records at more than 60 venues**
(Above right) **Fisher was behind the design, engineering and construction of Roger Waters' *The Wall***
(Top right) ***KÀ*, the gravity-defying production by Cirque du Soleil in Las Vegas**



Photograph by Stephen Kelly

Architect *Moshe Safdie*

Background: Israel-born, Canada-raised Moshe Safdie made his name with Habitat 67 – a prefab concrete housing complex in Montreal integrating gardens and open space

Did you know?: Safdie has also contributed to the restoration of Jerusalem's Old City and its New City

Highlights: Now based in Boston, his projects include Marina Bay Sands in Singapore and the Crystal Bridges Museum of American Art in Arkansas

The Kauffman Center for the Performing Arts has changed Kansas City's skyline

Surveying Moshe Safdie's cultural projects leaves you in no doubt that he likes to take on responsibility. "Yes," Safdie, 73, agrees, "I am attracted to projects that have a higher symbolic objective besides the more familiar challenge of making the building work."

His Yad Vashem Holocaust History Museum in Jerusalem and his recent US Institute of Peace Headquarters on the National Mall in Washington DC obviously tick the responsibility box. But Singapore's Marina Bay Sands resort also fulfilled a more ephemeral purpose when it opened in 2011. "The Singapore government hoped the Museum of ArtScience would become the symbol of Singapore because it's the gateway to the city. Actually the entire Marina Bay complex became that symbolic statement." It includes a hotel, casino, theatres, convention/exhibition space, retail, museum and a SkyPark capping the 200m-tall towers. "These projects fascinate me," Safdie continues. "When I hear a wonderful piece of music I wonder, could architecture ever touch us emotionally like music does? If so, it does it in projects of this nature."

Safdie has been criticised for his love of symbolic architecture; the lotus flower roof of the Sikh Khalsa Heritage Centre in India or the doves' wing roof of Tel Aviv's Yitzhak Rabin Center are among his calling cards. But he is definitely not a statement architect. "I feel uncomfortable with the idea that when there's an 'iconic objective' you don't need to fulfil the functional," he says.

Reflecting on the past decade, he chooses Yad Vashem as his most significant achievement. "It led to two very different projects: the Sikh museum and Marina Bay Sands. Sheldon Adelson [chairman and CEO of the Las Vegas Sands Corporation] was one of the Yad Vashem donors and was deeply moved at the opening."

Another level

"On an emotional level, Yad Vashem is perhaps my most powerful work," Safdie adds. It was also one of the most controversial. "I used to say Yad Vashem was the project that had the most meetings per square foot."

In 2011, Safdie's Kauffman Center for the Performing Arts opened in Kansas City; two vast arcs contain a proscenium theatre, concert hall and banquet space intended, says the architect, "as a celebration of public cultural life". That, he thinks, is part of an expanded agenda behind many new cultural buildings.

"On the one hand, the thing that matters most is that these performing arts buildings are perfect instruments. Their capacity to do the job is what really matters. But if the architecture doesn't celebrate the collective experience, it shortchanges the whole thing and people are less likely to go." According to Safdie, Kauffman's glazed lobbies and its position, facing the city, were all elements to say, "This is going to be one great party. It is a joyous building."

Working increasingly in China, South East Asia, South America and India, Safdie is returning to residential design on a megascale – the very subject of Habitat nearly 50 years ago. In the next decade, he believes density and resources will be the two preoccupations of architectural urban planning. "The 1980s and 1990s weren't about constraints – they were about exploding the imagination. But now the environmental agenda has become a common sense issue. Clients are insisting on that so it's hard to design without acting responsibly." And with mixed-use projects, this is as relevant to residential design as it is to cultural venues. ■

Theatre consultant
Joshua Dachs

Role: Principal of New York-based Fisher Dachs Associates

Did you know?: Dachs is a graduate of the High School of Music and Art in New York where he originally studied the violin

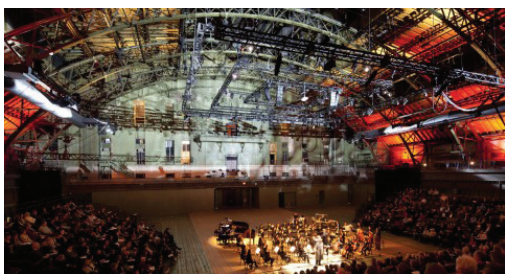
Other projects include: The new Guthrie Theatre; the remaking of Arena Stage; the Experimental Media and Performing Arts Center in Troy, New York; and the Schermerhorn Symphony Center concert hall in Nashville

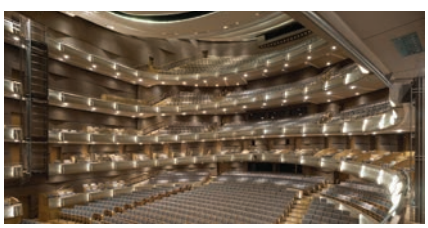
With an impressive portfolio of built projects all over the world, Joshua Dachs is a familiar name in theatre planning and design. He cites Toronto's Four Seasons Centre for the Performing Arts, the Smith Center in Las Vegas, and the renovation of Alice Tully Hall at Lincoln Center for the Performing Arts in New York as some of his firm's most important projects over the past decade. An ongoing project at New York's Park Avenue Armory is one he picks out as particularly exciting. "We've spent the past few years upgrading the building to accommodate unique and ambitious large-scale performances," he says. "Recently we designed an extraordinary performance there called Philharmonic 360, involving three orchestras arranged in a triangular shape, with 1,500 people interspersed among them. The show comprised what Alan Gilbert, the New York Philharmonic's conductor, described as "spatial music" – essentially live orchestral surround sound. It was a unique idea that only the Armory could support."

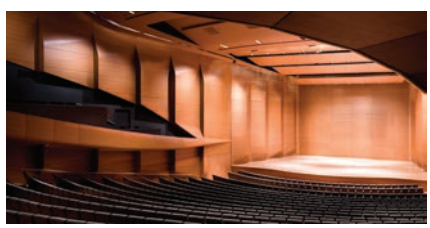
Trained as an architect and with a varied background including musical performance, theatre production, and theatrical lighting design, Dachs has been a pioneer in his field for more than 30 years. Having witnessed many of the industry's transformations over that time, he describes that current challenges are related, in part, to the collapse of traditional business models. "The subscriber-based regional theatre model developed in the 1960s doesn't work very well in the USA nowadays," he says. "Audiences seem less interested in traditional formal experiences and are more excited by things that are new and different, and that come with beer in an informal setting. Perhaps this is the end of the Cultural Mesozoic period and we're going to see the kill-off of a number of Dinosaur Arts Institutions and their replacement by small and nimble Mammalian cultural players.

"The more successful and forward-thinking cultural institutions are going to be reinventing themselves in the next 10 years. How they evolve will be interesting to watch. I imagine we'll be seeing fewer large new projects in the USA and Europe, and more rehabs and found-space adaptations. And I think those few large new projects will be trying new approaches.

The Tune-In Music Festival at Park Avenue Armory, New York (below left and right)**; the Four Seasons Centre for the Performing Arts** (bottom left)**; the Alice Tully Hall at the Lincoln Center for the Performing Arts** (bottom right)







Technological impact

"Inventive directors and designers will always push the envelope and use whatever is at hand to do remarkable things," says Dachs. "I'm not sure technology makes people more creative; it just gives them new toys to play with. And there's nothing wrong with that." Although Dachs isn't convinced new theatre technologies will greatly impact the quality of art, he appreciates technology enables organisations to earn additional revenue from live performances. "Live theatre has always been an ephemeral art form, but the success of Met Live, National Theatre Live and all the other webcasting and simulcasting efforts means that those ephemeral productions can be experienced – albeit at a distance – by a much larger paying audience, and that's a good thing for arts organisations in very many ways." ■

Theatre consultant
David Staples

After 38 years with Theatre Projects, David Staples is clear about where he finds his continuing motivation. "It's because of the diversity of the work," he says. "I love culture shock… that's why I do it." Recently returned from Korea – "the 59th country I've worked in" – Staples selects two projects 6,000 miles apart as highlights from the past decade.

Singapore's Esplanade – Theatres on the Bay was completed in 2002, a desperately needed splurge on culture by the government after 25 years of focused economic development. "It was our biggest project in Asia and it incorporated programming for Asian and western cultures."

The second highlight is Oslo's Opera House, designed by Snøhetta architects and opened in 2008. The new home to Den Norske Opera & Ballett swoops down to the city's fjord. "I worked on that over a 10-year period, and it's really rather special," Staples feels. "People overuse the word 'iconic' these days but it's up there with the Sydney Opera House. And unlike Sydney, it functions really well!"

Oslo's Opera House delivers beyond pure aesthetics, showing the transformative power of good design. It has elevated Den Norske's artistic development from a provincial company to one that regularly partners with the Metropolitan Opera in New York and English National Opera in London. "They have moved up and that's one of the most rewarding things for me."

After so long in the business, Staples dislikes being caught up in trends. "The challenge is to produce a building that's appropriate to its community and its circumstances. That counts, not trends," he insists.

Role: Having joined Theatre Projects Consultants in 1974, Staples is now managing director of the London office

Esteemed company: TPC has won AIA, RIBA and USITT awards. Staples is also a board member of the International Society of Performing Arts

Did you know?: He has lectured on every continent except Africa – and therefore regards Africans as being particularly discerning!

(Main image) **The foyer in the Opera House in Oslo** (Top right) **In October 2008, the Opera House won the Culture category of the inaugural World Architecture Festival**

"People overuse the word 'iconic' these days but it's up there with the Sydney Opera House. And unlike Sydney, it functions really well!"

Photograph courtesy of Jaro Holan, Statsbygg

Photograph courtesy of Trond Isaksen, Statsbygg

Small but perfectly formed

Nevertheless, Staples detects recent interest in "smaller, quality venues" (Oman's 1,100-seat Royal Opera House in Muscat, for instance), and digital demands placed on new venues. Miami's New World Center by Frank Gehry is another petite example with 756 seats. "It's also one of the most wired buildings we've done," adds Staples, explaining the Internet2 connections.

"You have the potential for all sorts of collaborations: a bunch of students in Miami having a masterclass with a violin teacher in Vienna, for instance. Or an ensemble where the strings are in Miami, the brass in Oslo and the percussion in Sydney."

Artistic innovations including collaborations and projections will certainly play an ever-bigger role in venue design. Selecting some of his most memorable performances, Staples hits on Klaus Obermaier's *Rites*, a dance-orchestral-digital collaboration at London's Royal Festival Hall in 2011. A solo dancer on stage was motion-captured and her movements projected and transformed live on a giant 3D screen above the orchestra.

Ultimately, the Theatre Projects man says he "would die to see a live performance over a recorded performance or a video any day", although he accepts the broadcasting/streaming trend is here to stay. "But it's not a panacea," he adds, believing that changes in the arts themselves are driving a renaissance. "Everybody now accepts that opera has surtitles. Fifteen years ago it didn't and the audience for opera has grown over that time. If the arts don't change, they'll die." ■

ROYAL OPERA HOUSE MUSCAT

Striking

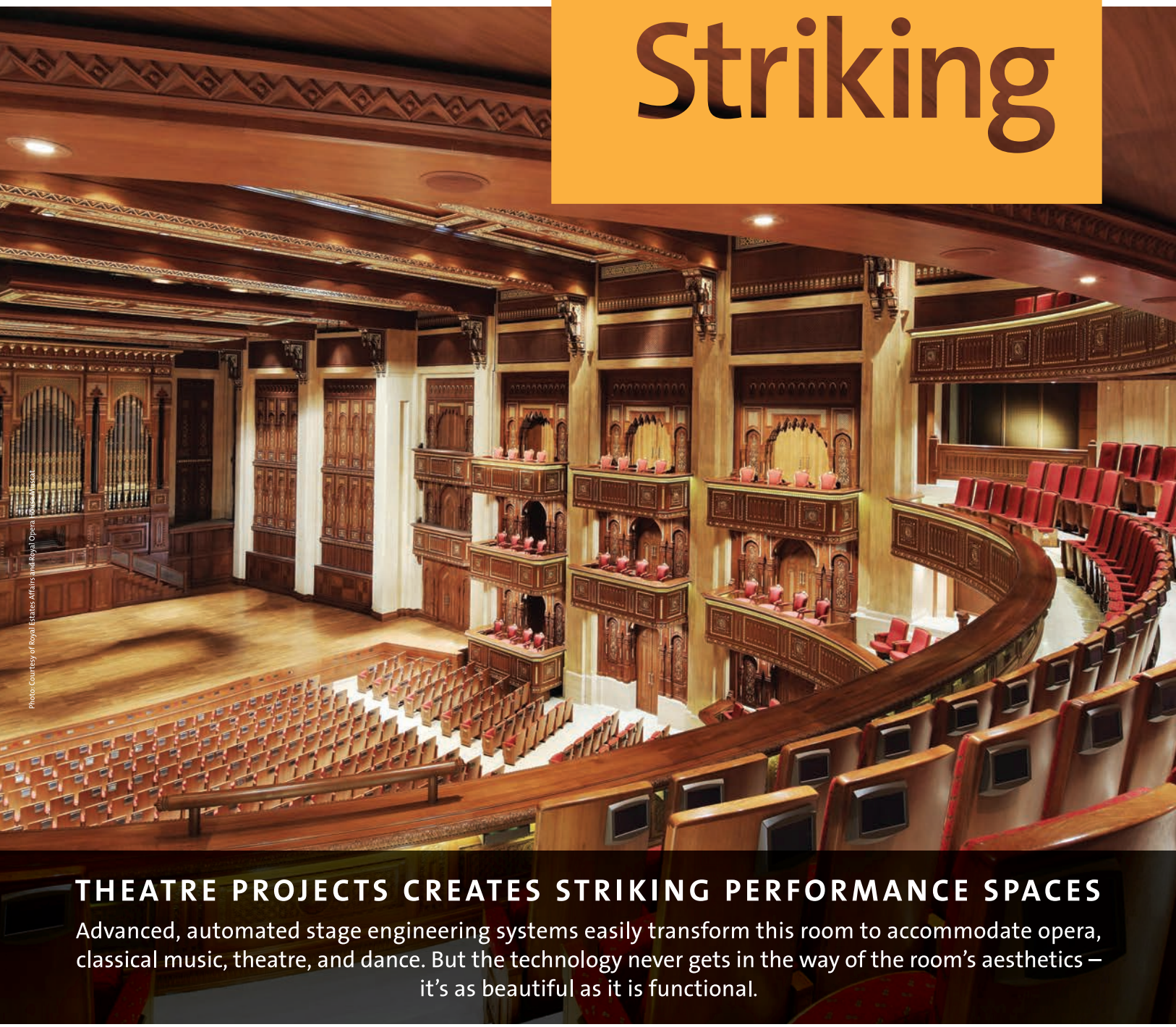


Photo: Courtesy of Royal Estates Affairs and Royal Opera House Muscat

THEATRE PROJECTS CREATES STRIKING PERFORMANCE SPACES

Advanced, automated stage engineering systems easily transform this room to accommodate opera, classical music, theatre, and dance. But the technology never gets in the way of the room's aesthetics – it's as beautiful as it is functional.

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Conductor
Kent Nagano

Photograph courtesy of Wilfried Hösel

Kent Nagano can speak first-hand about the impact of a great concert hall. In 2011, his Montreal Symphony Orchestra moved from its old multipurpose venue to a spanking new home designed by Canadian architects Diamond Schmitt.

"The new hall has gone beyond our dreams," Nagano says, raving about the 2,000-seater's acoustics. "In our old hall, there was no real sound, no real tone quality. Sometimes the air conditioning unit was louder than the orchestra!"

Occupying Montreal's first dedicated structure for symphonic concerts has put Nagano and his orchestra at the heart of the city's community. "This has been a wonder to us in Montreal; the community identifies with the hall and the orchestra," he continues, explaining the sense of civic pride felt at completing the hall during the present recession. "There is a real sense of family and attachment that goes beyond buying a ticket. That relationship is not to be taken for granted – it's earned over a long time."

Nagano studied music on the USA's west coast although he landed his first conducting posts on the Atlantic coast, at Boston's Opera Company and Symphony Orchestra. His move from the USA to Europe was the launchpad for a long and varied career. He studied with the French composer and organist Olivier Messiaen. "He introduced me to various key musical figures: the composers Pierre Boulez and Henri Dutilleux; conductor Seiji Ozawa; and also to brilliant political figures and writers. I lived with him and it was an entire cultural education, including to French cuisine. He opened a huge door that's never closed."

Nagano's European embrace has shaped the years to his current position as music director of Munich's Bayerische Staatsoper, held since 2006. And it is in Munich that he chooses his key performance from the past decade: Wagner's mammoth *Ring* cycle. "The *Ring* is always an extraordinary event for an opera house; it's a tremendous undertaking for the singers, the orchestra, the whole technical team. But to do the *Ring* in Munich, where the first two operas were given their world premiere with Wagner presiding – it's an honour to conduct."

Role: Is music director of the Orchestre symphonique de Montréal and of the Bayerische Staatsoper in Munich

Background: The Japanese-American conductor retained his roots as music director of the Berkeley Symphony Orchestra in California from 1978 to 2008

Did you know?: Has worked with the finest orchestras: Vienna, Berlin and New York Philharmonics; the Chicago Symphony; the Dresden Staatskapelle and Leipzig Gewandhaus

Photograph courtesy of Benjamin Ealovega

Digital revolution

Nagano sets great store by classical tradition and he welcomes digital streaming and relays to spread his cherished art to a broader audience. In this conductor's eyes, however, 21st century digital media is merely an extension of his own childhood discovery of classical music. "I grew up in a rural area of California and I tuned in to the radio broadcasts of the San Francisco Symphony Orchestra and to New York's Metropolitan Opera broadcasts in the late 1950s/early 1960s. They were important and inspiring.

"It was high-tech and quite a major statement when a sponsor invested huge amounts of money to share the art form with people thousands of miles away. That's what the internet is doing now. When you're able to hear something streamed or broadcast, more often than not it provokes you to want to hear a performer live."

Nagano is broadly optimistic about classical music's ability to expand its audience, but sees the next 10 years as one of change and challenge. "Clearly we're going through a transitional period, but if we didn't change we'd be in trouble.

"We need to keep our eyes focused on the quality of performances," he says thoughtfully. "We've inherited this tremendous tradition; we're provoked and inspired by it. It's our responsibility to carry it on to the next generation." ■

Acoustician
Yasuhisa Toyota

When you've designed the acoustics for more than 50 projects worldwide – including some of the most celebrated – choosing a career highlight is tough. Yet Yasuhisa Toyota has little hesitation naming Tokyo's Suntory Hall, built in 1986. "It was a challenge and a milestone," says Toyota of the venue that established Nagata Acoustics' international reputation. Visiting foreign orchestras praised the sound in the hall even if Tokyo's own orchestras took time to love it. It also made a certain Frank Gehry take notice, which resulted in Toyota's seminal experience of the past decade: working with Gehry on Walt Disney Concert Hall. The US$274 million venue opened in 2003 and was universally praised, described by conductor Sir Simon Rattle as "a wonderful gift to music".

"It was my first experience of the process of collaboration – it was very different," remembers Toyota. LA was Gehry's first commission for a concert hall and Toyota suggested he scrap the initial competition designs that had won him the commission. "Then Frank and his team prepared many different design models for our first meeting. I can remember at least 30 or 50; he wanted us to evaluate every one," recalls Toyota. "So we started from number one, asking 'Do you prefer this one? Is this your design direction?' And Frank said, 'No… I don't know.'"

Gehry drew on Toyota's acoustic expertise at every stage of the vineyard-style, 2,265-seat hall. "Frank was just waiting and developing the interior design before the outside. Then he added the exterior design. I've never experienced that process again."

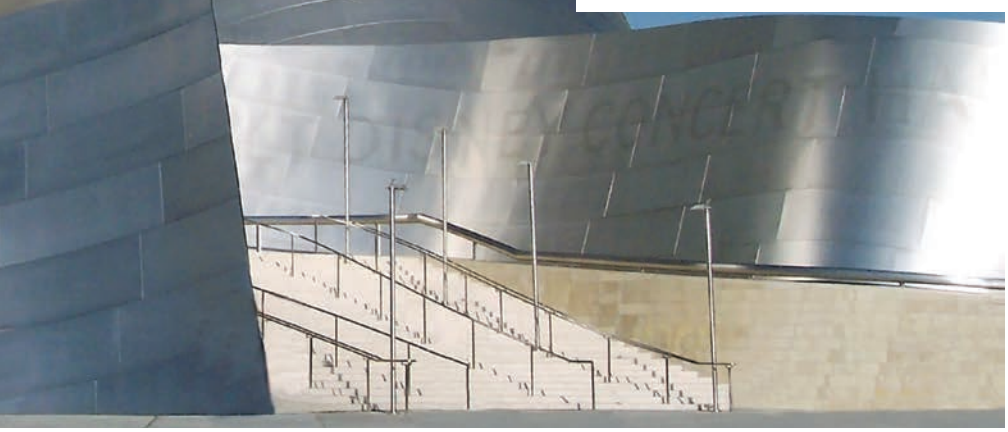
In 2007, Toyota and Nagata Acoustics were asked to work on the renovation of the world's most iconic opera house, in Sydney. But they

Role: Yasuhisa Toyota joined Nagata Acoustics in 1977 and established the Japanese company's US office

Claim to fame: Toyota's acoustic triumphs include Tokyo's Suntory Hall, Copenhagen's Koncerthuset and Miami's New World Center

Did you know?: Besides contemporary classical music, Toyota has a weakness for Mozart and Hamburg composer Brahms

"Frank and his team prepared many different design models for our first meeting. I can remember at least 50; he wanted us to evaluate every one"



declined. Why? "Officially, we were too busy." And unofficially? Toyota laughs. "No comment."

Miami sound machine

Toyota is happy, however, to discuss his most recent projects and how these point towards future trends. Discussing the New World Center in Miami, where images are projected onto acoustic sails during concerts, he says, "Visual media is becoming a part of programming and therefore the seating layout for audiences will become very important. "The vineyard style is a very attractive layout and exciting for the audience. They can see each other – unlike in a conventional layout. When a concert on stage is thrilling it's wonderful to see the audience."

Toyota detects other trends that will have an impact on acoustics and design. When Nagata Acoustics worked on the Mariinsky Theatre Concert Hall, opened in 2006, it was primarily designed as a symphonic hall. "But Valery Gergiev [artistic and general director] insisted on making an orchestra pit." Since then, Gergiev has programmed semi-staged and full opera including *Aida* and *The Marriage of Figaro*.

"There is some merit in performing opera in concert halls as the acoustic is much better, but poses a challenge for us to create an acoustic for both opera and symphonic concerts. Demands for stage lighting, rigging and so on will also increase. And we'll have to fight with them."

Looking to the next 10 years, Toyota turns his attention to the digital question. "There may be some indirect impact. In the design phases we talk about the Berlin Philharmonic's digital concert hall [its live streaming service for subscribers]. How can we accommodate those services in a new concert hall?" he asks. "But I believe that live concerts will still be attractive to people and this is why the concert space must create a special feeling in a concert." ■

(Main image) **Walt Disney Concert Hall is one of the most acoustically sophisticated concert halls in the world**
(Top right) **Miami's New World Center was conceived to be at the intersection of music and architecture**

Roles: Wim Lemmens (above) and Koen Van Kerkhoven (top) are the managing partners of ShowTex Belgium

Who are they?: ShowTex is one of the leading companies in inventing, manufacturing, selling, and installing innovative flame-retardant curtain fabrics, tracks, and motion control systems

Eco friendly: ShowTex undertook the Oeko-Tex Standard 100 certification process in response to recent green theatre initiatives around the world and a growing interest in ecological products for the event and entertainment industry

Materials

Wim Lemmens and Koen Van Kerkhoven

Technology is said to be the future, but for Wim Lemmens (left below) and Koen Van Kerkhoven (left above), managing partners of ShowTex Belgium, technological development is not just about special effects. "Enhancing the audience experience is just as much about what you don't see," Lemmens says.

With thousands of installations worldwide and a 30-year company history, the partners are well rehearsed in setting the scene. "In order to create the visual perception of infinity on stage, a truly black box is essential," explains Lemmens. "But, as stage lighting has got brighter, the black box in the theatre has turned grey."

In response, the company developed a specialised material that reflects fewer than 1% of light. "The Ultrablack velvet absorbs the stronger light sources and keeps light where it belongs: on the performers," adds Van Kerkhoven, who is especially proud of the company's project at the Bolshoi Theater. "The project marked the world's largest installation of Oeko-Tex 100-certified stage drapes," he remembers, proudly. "There were numerous requirements for the new drapes, from fabric weight and colour to density of weave and flame-retardant certification level. Our Molière cotton velvet stood out as the truest black that could be achieved in a staging environment. The 20m-long curtains constructed from 600g/m² ShowTex Molière velvet combined with the five layered acoustic panels are the heaviest drapes ever made in the theatre world."

Safety factor

For flame-retardant draperies, developments over the past 10 years have been subtle but important. "Chemical treatments and dye processes are becoming more environmentally friendly and methods of measuring ecological impact (such as the Oeko-Tex 100 label) are becoming more standardised," Van Kerkhoven reveals. "Our challenges have been to achieve the strictest flame-retardant standards and reduce our carbon footprint without compromising the dazzling show effects audiences expect when light and fabric meet."

"Arts institutions are increasingly aiming for personalised and interactive experiences," says Lemmens. "Looking forward, venues will have to reconcile this individualised approach that allows audiences to shape the performance and even the venue in real-time with traditional performance and historical venue design." ■

Russia's Bolshoi Theatre is ready for the future with ShowTex Ultrablack eco-friendly stage drapes

Photographs courtesy of Live Nation

Promoter
Simon Lewis

For Simon Lewis, who celebrates a decade with Live Nation in 2013, live will always keep its appeal. What may be surprising, though, is that Lewis welcomes digital streaming and live relays to the party. "Technology allows access – for people who couldn't go to a show or for major fans. And major fans try to access as much content as possible. I think it's highly complementary."

Challenges ahead

Live Nation is Madonna's MDNA international tour partner and, last summer, fans could watch a live stream of her intimate Paris club show on the LoveLive *YouTube* channel; money-can't-buy-tickets available to all. In the digital realm, Lewis regards maximising social media as the big challenge of the next 10 years. Another is the continued financial downturn: "In southern European markets – Spain, Italy, etc – you really have to go the extra mile to convince consumers still to come to the show."

Among Live Nation's major sponsorship partners are Vodafone and O_2. Vodafone's deal includes smartphone apps for Live Nation festivals; O_2's package includes priority tickets for its network customers and sponsorship of Live Nation venues (London and Dublin's O_2s, for instance). These tie-ins are models of what Lewis calls new "meaningful sponsorship" around live events and venues. "When I joined the business, I was determined to rid it of the term 'sponsorship'," he adds. "To my mind it's always felt like a shallow relationship; logo-led, a brand taking space at a festival site or venue."

Lewis puts it another way. "Do you become part of the hosting process or do you gatecrash and shout your brand with no reason for fans to take an interest?" Partnerships should be mutually beneficial. Fans get more value and the sponsors get a point of difference: "From being a mobile business to being a lifestyle business."

Another key change in the past decade has been the rise of the festival. Live Nation produces some of the world's biggest and best-known festival brands: Download, Wireless and Coachella, for instance. Lewis is proud of how solidly Live Nation has established new festivals such as Wireless in a crowded market. Download (the UK's leading rock festival) will also be 10 years old this year. "We created these from scratch but there was no sense of going out on a limb," Lewis reflects. "We had confidence that we had the ability and we'd done the analysis. It's like any business."

Live Nation also owns and manages venues around the world. In summer 2012, it opened Amsterdam's Ziggo Dome, a 17,000-seater clothed in 120,000 LED fixtures and designed by Benthem Crouwel Architects. Yet one of the most emotive venues in Live Nation's portfolio is also one of the oldest: London's Wembley Arena. "Very few venues in Europe have a personality that excites fans," Lewis says. "Wembley is still the pinnacle of a rock venue." ■

Madonna's MDNA concert at Paris's famed Olympia was streamed for all to see

Role: Simon Lewis is CEO of international concerts and sponsorship at Live Nation Entertainment

Who are they?: Live Nation Concerts promotes more than 20,000 shows a year for more than 2,000 artists globally

Not only, but also: The group also comprises ticketing website *Ticketmaster.com*, which boasts more than 27 million monthly unique visitors

Danielle de Niese "put the sex in Sussex", swooned the *Guardian*'s critic when she sang the role that launched her career, Cleopatra in Handel's *Giulio Cesare* at Glyndebourne opera in 2005. Making her British debut, the then 25-year-old dazzled critics and left audiences panting for more.

Director David McVicar's production proved to be a game-changer for de Niese and for opera itself. Slick, visceral, tongue in cheek… this was Baroque meets Bollywood, for goodness sake. "It changed the way people looked at opera, pushing singers to another level," de Niese remembers.

She ranks Cesare and her Metropolitan Opera debut as the "major milestones." Aged just 19 and sharing the New York stage with a jaw-droppingly starry cast, she sang Barbarina in Mozart's *The Marriage of Figaro*, conducted by James Levine. The Met is the venue she thinks of as home, closely followed by Glyndebourne (this is the soprano's actual UK home since she married executive chairman Gus Christie). "Both the Met and Glyndebourne have wonderful, natural acoustics. At the Met [capacity 4,000] I love achieving intimacy amidst all the history and grandeur, and at Glyndebourne (1,200 seats) the intimacy is already in the space, but you can still achieve grand things."

De Niese personifies a new kind of diva: movie star looks, on-stage physicality and genuine acting ability. Her timing is impeccable,

Background: Born in Australia and raised in Los Angeles

Did you know?: Aged eight, she was the youngest ever winner of Australia's Talent Discovery of the Year. She won an Emmy Award, aged 16, for presenting *LA Kids*, a TV arts show

Right here, right now: Now 33, de Niese records exclusively for Decca and has sung around the world's major classical venues

bursting on the scene just as cinema relays of opera took off. Beginning in 2006, the Met has pioneered live relay screenings of its opera season in cinemas worldwide; it now shows in 54 countries from Abu Dhabi to Uruguay and the 2011-12 season brought in a net profit of US$10-12 million. De Niese is definitely a fan.

"A close-up view and screen intimacy often inspires people to come to the opera to experience it live. One doesn't replace the other," she says regarding fears of cannibalising the audience for live operatic performance.

Cool and culture

Digital wizardry is also creeping into opera productions. Last year de Niese appeared in *The Enchanted Island* (a pastiche opera with Baroque tunes spliced together from Handel, Purcell et al.), staged at the Met with stunning digital imagery projected onto the stage. "That was cool," she beams. "The combination of scenery and 3D, LED, or filmed imagery… it really adds another dimension to opera and makes the staging possibilities endless."

For the self-styled 'diva for the digital age' (de Niese is rarely off Twitter), it's no surprise she is passionate about the future of opera and its audience. "I am doing everything I can to send out positive messages about classical music to younger and new audiences," she reveals.

For a singer so in touch with her fans, would she like to sing before hundreds of thousands in a mega-venue, such as LA's Staples Center, Wembley Arena or Madison Square Garden? "I'd like to do all three!" she gushes. In fact, she has already turned down an offer to sing with rock band Snow Patrol at the Garden due to a schedule clash. "I will have to remedy that!" ■

Danielle de Niese performing at the Met in Mark Morris's *Orfeo ed Euridice*

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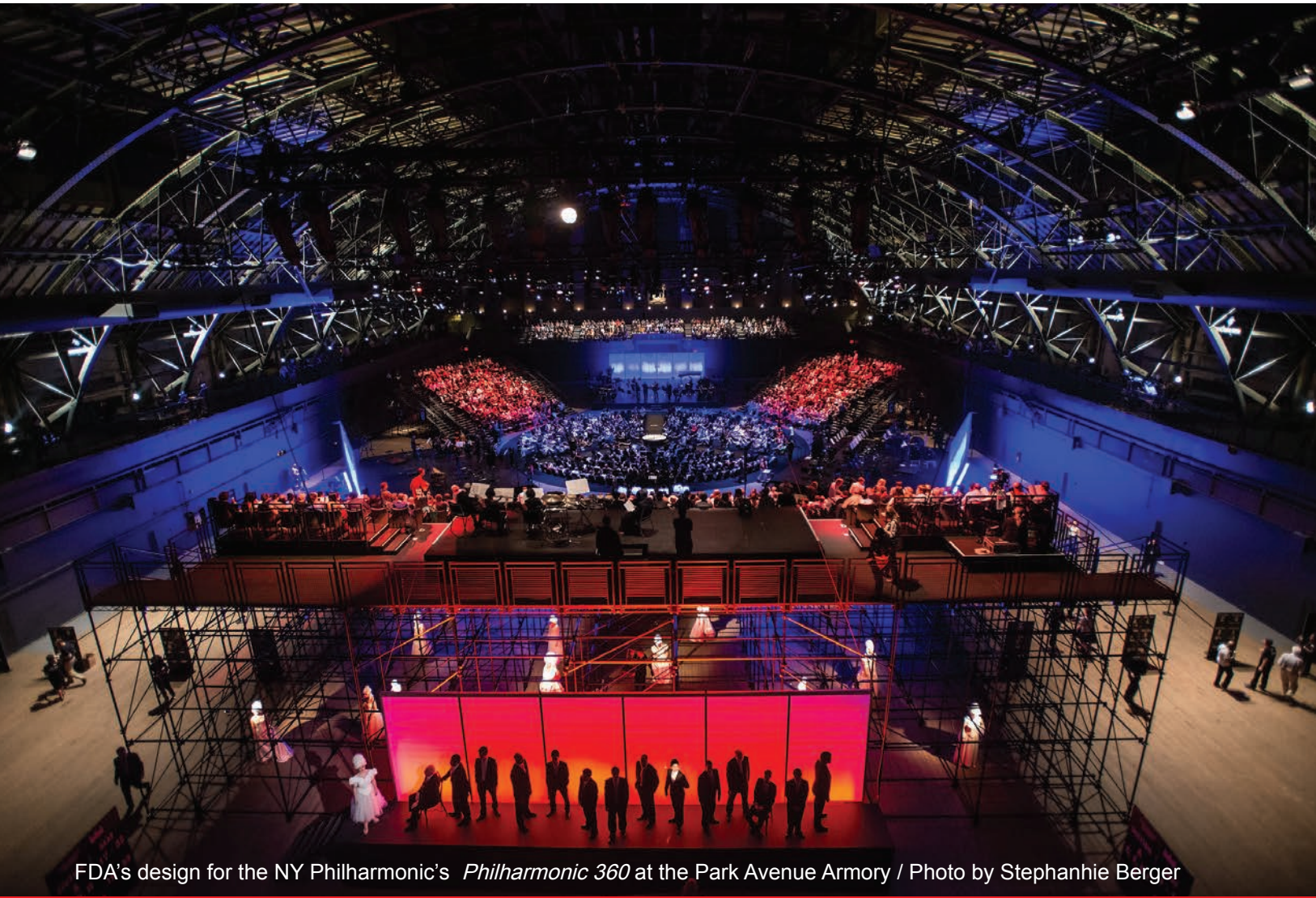

FDA's design for the NY Philharmonic's *Philharmonic 360* at the Park Avenue Armory / Photo by Stephanhie Berger

"When you come in, it's not as though you sit in your seat and you're separate from the work. You are *in* the work. You are *part of* the work. And it completely changes your perception of it."
-Rebecca Robertson, President & Executive Producer, Park Avenue Armory

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ELBPHILHARMONIE HAMBURG

BRIAN LIBBY

Photograph courtesy of Thies Raetzke

Heart in the harbour

Uniting the sea, the sky and Hamburg in an architecturally unique building, the Elbphilharmonie is destined to breath vitality into the port city and attract the finest musical talent from around the world

"It acts like an immense crystal, the appearance of which keeps changing … It captures and combines reflections from the sky, the water and the city" **Pierre de Meuron**

Rendering courtesy of Herzog & de Meuron

Although the construction industry has generally slowed in most regions in recent years, there's no stopping Hamburg's ongoing HafenCity – the largest urban development programme in Europe. Situated alongside the Elbe River in Hamburg's central harbour, the 388-acre development – which will increase the size of central Hamburg by 40% – boasts new apartments, hotels, offices, restaurants and shops. Bookending the project at the end of the Am Sandtorkai peninsula is the Elbphilharmonie – arguably the crown jewel of the entire development.

The building of the Elbe Philharmonic Hall, as it's known in English, has been a long and somewhat challenging journey. However, an icon that will energise Hamburg both culturally and economically is nearing completion, bit by bit. "The Elbphilharmonie Hamburg and the HafenCity are strengthening the city's image as an international metropolis," feels Enno Isermann of the Hamburg Department of Urban Development and Environment. "At one of the most exciting locations in the city, one of the most fascinating concert halls in the world is emerging. The finest orchestras will play here and we're inviting musical friends from all over the world with open arms."

The Elbphilharmonie's Grand Hall will house the NDR Symphony Orchestra and will seat 2,100 visitors. There is also a smaller recital hall, a 250-room five-star hotel, and 45 residential apartments. Designed by the legendary Herzog & De Meuron – which has gained international recognition for landmark projects such as the National Stadium in Beijing, Munich's Allianz Arena and the Tate Modern in London – the Elbphilharmonie has been constructed on the site of the historic Kaispeicher (or Kaiser Warehouse), a neo-Gothic structure with a distinctive bell tower that was destroyed in 1945 during World War II, and Kaispeicher A, a 1966-built warehouse. The latter will serve as the base for the new philharmonic hall, with six stories of parking.

"It looks somewhat archaic – a monument of the post-war period," suggests Pierre De Meuron from Herzog & De Meuron. In contrast to the stoic brick façade of the Kaispeicher, the concert hall is clad in variously curved and cut panels of glass. "It acts like an immense crystal, the appearance of which keeps changing," the Swiss architect adds. "It captures and combines reflections from the sky, the water and the city."

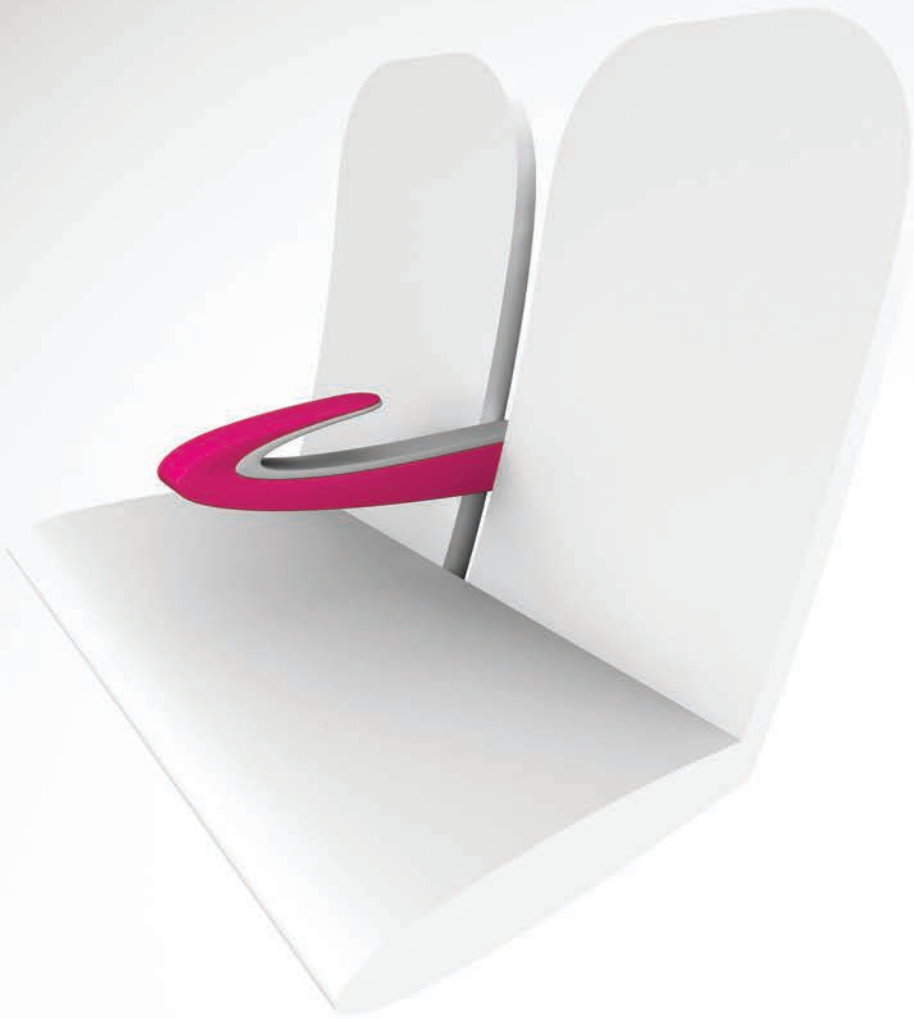
The 21,500m^2 façade is the equivalent size of three football fields and comprised of 1,100 3-5m^2 panes, each individually marked according to a pre-determined spot, the curvature of which varies to create a more organic composition. In the hotel portion of the building, for example, they're designed to resemble fish gills, yet have horseshoe-shaped recesses at the westernmost edge of the façade. Given Elbphilharmonie's geographical location and chance for stormy weather, the panes are constructed to withstand winds up to 150km/h. They also have small reflective dots to minimise solar heat gain, the placement of which has been digitally configured to maximise the shading properties of the semi-translucent cladding.

Variety and vitality

De Meuron notes that the urban nature of the project helped determine its multifaceted programme. "From the outset, we knew it was crucial that this was not a mono-functional building only for music but should have uses overlapping, mixing and contributing to the vitality of the entire neighbourhood," he says. "It is where people live and eat. There is a hotel and public plaza. All of these programmatic functions are contained within the simple form developed from the existing Kaispeicher."

With its panoramic view perched 37m above the water, the public plaza is crucial to how the building interacts with its surroundings. "It is a place for everyone, not just concert-goers who bought a ticket," adds Ascan Mergenthaler of Herzog & De Meuron, project manager for the Elbphilharmonie. "The plaza is situated at the same height as Hamburg's roofs, with a 360° panoramic view of the cityscape from a unique spot between the city and the harbour."

Although rising above the brick block of the older building with an identical ground plan, the top and bottom of the new structure are



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fundamentally different from the simple form of the warehouse below. The broad, undulating shape of the new roof rises to a total height of 110m at the Kaispitze (the tip of the peninsula), sloping down at the eastern end where the roof is 30m lower. Between the top of the warehouse and the underside of the new structure is the lively animated plaza, divided into zones defined by expansive vaulting that ranges from flat to very steep. Large openings cut into the façades provide views of the sky and spectacular, theatrical vistas across the Elbe River. Tall recesses within the building above the plaza provide views of the foyers on several levels.

"Its shape also defines the structure of the entire volume of the building and is correspondingly reflected in the silhouette of the building as a whole," Mergenthaler notes. "In order to reach this goal we studied archaic forms of theatres. We also looked at the Globe Theatre of Shakespeare and La Scala in Milan, especially in terms of their vertical dimensions."

Break from tradition

The main Elbphilharmonie hall is distinctive of the vineyard-style concert hall configuration. "There are certain building typologies and hall types; ours is a radical architectonic advancement on these existing types," de Meuron continues. "The orchestra and the conductor are located in the midst of the audience. The tiers extend high into the overall space so the tiers, walls and ceiling form a homogeneous and continuous whole, and create the sense that the room is defined by the people themselves – the performers and audience. In this respect, the space of the concert hall resembles some of the football stadia we developed in recent years where there is an almost interactive intimacy between the players and the audience."

To realise the design, Herzog & De Meuron also worked closely with acoustics expert Yasuhisa Toyota, who helped give his concept a finishing touch. Toyota has headed more than 50 acoustic projects worldwide, among them the Disney Concert Hall in Los Angeles, the Suntory Hall in Tokyo, and the acoustic refurbishing of the Sydney Opera House in Australia.

To shield performances from the sounds of the outside world, the Elbphilharmonie's concert hall was detached from the surrounding building. "The target was to create one of the best concert halls in the world," explains Mergenthaler. "And notably, a concert hall that is situated in the middle of a harbour, surrounded by busy activities, ships' horns, flats and a hotel. We thus had to detach the Elbphilharmonie's heart from the environmental noise by cocooning the hall in a concrete container and resting it on giant spring assemblies to ensure that there is no noise transmitted from the harbour into the concert hall, while simultaneously no sound escapes from the hall into the hotels or residences."

Great expectations

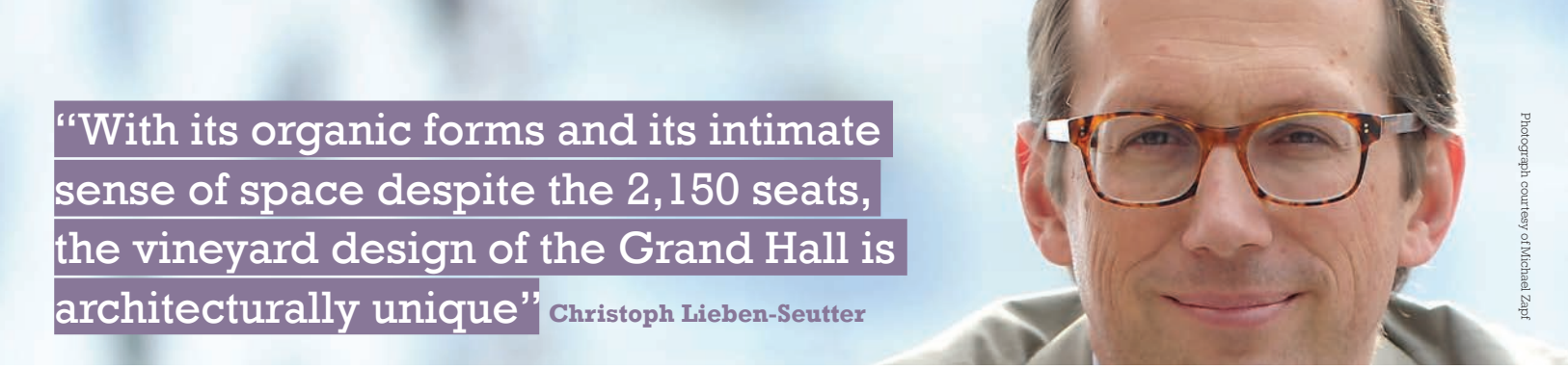
Musicians are already taking notice of the venue. "It will be very different," believes Christoph Lieben-Seutter, artistic director of the Elbphilharmonie Hamburg. "With its organic forms and its intimate sense of space despite the 2,150 seats, the vineyard design of the Grand Hall is architecturally unique. Acoustically it will be similar to Yasuhisa Toyota's very finest halls, probably comparable to Helsinki's Musiikkitalo, which I found very impressive. Local orchestras, ensembles and concert promoters are already improving and expanding their programmes in anticipation of the Elbphilharmonie opening.

URBAN METAMORPHOSIS

Architect Pierre de Meuron is a believer in a cultural project's ability to transform neighbourhoods and districts. "One might speak of cultural implants or acupuncture," he says. "We imagine we are stimulating a city's body by pushing or piercing it in the right spot and in the right way. This method has helped us increase the attractiveness of entire districts in other cities, the Tate Modern in London being a great example. The original building was a power plant and was closed to the public. Not only is the building now opened up but the neighbourhood is as well. The Turbine Hall in particular has become a popular public space. It is open to everyone – to people who have come to visit the galleries, or to take a look at the installations created by artists specifically for this space, or to simply share in the lively atmosphere. Soon, the people of Hamburg are going to have a similar experience – to see their city with a new perspective. The Tate is for contemporary art, the Elbphilharmonie for music, but these cultural buildings blend in and enhance the city experience at the same time. The Elbphilharmonie will stimulate Hamburg's body like an acupuncture needle."

Renderings courtesy of Herzog & de Meuron

Architectural renderings of the interior of Herzog & de Meuron's Elbphilharmonie concert hall



"With its organic forms and its intimate sense of space despite the 2,150 seats, the vineyard design of the Grand Hall is architecturally unique" **Christoph Lieben-Seutter**

Photograph courtesy of Michael Zapf

(Bottom) **The towering gesture of the great hall with its vertically arranged seating has determined the entire architectural structure of the Elbphilharmonie**

Both local and guest musicians are very excited about the prospect of playing here. Of course, they expect great acoustics and state-of-the-art facilities. The backstage rooms on the 12th floor, for example, will certainly be spectacular."

Getting to this stage hasn't been without its trials and tribulations however, with substantial delays since construction began in 2008, as well as attendant cost increases. The city government of Hamburg initially approved an estimated budget of €241.3 million, with around half of that sum undertaken by the city. The public sector share has since grown to €323 million though. What's more, the original targeted opening date has already passed by two years, with completion now set for spring 2014.

ART AMONG AUSTERITY

The Elbphilharmonie represents one of the last major concert halls conceived before the economic crises that have plagued much of the western world over the past four to five years. Can countries used to providing generously for arts funding keep building facilities such as the Elbphilharmonie in a prolonged age of austerity? "Public funding for such a project might be more difficult today than six years ago, and the European debt crisis will certainly affect public spending for culture, as it already does in several countries," believes Christoph Lieben-Seutter, artistic director for the Elbphilharmonie Hamburg. "But there will always be a chance for outstanding ideas and there is a lot of public and private money in Germany. Hamburg has developed in many interesting ways over the past 20 years. It's a growing city that attracts young and entrepreneurial people, and it offers a great quality of life. Projects such as the Elbphilharmonie give Hamburg a more urban and metropolitan character."

Rendering courtesy of Herzog & de Meuron

Part of the travails began in November 2011 when general contractor HochTief stopped construction after concluding that the steel roof structure would not support the 3,800-ton roof. A lawsuit was filed by the city of Hamburg against the contractor and its parent company, Adamanta, after the design's viability and safety were confirmed by an independent expert.

"To some extent, the agreement contained weaknesses," Enno Isermann says. "Additional construction work was added after the acceptance of the tender (e.g. another small concert hall as well as another floor in the hotel area), but the experienced cost increases were mainly due to the construction delays."

"Many projects with a complex infrastructure face similar problems with delays and cost over-runs," accepts Lieben-Seutter. "The difficulties lie in the decision-making, the legal setup and the management of big public projects in Europe. Equally, though, it is always risky and expensive to develop something new and outstanding."

Ultimately, Lieben-Seutter says, the investment will easily pay for itself. "Similar to the Sydney Opera House, the Elbphilharmonie will attract huge crowds," he predicts. "Although many of them will just have a coffee in the plaza on the eighth floor and take in the wonderful view across the harbour, we expect a rising interest in classical music as people will come to experience a live concert in this impressive new venue. Our challenge will be to convince first-time visitors to come again – by providing a high artistic level, great acoustics, high-class customer service and reasonable ticket pricing."

Despite the challenges, Elbphilharmonie nevertheless appears destined to become another architectural icon for Herzog & de Meuron, as well as a cultural anchor of a 21st century Hamburg. "What the architects have done is establish a superb connection between water, land and sky," marvels Isermann. "The colour of the Elbe is reflected in the façade of the Elbphilharmonie; it's already a landmark." ■

Author

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

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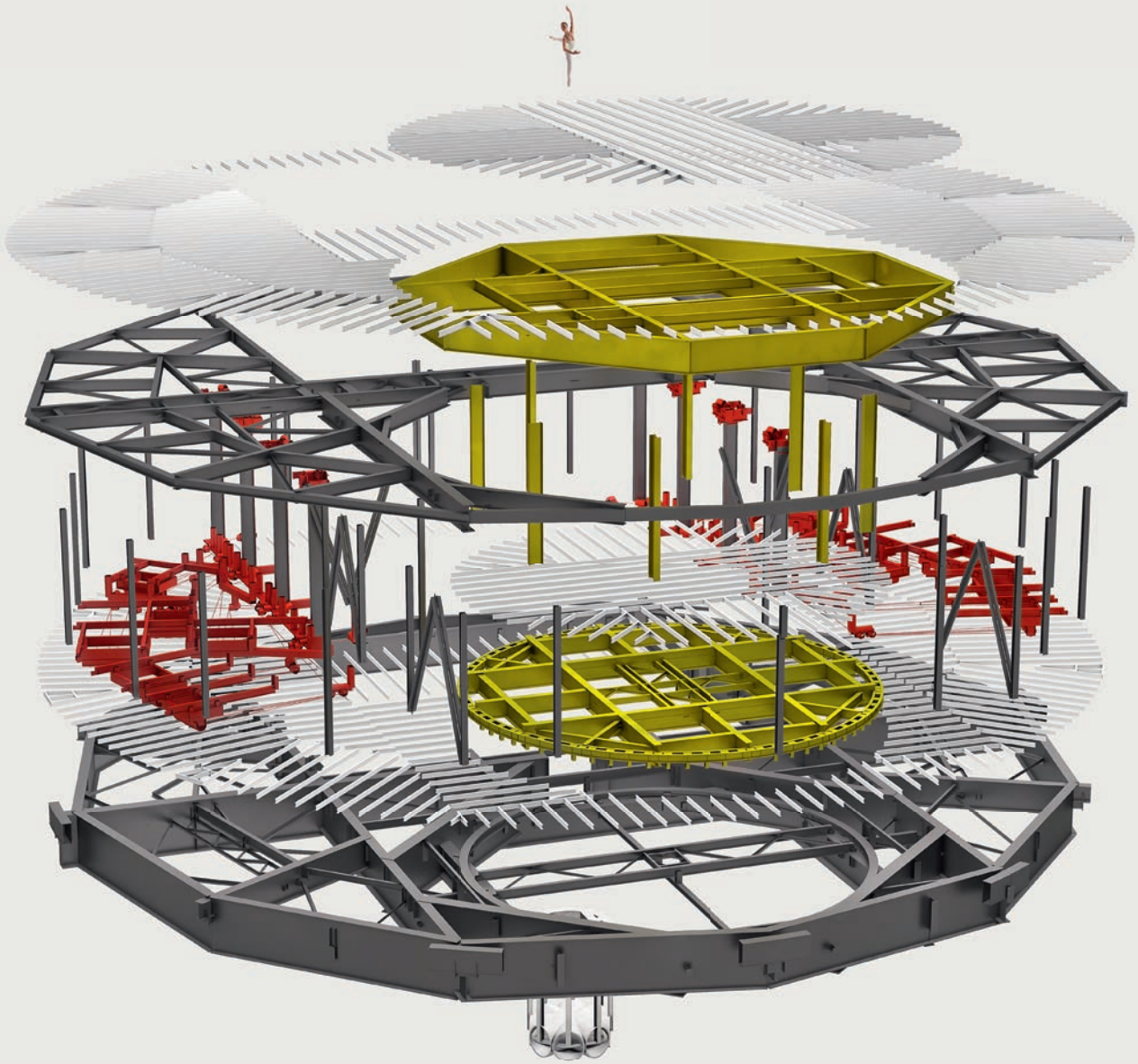

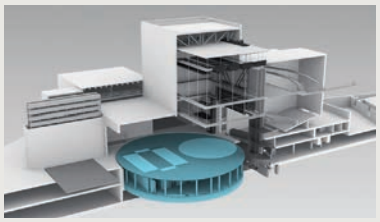

When emotions run high on the leading stages of the world, the background technology must play its role perfectly: In the Music Theatre Linz the 32 metre diameter revolving stage currently being installed is one of the largest and technologically most demanding in the world.

waagner biro

STAR PERFORMING ARTS CENTRE

RUTH SLAVID

With two masters to serve, the architect of Singapore's Star Performing Arts Centre was faced with the challenging task of seamlessly combining civic and retail functions in one complex, striking building

Wishing on a Star

Jack Ho from the Star Performing Arts Centre in Singapore has charmingly immodest ambitions for the nearly complete building. "I think we will be Singapore's answer to the Sydney Opera House," asserts the venue's chief operating officer. Presumably he is aiming for the iconic status rather than the performance issues that dogged the Australian opera house in its original incarnation.

Whether or not the Star PAC (as it is generally known) comes to symbolise Singapore in the way that the Sydney Opera House can be said to represent the whole of Australia, it is certainly a bold statement. Designed by a team led by Andy Bromberg at architect Aedas, it is a complex, fractured creation, as ambitious in its appearance as its intentions. The project fills a gap in Singapore, providing a purpose-designed space that can seat 5,000 people; other dedicated spaces can only take up to 2,000. Larger crowds have to use arenas and stadia which – although they have capacities of up to 10,000 – do not offer the ambiance and comfort of a dedicated space.

Team players

The client for the project, Rock Productions, didn't just take this on trust; it worked with Mindy Coppin, senior vice president and managing director at IMG Artists (Asia Pacific) to research the needs and desires of potential audiences. "We interviewed many people over a couple of years," she reveals. "We were able to build a profile of utilisation into the operating budget."

Even earlier, Rock Productions appointed theatre consultant and acoustic specialist Artec. "We have been on this for longer than anybody, apart from the owner," reveals Tateo Nakajima, partner at the New York-based acoustician. Pretty early on, the project homed in on a site: a very well-connected position just beyond the city centre, in the One North Area masterplanned by Zaha Hadid Architects.

All images courtesy of Aedas

WHO WILL USE THE STAR PAC?

One strand of users will be audiences for the various types of Asian pop music, which Tateo Nakajima describes as C-Pop (Cantonese), T-Pop (Taiwanese), K-Pop (Korean) and J-Pop (Japanese). But the usage will be wider than that. Singapore currently lacks a venue suitable for film launches and other similar events. As a result of the New Creation Church's broadcasting activities, there will be a fully functioning TV studio associated with the main auditorium, making it ideal for this purpose. The building is also expected to host events such as kindergarten graduations and weddings. "Artec has looked at the technical specifications, the comfort of the artists, the people attending and the technical people who run events," says Jack Ho. "From the moment an artist arrives, they will be so well supported they will want to come back next time they are in Singapore."

But this business-like approach masks the most unusual aspect of the project – that Rock Productions is not a conventional arts organisation at all but the operational arm of the New Creation Church, which is based in Singapore and broadcasts its services around the world. A large part of the rationale for Star PAC was that the church needed a venue in which it could hold four services every Sunday, each with a congregation of 5,000. A performance venue seemed just right because these services boast high production values. At present, the church is operating in two smaller spaces and having to ticket its services to prevent overcrowding. It therefore saw the opportunity to develop a venue that could serve a religious purpose on Sundays, and a secular – and commercial – one for the rest of the week. "It is important to us to at least cover the operating costs," Ho states.

But Rock Productions does not own – and will not operate – all of the building. The performance space is raised above a retail scheme, for which the developer is CapitaMalls Asia. This unusual arrangement arose from a condition set by the government of Singapore when it was seeking a developer for the land, which stipulated that on this very prominent site, the development should be 60% civic and 40% retail. "We had to find a retail partner," says Ho. "We had no experience in this field."

The double-act challenge

Aedas was therefore faced with designing a building for two clients – each with very special requirements – and making the two as seamless as possible as one part of the brief was that visitors should not feel they were moving from one environment to another, but that they were in a single space through which they could navigate easily to the areas that interested them. "I very much wanted to blur the civic qualities that exist in a retail area and a performance building," Bromberg explains.

Well before the architect was appointed, Rock Productions worked with Artec to define the spaces, which was also unusual as it is better

known for the spaces it creates for classical music rather than amplified sound. This is something of a misconception, according to Nakajima. "We have been worked on these sorts of places before," he says. "We want to make sure that it sounds as good as unamplified sound, which starts from recognising what performers need, and their relationship with the audience."

Come together

At the Star PAC, Nakajima goes on to explain, the main challenge was to create a feeling of intimacy in such a large space. "People are used to big-screen TV," he says. "It has made them much less forgiving of distorted audio or distorted views. But they want to go to communal and participatory events. So we put people as close together as we could. Fans want to feel that they can touch the artists."

The main space has two balconies; unusually, the circulation linking these to the main floor is within the space. This provides an added feeling of connectedness, although this is almost accidental as it arose from an early requirement (later dropped) that members of the church congregation should all be able to take communion. Getting people as near as possible, but not giving them a side view, is a balancing act, Nakajima feels. The auditorium is in the shape of a horseshoe, providing the best compromise. He contrasts this with some Las Vegas performance spaces, which are of a similar size, and where – in order to get everyone close enough to the front – the seating forms a 180° arc, putting some patrons way off to the side.

Getting the acoustics right in such a space was also a balancing act. "The question is, how

Intimacy in the large main hall has been created by the use of a horseshoe-syle seating arrangement

"We want to make sure that it sounds as good as unamplified sound. It all starts from recognising what performers need, and their relationship with the audience"

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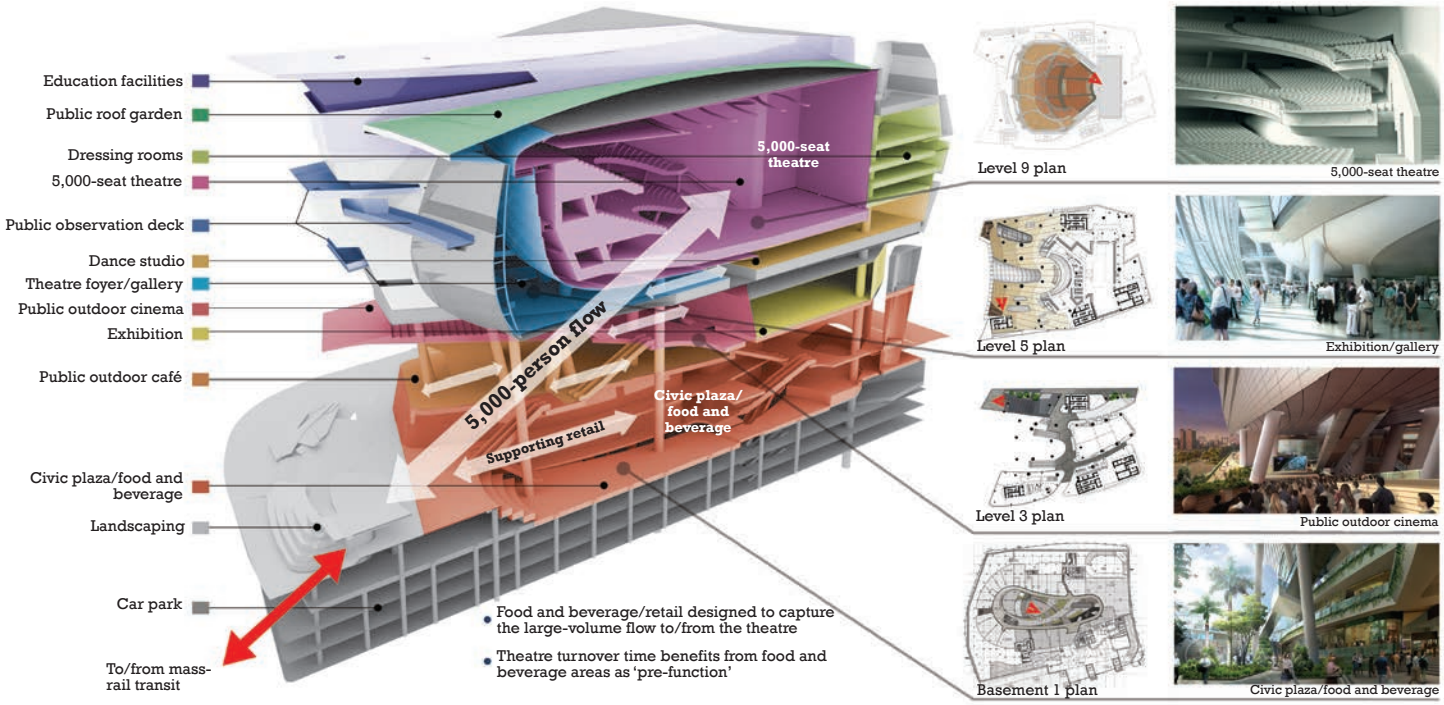


The mixed-use building has been designed to satisfy two unique purposes while remaining a single, integrated entity

dead or alive do you want it to be?" Nakajima says. "In a room that uses exclusively amplified sound, it could be completely dead acoustically." Technically this would be the best solution but it has two enormous drawbacks: any unamplified sound would be completely killed, and so would any sense of excitement during amplified events. You wouldn't hear applause or audience response. There has to be some acoustic response, and the dynamic had to be worked out carefully. The resulting design uses a lot of lattice surfaces as flat surfaces give reflections that are too flat. Base sound poses a particular challenge – large spaces are needed to absorb low frequencies so 'base traps' have been built behind the surfaces.

Special effects

As much attention was paid to the visual effects as to sound. There is a double rigging system, with 55 fly bars and a further 35 material hoists on a gantry that can be used for heavy elements such as LED walls. Lighting is also highly sophisticated. "We figure with all this in place it will be easy to set up and take down shows," continues Ho. Although this is important for all venues, it has a particular significance here. If a show finishes at 11pm on a Saturday it will have to be cleared away by 3am so the space can be made ready for the morning church service.

Although the 5,000-seat auditorium is undeniably the star of the show, there are

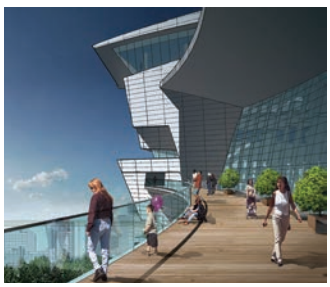
> "There should be a spatial component and the discovery of space should be as interesting for people going up to the theatre as the performance they are going to see"

ROCK PRODUCTIONS AND THE NEW CREATION CHURCH

Rock Productions already runs two venues in Singapore – the Rock Auditorium and the Shine Auditorium – although these are smaller and not purpose-built. They also host services on Sundays and are used for other purposes during the week. Rock Auditorium is in Suntec City Mall; Shine Auditorium, which opened officially in February 2012, is in Shaw Tower. The company, which also runs a travel agency, and sells books and records, was founded in 1998, with Jack Ho as general manager. He relinquished the role to take on the running of the Star PAC. He has 20 years' experience in the gospel music industry as a musician and musical director, and has produced several gospel music records over the past decade. The New Creation Church, which owns Rock Productions, was founded in 1983 by 'a small group of young Singaporean believers with a vision of an independent, non-denominational church based solely on the unchanging Word of God'. Now run by Pastor Prince, it launched its international broadcast ministry in 2007 and says that millions of people around the world now watch its weekly transmissions.

STAR PERFORMING ARTS CENTRE

"We thought a lot about circulation and about how you get from the ground up to where you are going"



The retail area and civic space are seemlessly integrated (top left)**; concrete columns have been strategically placed** (top right)**; open walkways provide views of the city** (above)

a number of smaller spaces that can be used for performances or rented out commercially. A 770-seat multi-purpose hall, for example, can expand the main space or be used separately. Perhaps more exciting is an outdoor amphitheatre with seating for 300 people. "This area is really beautiful," says Coppin. "It has a lovely view and I think it will be used a lot."

Discovery of space

Logistically, the demands are complex. Not only do audience members have to come in and out rapidly – rising up to the auditorium from street level – but equipment also has to be brought in and out (there are two freight lifts). Moreover, there is a separate VIP entrance that can be used for events such as film premieres, positioned specifically to offer the best possible backdrop for photography. All this added up to a very complex brief for the architect, in addition to the fact that it was serving two clients.

"We thought a lot about circulation and about how you get from the ground and the subway up to where you are going," Bromberg recalls. "We thought about how people could pass food and beverage outlets. There should be a spatial component and the discovery of space should be as interesting for people going up to the theatre as the performance they are going to see. I didn't want them to know when they were leaving the retail area and entering the civic space."

From the food and beverage area, visitors can see 40m up through a skylight to the lobbies of the auditorium. Singapore has a tradition of outdoor food markets, which Bromberg was keen to emulate, making the retail area as open as possible to improve ventilation and remove the feeling of being in an enclosed mall. In architectural and structural terms, however, the creation of a largely closed space for performance sitting on top of a retail area that is as open as possible posed an interesting conundrum.

"A 5,000-seat space is very big," he adds. "We took the mass and looked at ways to create fissures. We had to give it a lighter appearance. We also wanted it to look edgier and more faceted from a distance, and to have a softer, more human experience once you were inside." The effect is a futuristic, light-coloured helmet sitting on top of angled columns with large escalators rising up through a glazed underbelly. There are large areas of transparent glazing on the east side, offering views out from the auditorium lobby. The south side, which looks over a park, is far more open than the northern side, which has an elevated MRT line (Singapore's rapid transport) running alongside. The glass cladding has a number of interlayers so that some elements are translucent, creating a shadowy effect. All the opaque areas are white.

The slope of the concrete columns, some of which are 30m high, was dictated by the layout of the shops and the underground car park. In the retail area, the columns could be set either within a shop or in the circulation area, but had to avoid the position of shop walls. In the car park they had to fall into (and hence remove) a parking space, rather than obstruct circulation. The position and angle of every column therefore had to be calculated, and so what seems a slightly random arrangement, which helps animate the building, was actually very carefully worked out.

In fact, care and attention seems to be the hallmark of the building, at all scales. Singapore, for instance, has guidelines detailing how many toilets should be provided for a given venue size, but Artec advised that for women this number would be, Ho reflects, "grossly inadequate" and so it increased the allocation. This could well play as large a part in many users' pleasures as all the architectural flourishes and technical wizardry. ■

Author

A regular contributor to the *Architects' Journal*, **Ruth Slavid** is a UK-based journalist specialising in architecture and construction

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QNCC
MARK BISSON

nature's finest

Five and a half years after its conception, the ambitious Qatar National Convention Center is blooming in the Doha desert, a truly stunning new facility for conferences, exhibitions, and much more

All images courtesy of Qatar National Convention Center

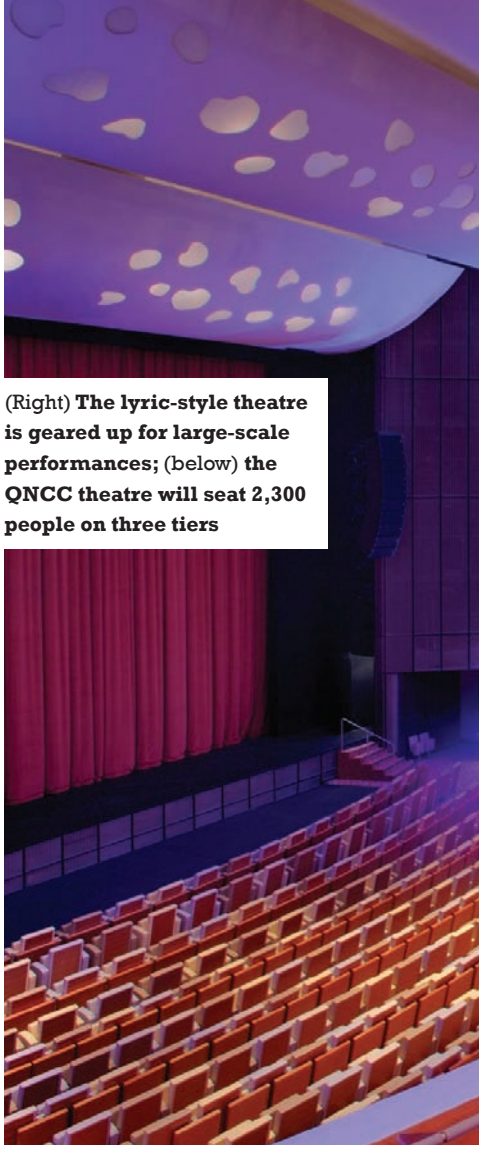
The Qatar National Convention Center (QNCC) claims to be 'one of the most sophisticated convention and exhibition centres in the world'. Given the building's sheer size, its high level of finishes and the scale of its ambition as part of Qatar Foundation's Education City precinct, it's hard to disagree with the statement.

The new convention centre opened in December 2011 with the 20th World Petroleum Congress, and rounded off the month with a star-studded theatre production of Shakespeare's *Richard III*, in which Oscar-winning actor Kevin Spacey played the title role. Qatar was the only Middle Eastern country on the show's global tour – not a bad start for a venue that's reputed to have cost US$1-2 billion. That could be money well spent, though, as QNCC is on course to stage well over 200 events in its first year alone. By May 2012, in fact, seven months into operation, the facility's director of business development Trevor McCartney announced its revenue target had already been exceeded for the opening 12 months, while posting an economic impact of US$19.9 million from overseas visitors.

It could be the design of Japanese architect Arata Isozaki that is winning the hearts and minds of those in the international convention market. Its impressive façade is a 250m long, curved steel tree structure reaching up to support the exterior canopy. Inspired by the local Qatari icon, the Sidra tree, it's meant to symbolise the Qatar Foundation's three key pillars of education, science and research, and community development.

It could also be the multitude of fixed and flexible venues on-site that's helping to capture new business. With a 2,300-seat lyric theatre, three separate auditoria, a multi-purpose conference hall for up to 4,000 guests, 40,000m^2 of exhibition space, nine halls and 52 meeting rooms, the venue can accommodate up to 27,000 people at any one time.

The business plan called for multiple events to be held simultaneously, according to Tom Davis, a director in the London office of Theatre Projects Consultants. "Occupancy is key," says Davis, who worked on the project alongside colleagues David Staples and Mark Stroomer ever since it was given the go-ahead in 2004.



(Right) **The lyric-style theatre is geared up for large-scale performances;** (below) **the QNCC theatre will seat 2,300 people on three tiers**

So far, the Qatar National Convention Centre has exceeded its targets for bringing both large and small events to the complex, and boasts strong food and beverage sales figures, too.

Davis assisted in the centre's design process, figured out the area plan for the building, and also worked on the construction supervision side. With extensive knowledge of the Middle East, he has a pretty good idea why the venue is already thriving. "It has technical specifications that are the envy of most other centres," he says. "It's extremely well-equipped, finished to a high standard, and gives clients and production companies a huge amount of flexibility. There are few buildings in the Middle East able to do that.

"It's certainly the current benchmark for the Middle East and the wider region," he adds, noting that the funders, Qatar Foundation, invested heavily in the facility areas and finishes. "All in all, QNCC is a very good, tight package – it's all under one roof, well-built, with good operations," Davis confirms.

No surprise, then, that space at the venue has sold very quickly from the outset, supporting the Gulf state's transformation to a knowledge-based economy. A quick look at the QNCC's event calendar shows just how it is advancing objectives to become a new global hub for ideas and innovation alongside elite universities, and research and technology institutions in and around Education City.

Long time coming

But QNCC took a while to come to fruition – including five and a half years of planning and construction time."It's a vision that has materialised from years of hard work and dedication involving many multi-skilled teams," comments the centre's general manager Adam Mather-Brown.

Clearly the scope of the project incorporated more than simply realising Isozaki's intricate design. The designer's buildings in Doha also include the Qatar Foundation's headquarters building, which is located directly opposite the convention centre.

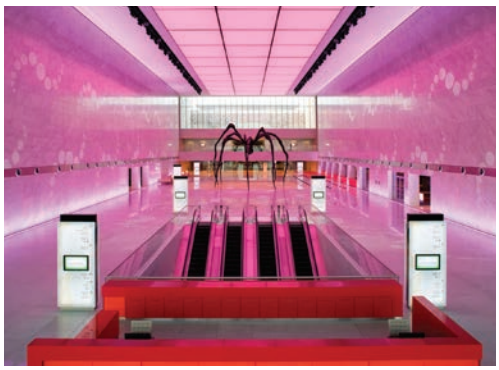
Davis and Theatre Projects had in fact already worked with Isozaki on Shanghai's Himalayas Center prior to teaming up on QNCC. The project architect was RHWL, with Halcrow as the consulting engineer. Theatre Projects carried out the theatre planning and auditorium design, as well as design and specification of the technical systems and associated infrastructure.

Phase one called for the development of 10 halls: four fixed-seat auditoria, ranging from 2,300 to 3,000 capacities; four large flat-floor meeting rooms; and two halls – the 4,000-seat congress hall or banqueting venue and an open exhibition hall.

"Timescales were initially rather crazy," Davis recalls. "The building had originally been intended to open in time for the Asian Games, to be held in Doha in 2006. We went from proof of concept and Royal approval to proceeding tender documents in a period of around three months."

AEG Ogden was approached by Qatar Foundation to be a potential operator very early on in the design process. "We were able to step through the room design and technical criteria with them during the condensed design timescale," he says with relief.

The project went on-site in 2006, with the development of phase two, which provided



additional flat-floor exhibition space and extra meeting and breakout rooms. "The main challenge was figuring out what would be 'current' in terms of both infrastructure and equipment when the building was to open," Davis continues. "Qatar has a growing rental and hire market – and Dubai is only an hour away by flight – but we had to work out how self-sufficient the convention centre would need to be, and decide what equipment and services were expected to be present in-house. Thankfully, the budgets and aspirations at QNCC were clearly understood from the start, and the venue is very comprehensively equipped throughout."

Challenges

Pushing the project through the design-build contract was a major test as the building fit-out – i.e., loose equipment such as speakers, lighting, and tables and chairs for food and beverage areas – was part of the agreement. "It became quite an animal to deal with contractually," Davis admits.

This contributed to slowing down work on the project as Turkish builders Baytur sought to deliver to the precise needs of the contract. "The level of knowledge and understanding goes up when you are dealing with things that have operational impact," says Davis.

Indeed, it was a sharp learning curve for all those involved in the construction, as the project managers had to deal with coordinating the movement and storage of the loose equipment as well as overseeing building of the monster structure. Nabhan Chalabi, project manager of Qatar Foundation subsidiary, Capital Projects, feels that the key challenges were in the integration of high-end technologies across all areas of the QNCC, especially building systems and controls, audio-visual and theatre lighting technology.

"We found the most advanced integration technologies, and the most precise planning and coordination between each part of these systems before any construction started on-site," Chalabi reveals. The exhibition halls alone feature 35,000m^2 of modular mobile rigging grids and 100% fibre-optic connections for all service pits, for instance.

With huge amounts of time and money invested in making the building look attractive both outside and in, another challenge for the project managers was procuring and obtaining the best quality materials, which is part of the reason that the construction of the QNCC took so long to complete. "When you have a vision for a unique and symbolic building, the most challenging time is the concept stage," Chalabi states. "You have to be sure before you move to the schematic side that everything has been addressed. Everything was reviewed carefully

QNCC vital statistics

Client and funder: Qatar Foundation
Designers: Japan's Arata Isozaki and RHWL
Project architect: USA-based Yamasaki – RSA
Theatre design consultants: Theatre Projects Consultants
Theatre consultants (post-design development phase to project completion): Auerbach Pollock Friedlander
Design-build: Turkey's Baytur
Operators: QNCC and AEG Ogden
Cost: Not disclosed (but estimated at US$1-2 billion)
Opened: 4 December 2011 (construction started 2006)
Main features: 40,000m^2 of exhibition space; conference hall for 4,000 delegates; 2,300-seat lyric style theatre; three-tiered auditoria; theatre-style seating; banqueting for up to 10,000 in exhibition halls; 52 meeting rooms
Sustainability: QNCC is the first convention and exhibition centre of its kind built to the gold certification standard of the Leadership in Energy and Environment Design (LEED) rating system of the US Green Building Council. Technologies include systems for water saving, energy efficiency and indoor environment quality. On the roof, 3,676m^2 of solar panels utilise Qatar's almost constant sunshine to provide 12.5% of the building's energy needs when fully operational.

(Above) **Exhibition centre entrance;** (top left) **QNCC's spacious public areas;** (top right) **Qatar Foundation's Education City**

on the concept design, hence why we have delivered such a beautiful building."

Fulfilling the vision

Chalabi thinks QNCC's multi-functionality complements the other buildings at Education City and that it fulfils its purpose 'to accommodate international events from different fields of research and educational institutions'.

Highlighting the diversity of congresses slated to be staged there, the Doha Climate Change conference in December will be followed by the 4th International Conference on Argumentation, Rhetoric, Debate and the Pedagogy of Empowerment in January 2013. Events booked in for next year also include the Power-Gen Middle East conference and exhibition, focusing on new developments in the power and water industries, and the Water World Middle East congress that will debate water and wastewater issues.

It seems there will be no shortage of new business coming QNCC's way. Qatar recorded a huge increase in the number of visitors in 2011 and according to the Qatar Tourism Authority, visitors from the Gulf region were up 50% compared to the previous year, while there was an increase of 12% in international visitors. Crucially, business tourism accounted for 72% of the total number of visitors to the oil-rich Gulf nation last year; Qatar tourism is expected to post a 13% growth rate in 2012.

In December 2010, the country also secured hosting rights for the FIFA 2022 World Cup – a landmark decision that has spurred investment in the country's transport, infrastructure, construction and hospitality sectors – and one that has had a beneficial effect on attracting events to QNCC. "The feedback from everybody has been very positive," Chalabi stresses, noting that people have been generous with their praise for the vision and design. "It is another venue to use for conferences and to get the most important people to Qatar to present their work or research."

For Chalabi, though, the most satisfying aspect of the project was seeing the functionality of the spaces come to life from the design concept. In addition to its role as congress centre, the building's mix of spaces is set to make QNCC a magnet for local and international music events, and arts festivals in years to come. "Of course we are proud. Architecturally, it's a landmark in Doha," he concludes. ■

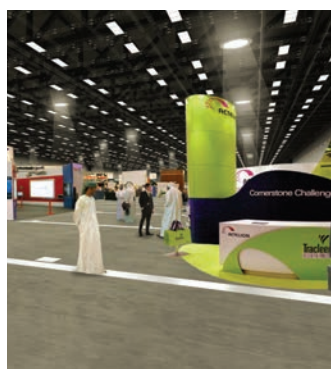
GLOBAL PLAYERS

For Turkish builder Baytur to take the schematic-level design criteria up though the construction document level, it required the services of a full complement of architects, engineers and design specialists, including US theatre and AV consultant Auerbach Pollock Friedlander.

"It was like running a relay race," notes the firm's theatre systems specialist Tom Neville. "We were handed the baton by TPC and ran with it. There was also new design work needed for some of the major systems to accommodate changes in the architectural design, current technology and in the client's goals and aspirations."

"When AEG Ogden came on board to manage the project, several design changes were requested," adds Paul Garrity, Auerbach Pollock Friedlander's project manager, "from the type of lighting grids and stage elevators to the distribution of video and digital signals to the capabilities of the staging areas. We worked to accommodate those changes while remaining true to TPC's original design intent, yet also being mindful of the schedule and budget.

"To reduce overseas travel, we made extensive use of video conferencing to bring Auerbach Pollock Friedlander's design specialists in our three offices into a 'virtual room' with Baytur's Michigan-based architect, Robert Szantner of Yamasaki-RSA, and the site in Doha – often spanning 11 time zones on a single call. The construction of this world-class venue was truly a global effort."



(Above) **QNCC boasts 40,000m² of exhibition space;** (top left) **the third auditorium seats 500 people;** (top right) **exhibition foyer areas**

Author

Mark Bisson is an Amsterdam-based freelance journalist and former editor of *Auditoria* and sister publication *Stadia*

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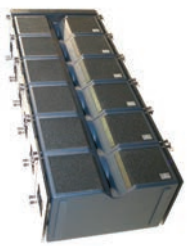

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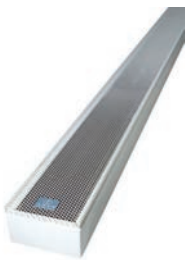

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Festival of light

The Busan Cinema Center – a new permanent home for the the internationally renowned film festival – has brought glitz and glamour to a culture-loving South Korean city

The Busan Cinema Center is a real spectacle in the South Korean city landscape, set apart from its surroundings by an eye-catching cantilever roof that extends 85m from a huge single cone-shaped column support. It is, in fact, the longest such roof structure anywhere in the world and is listed in the *Guinness Book of World Records*, weighing in at an impressive 6,376 tonnes.

At night, the underside of the 60 x 163m roof can be illuminated in an array of colours with LED projectors, communicating the building's status as a dynamic cultural and entertainment mecca. Wolf D. Prix, the charismatic founder and design principal at Austria's Coop Himmelb(l)au, is the brains behind the design, which was the talk of the town when the venue opened for the Busan International Film Festival (BIFF) in September 2011. It has in fact been built to be the new permanent home of the annual event, 'Asia's largest film festival', held in South Korea's second biggest city.

An architectural statement

"The mayor wanted me to design an icon that is visible from all over the city, to create a festival building concept in a very exceptional form," Prix reveals. "The city wanted to have a building for the opening of the film festival ... it's a kind of counterpart to the Venice Film Festival.

"I hate columns," Prix adds, by way of explaining the spectacular cantilever roof structure. "The dream of architects since Gothic times has been to overcome gravity. It could cover an entire football field."

Discussing the spatial grid of LED projectors that provide the glitz as darkness falls, and can be configured for different events, the Vienna-born architect explains: "At night, if you are far away, you cannot see the building, but this moving roof with the projection of lights is like a lightning cloud."

The roof structure does indeed sway – a key design consideration for Busan's sometimes extremely windy weather

Photograph courtesy of Coop Himmelb(l)au, taken by Duccio Malagamba

LIGHTS, FANTASTIC

A central part of Busan Cinema Center's architecture is its huge roof with 42,000 Luxeon LED lights, spanning one and a half times the size of a football field. On the underside of the roof is an LED screen, which provides dynamic lighting and a variety of video effects.

Alongside Humanlitech, Future Lighting Solutions helped to determine the highest quality, most effective lighting to meet the technical requirements as well as aesthetic priorities for such a visible and large-scale venue. The Luxeon Rebel Color Portfolio was selected based on high colour quality, reliability, and colour control. "Using our exclusive design tools to achieve high colour quality and ensure consistent colour bins, we were able to provide support to Humanlitech from concept through evaluation," says Alex Lee from Future Lighting Solutions Korea.

The result is a stunning LED-saturated roof, with lighting that virtually connects the Busan Cinema Center to the sky, artfully merging the plaza with its surroundings and creating a multi-functional urban space that successfully coexists with nature.

Photographs courtesy of Coop Himmelb(l)au, taken by Duccio Malagamba

(Above) **The multi-purpose theatre covering five floors can host operas, musicals, plays and concerts as well as screening movies;** (main) **the cutting-edge outdoor stage**

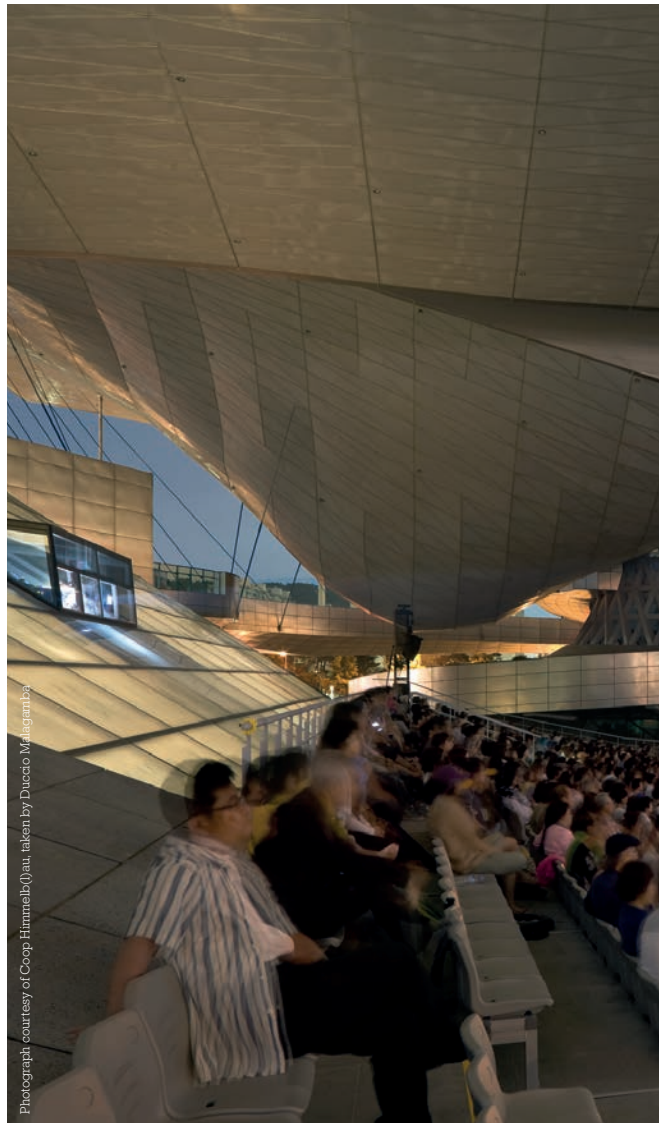
conditions (Busan is on the south-east coast). "It was thought that there will be strong winds in the future so we built in these subterranean columns that can be raised hydraulically and keep the roof from flying away," he explains.

A real show

Busan Cinema Center is, of course, so much more than its signature roof. Built on a 32,100m² site, the €100 million venue offers nearly 60,000m² of performance, entertainment, dining, conference and administrative space. The nine-storey building is a multi-purpose venue boasting 841 seats, a 413-seat theatre and two theatres each with a capacity to accommodate 213 people. Additionally, there is a 4,000-seat outdoor performance hall, which is covered by a smaller roof.

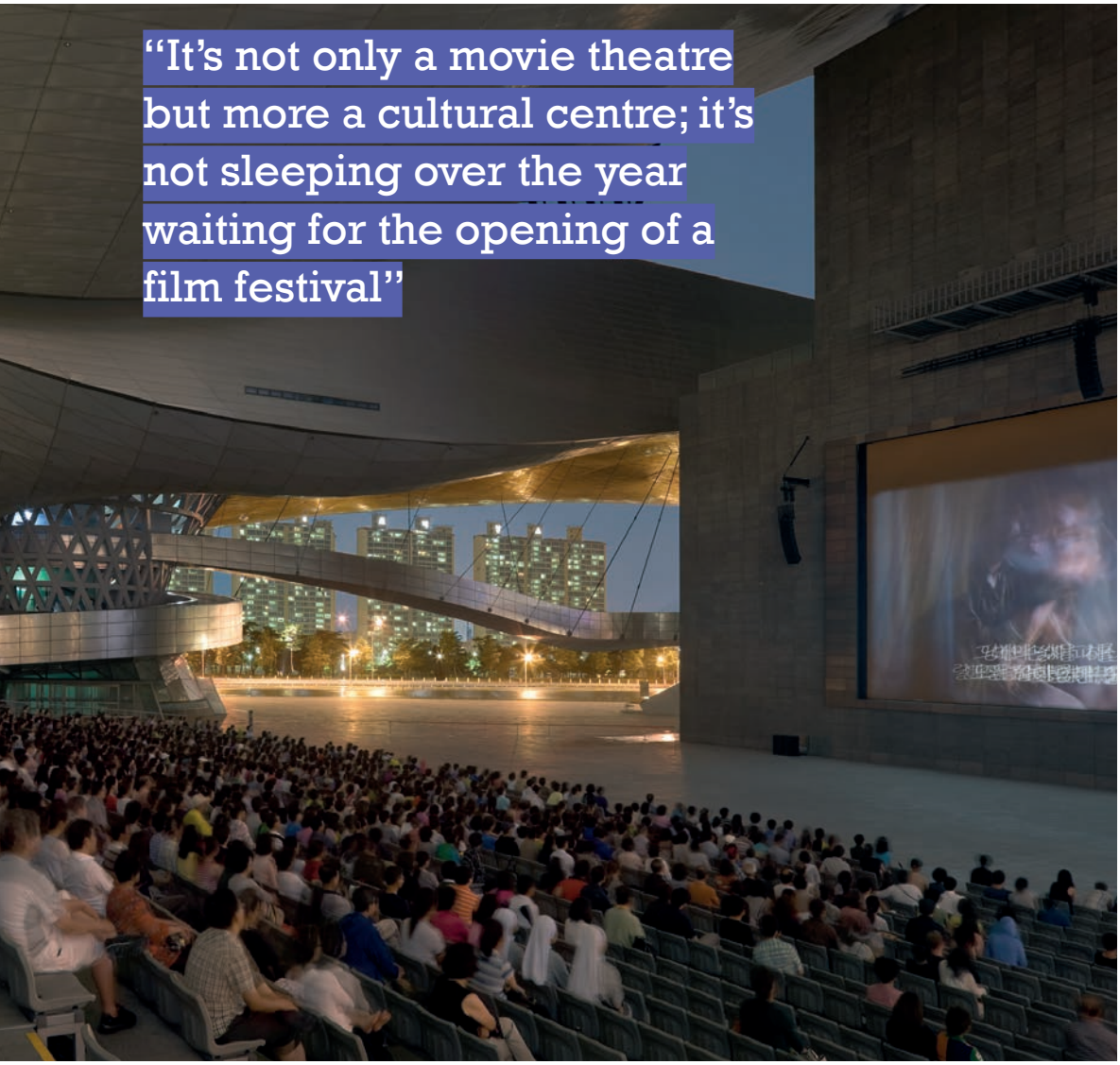
Prix says the project was all about "the combination of public and private space" to allow for the staging of a diversity of events. The smaller roof over the open-air plaza "gives it a special atmosphere", he feels, claiming it is akin to another one of his famous projects, Munich's BMW World. For that project, the 16,000m² roof emanating from a double cone is supported by just 12 hinged columns, which is designed to create the illusion that it is floating.

Despite the stunning Busan Cinema Center design and obvious construction challenges in delivering on the concept, Prix describes it as

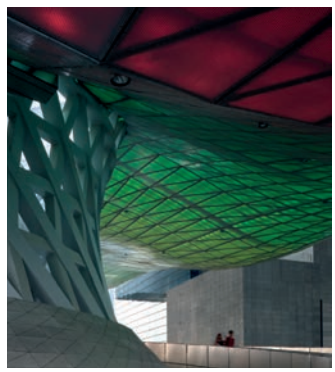


Photograph courtesy of Coop Himmelb(l)au, taken by Duccio Malagamba

a "very economic build" and denies that it was difficult to realise the vision in partnership with the Korean contractor, Hanjin Heavy Industries. The trickiest aspects were the language and cultural differences, which posed some communication problems between the Austrian design team and local architects through the three-year construction phase, which began in 2008. A 25-strong team from Coop Himmelb(l)au kickstarted the project; trips to Busan were frequent in the early stages, Prix recalls. But that number dwindled to three architects who worked closely with



"It's not only a movie theatre but more a cultural centre; it's not sleeping over the year waiting for the opening of a film festival"



Photographs courtesy of Coop Himmelb(l)au, taken by Duccio Malagamba

Media, technology, entertainment and leisure are merged in an open-architecture of changeable and tailored event experiences

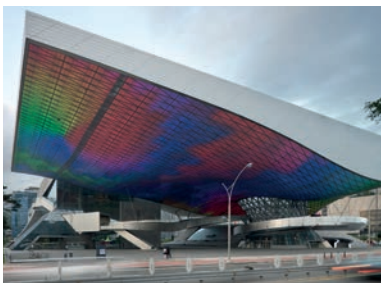
the local architectural firm and constructor to supervise the design and build. "They did it very well," he states.

New chapter for Busan festival

The inauguration of Busan Cinema Center took place in the presence of the South Korean president last September, just a week before the film festival kicked off. "It was incredibly crowded – they absolutely love it!" Prix says of the reaction from film industry types and visitors. "You really appreciate how big it is when people are gathered under that roof."

At the festival itself, 307 films from 70 countries were shown across 36 screens in five theatres, amounting to a total of 815 screening sessions. Nearly 200,000 film lovers attended over the eight-day event, the building drawing praise in the Busan International Film Festival's 2011 report. "It received positive reviews from cineastes and audiences from all over the world for its exceptional design and ultra-modern facilities," the report stated.

The client is pleased and BIFF organisers say the magnificent screening venue ushers in a new era for the event, the 17th of which opens



Photographs courtesy of Coop Himmelb(l)au, taken by Duccio Malagamba

The roof structures on the Busan Cinema Center are designed to endure earthquakes measuring as high as 7.0 on the Richter scale, as well as winds gusting up to 65m/sec and snowfall of up to 1m

in October 2012. Meanwhile, visitors are enjoying a new movie-going experience. It is a cutting-edge slice of architecture for a festival growing in stature on the world stage. Other screening theatres in the Haeundae area of Busan are also used for the event.

Prix, too, is proud of the outcome of an architectural concept that won an international design competition in 2005. "I have had a lot of compliments and they are very happy. I am now an honourable citizen of Busan," he adds. "They gave me a medal!"

Nearly a year after opening, Prix says the Cinema Center is being well used, not just as a venue for film screenings but also as a public space for art exhibitions and different forms of entertainment. "It is very lively," he says.

And that is clearly the point of it – a thriving focal point for the arts world in Busan, and the city is delighted to see the venue it funded starting to pay back on the investment. "It's not only a movie theatre but more a cultural centre; it's not sleeping over the year waiting for the opening of a film festival," Prix explains when asked about its revenue-generating potential. "People use it for exhibitions and shows and rock bands play there, too."

Chinese landmark

Coop Himmelb(l)au's other Asian projects go some way to showing why the Austrian company has garnered a growing reputation for delivering extraordinary pieces of architecture. Construction is nearing completion on the International Conference Center in Dalian, China, for instance, which is set to open in late 2012. Prix flags it up as a further example of his firm's multi-functional design concept for the business and arts world – on a 40,000m² site, the venue includes a theatre, opera house and exhibition space under a single shell-like roof. By any standards, it's a particularly dazzling landmark – an Asian entertainment destination set to wow thousands of visitors each year. ■

TEAM PLAYERS

Client: Municipality of Busan
Lead architect: Austria's Wolf D. Prix; Coop Himmelb(l)au
Builder: Korea's Hanjin Heavy Industries
Cost: Approx €100 million
Funded by: Federal and municipal governments
Site area: 32,100m²
Main features: Longest cantilever roof in the world. New home to the largest film festival in Asia. Houses a multi-purpose venue, three theatres and a 4,000-seat outdoor performance hall covered by a roof
Start of construction: October 2008
Completion: 29 September 2011

Author

Mark Bisson is an Amsterdam-based freelance journalist and former editor of *Auditoria* and sister publication *Stadia*

17th BUSAN INTERNATIONAL FILM FESTIVAL

Dates: 4-13 October 2012 (10 days)
Venues: Busan Cinema Center, plus screening theatres in the Haeundae area of the city
Number of screening venues: 36 screens
Number of films: Around 300 films from 70 countries
Participating guests: Over 10,000 guests from 60 countries
Visitors: Around 200,000 attendees
Source: BIFF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EVERYMAN THEATRE

RUTH SLAVID

Hub of creativity

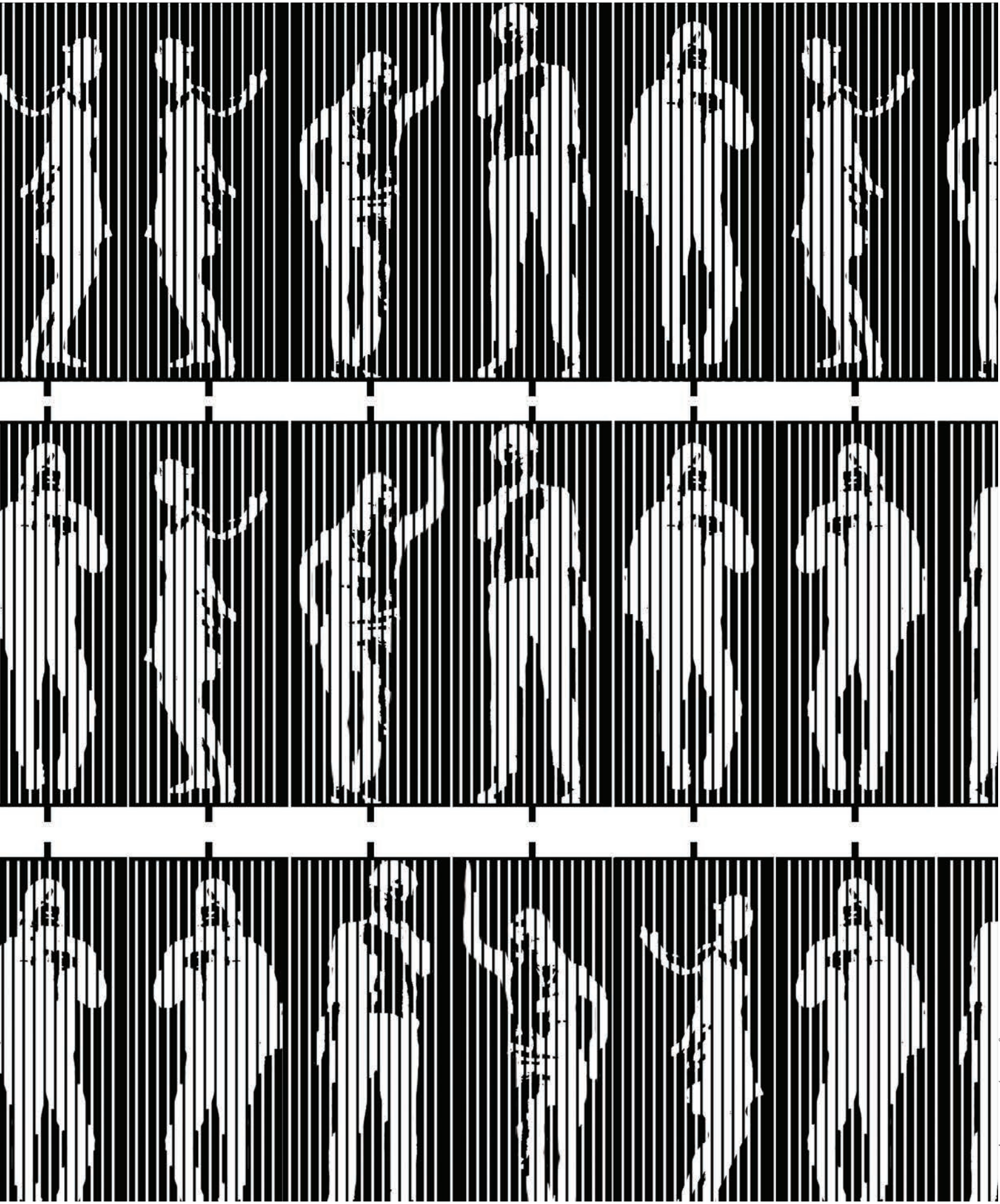
Liverpool's Everyman Theatre has long been a fertile breeding ground for new directors, actors, writers and designers. So how will the 21st century incarnation shape up to its legendary past?

It's not yet clear at what point during the Liverpool Everyman Theatre project that Steve Tompkins, one of the founders of Haworth Tompkins architects, will get his hands dirty, but it's bound to happen at some point. Having worked on some of the most high-profile theatres in the UK, the architect produces sensitive projects through his determination to preserve the spirit of the place, and to attend to every detail. And this almost always leads to a hands-on approach, whether making light fittings in the office, 'skip-surfing' for timber, or grading an exposed aggregate finish in a way that is too subtle to explain to any contractor.

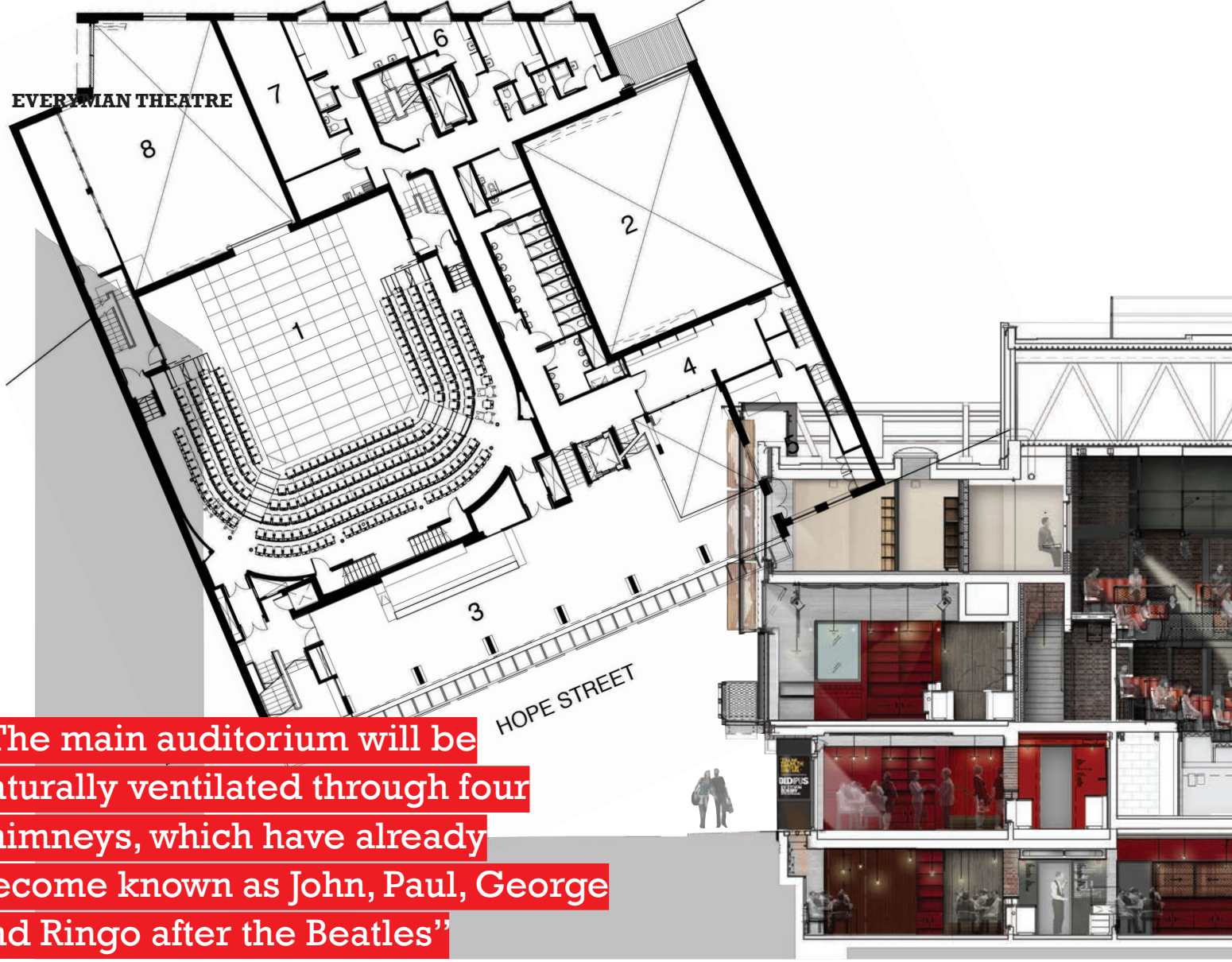
Atmospheric pressures

Most of the practice's theatre work has involved keeping at least a small part of an existing building – and often much more – sometimes for pragmatic reasons, but also to retain the essential atmosphere. At the Everyman, the building fabric will be entirely new, although on the existing site, because the original structure was impractical and of no artistic merit. But keeping the spirit of a place that has pioneered much original theatre, and provided a cultural meeting place for decades, is vital. Among the stipulations in the brief, therefore, was that a basement bistro had, in some sense, to be retained, and that the new building must – like its predecessor – have a large sign on the front spelling out the word 'everyman' (all in lower case).

It wasn't always obvious that the site would be retained though. In 1999, the Everyman merged its management with Liverpool's other main theatre, the Playhouse, and the architect was originally asked to look at a feasibility study to design replacements for both buildings, each of which was in its own way unsatisfactory, on entirely new sites. Not only would this have cost more than £100 million, says Tompkins, but it would have been the wrong decision because



All images courtesy of Haworth Tompkins architects



"The main auditorium will be naturally ventilated through four chimneys, which have already become known as John, Paul, George and Ringo after the Beatles"

The accessible and environmentally sustainable new Everyman will combine the trademark wrap-around auditorium and basement bistro with many new facilities

"the Playhouse is an amazing building, and the Everyman building is in an amazing place".

It's the idea of the Everyman – not the physical fabric – that is important. It sits on Hope Street, a relatively short road of Georgian houses running between Liverpool's two iconic cathedrals, and is also home to the Liverpool Philharmonic Hall, completed in 1939 and about to undergo its own radical refurbishment.

Unfit for purpose

The rough-and-ready auditorium of the old Everyman provided an ideal environment in which to showcase new plays, and the front of house had an exciting buzz to it regardless of whether it was full or half-empty. But in all other respects the building – which was originally a chapel and had been through a number of different uses – was unacceptable: backstage facilities were non-existent; there was no air conditioning, making the temperature insufferable in summer; the front had an ugly 1970s addition; and disabled access was problematic. In addition, neither of the two theatres had facilities for education or a youth theatre – nor proper office space – which were sorely needed.

The theatre therefore decided to purchase the existing site (which was, in fact, owned by the bistro) and build from scratch. As well as the requirement for a replacement for the bistro and the sign, Gemma Bodinetz, artistic director, laid down a vision of the essence she wanted to maintain: "You can come in your jeans; you can come in a dinner jacket. Its scale is human, its aesthetic unpretentious," she states. "There is a real sense that something exciting will happen upstairs and in the meantime you can feel comfortable. You can be yourself. What's more, you can feel pretty sure that all the visible theatre staff will be aware of you, pleased to see you, and ready to serve. There is never the possibility of feeling anonymous or dispensable. It also has a rare ability to make all ages and cultural groups

PORTRAITS OF THE PEOPLE

As part of the creation of the façade of the theatre, in the spring weekends of 2012 a stream of people visited a university building near the Everyman Theatre site to be photographed in a makeshift studio set up by photographer Dan Kenyon. In all, 105 of the resulting photos would eventually be chosen to form the decorative shading to the Hope Street façade of the building. This performs both a decorative and a functional purpose – as the building faces south west, solar shading in the summer is important.

There will be three rows of 35 shutters on the upper part of the building, each formed from vertical strips of patinated aluminium from which the shapes of the subjects in the photographs have been cut out. The aluminium will be a golden colour and will glow in the sunlight. The level of abstraction will be such that – although the subjects will know who they are – they are unlikely to be recognisable. Passers-by will merely see a range of ages and shapes and attitudes that will represent the people of Liverpool – a representation of everyman (and everywoman) on the façade of the brand-new theatre.

The shutters will sit in front of windows, many of which will be administrative offices. Users of the spaces will be able to open and close the shutters to respond to the light. Whereas in many buildings this would be an automated process, with sophisticated sensors responding to changes in daylight intensity, at the Everyman the process will be much simpler – just open the window and adjust the shutter manually. This seems indicative of the general approach at the theatre.

feel welcome. There is no sense of exclusivity at the Everyman, but it achieves that aura without losing its own particular identity."

Stage configuration

The other element that the theatre wanted to keep was the thrust stage, one which – according to accepted norms – is too wide for the size of the theatre. But it had always worked well and, against the advice of other consultants, will be reproduced in the new theatre. It will also allow the space to be reconfigured in every possible way: as an end stage; in the round; in traverse; or as a promenade stage. For the first time there will also be a balcony, and the total capacity in thrust-stage configuration will be 411.

By an odd coincidence, the new auditorium will occupy exactly the same place as its predecessor, but the rest of the space will be entirely different. The front of house will be on three levels, with a bar on the ground floor of a double-height space, and a connection to the basement bistro so that although it will still have a cosy feel, it will be less closed off from the rest of the theatre. This should address the issue of falling visitor numbers as the old stalwarts have died or moved away. The areas will be 'buzzy', but not too noisy as there will be acoustic plaster on the ceilings. This is a potential problem for artist Antoni Malinowski, with whom Haworth Tompkins has collaborated on several projects. At the Everyman he has produced a proposal for using rich colours on the ceiling, but is struggling with the absorptive properties of the acoustic plaster, and in particular with the potential effect of any making good.

Creative thinking

Other elements of the theatre will include a writers' hub, a dedicated space overlooking the entrance area and divided into an informal area and a space with desks for writing. In a theatre that lays such an emphasis on new writing, this is an important resource. Equally important are the

The new façade, representing the people of Liverpool, expresses the fact that this is an Everyman for everyone

theatre and community room with rehearsal space above. Both of these are at the rear of the building and although connected to the foyer can also be accessed by a rear entrance when the theatre is not open to the public.

Along with the main auditorium, these spaces will be naturally ventilated through four chimneys, which have already become known as John, Paul, George and Ringo after the Beatles. This approach will help the building – the design team hopes – to achieve BREEAM excellence.

"The Everyman has always been a brave theatre; it has been counter-cultural and stood for workers' rights," continues Bodinetz. "It would be wrong if this was perceived as an indulgent piece of architecture. As an organisation, we already take green issues seriously, but it's hard to be green as a theatre." The other reason for natural ventilation, she adds, was that "actors hate air conditioning. It's a hideous white noise". Bodinetz is delighted, though, that it will no longer be necessary to close the theatre in the summer. A void above the venue will provide the acoustic attenuation needed to prevent outside sound leaking back into the theatre through the chimneys.

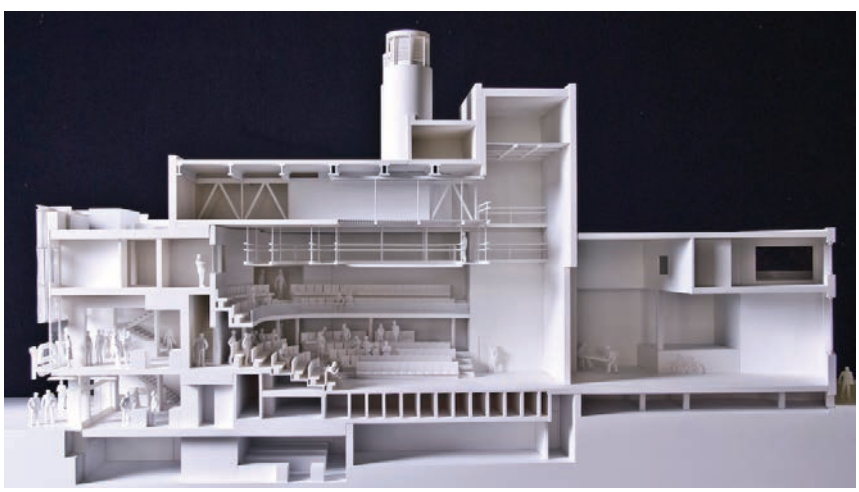
Built to last with bricks from the past

The construction materials are predominantly concrete and brick, the latter being another link with the old theatre as it's been re-used from the demolition, and will form the walls of the auditorium where it will be fixed with lime mortar and painted a dark colour for intimacy.

SIGN FOR THE TIMES

The bright red neon 'everyman' sign was the most obvious part of the old building, and an important signifier of its position. There will be a similar sign on the new incarnation and although it will glow like neon, more energy-efficient LED lighting will be used. This also has the advantage of being very long-lasting so that maintenance can be planned and there will be no risk of parts of the lighting going dark. Jake Tilson Studio has designed a special typeface for the sign, which the theatre is already using on badges and may use on other promotional material. As well as shining into the street, the sign will cast a warm glow into the Everyman bar at night.

(Below) **The new Everyman will allow the venue to expand its already ambitious programme and attract the UK's leading theatre companies;** (bottom) **a scale model of the new theatre**



Although the texture has a certain luxury, it is a fairly rough, tough one, but this will be offset by the old gold colour of the seating, a colour brought over from the previous theatre and – again as in the previous theatre – the seats will have two arms for comfort.

Just as a kind of understated dressing that is seen as cool in London would seem shabby and underdressed in Liverpool, so an Everyman Theatre without a touch of bling could be misunderstood and seem to exclude parts of the community. "People don't want to feel threatened by a place that's too cool for school," Bodinetz says. "Audiences don't want to have to dress up; we don't want it to feel civic. But if you're parting with money, you don't want to give them a shed either. Having a mix of materials is important."

Including the land acquisition, the new theatre will cost £27 million. For this, Liverpool should get a theatre that is new in every way that counts: energy-efficient, comfortable, accessible, and has all the facilities that are needed by performers and the community. And yet, in other ways, it will be as similar to the old theatre as possible: friendly, adaptable, ambitious but inclusive. Materials have also been chosen to grow old gracefully, so there won't be any question of having an initial excitement that soon wears off as the building ages. The design of the new Everyman is a delicate balancing act, but one the client and architect seem to have achieved. ■

Author

A regular contributor to the *Architects' Journal*, **Ruth Slavid** is a UK-based freelance journalist specialising in architecture and construction

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ROYAL OPERA HOUSE MUSCAT
THEATRE PROJECTS

Jewel of the East

Photograph courtesy of Royal Estate Affairs and Royal Opera House Muscat

The Royal Opera House Muscat combines an intricate, opera-ready stage with complex technological innovations that convert the auditorium into an acoustically perfect symphonic concert hall

Beautiful and technically complex, the Royal Opera House Muscat is a landmark arts facility established by Royal Decree to develop the Sultanate of Oman's cultural heritage and artistic engagement. At its heart lies a versatile state-of-the-art auditorium, capable of seamlessly transforming from a proscenium theatre for opera to a symphonic concert hall – and all at the touch of a button.

Radical vision, cultural icon

One of the most remarkable things about the Royal Opera House Muscat is the vision that inspired it. It's the first opera house in the Gulf where there is no established culture of opera or western classical music in the region. In fact, the nearest dedicated opera house is in Cairo, more than 2,750km (1,700 miles) away.

Sultan Qaboos Bin Said's ambition to build a world-class cultural exchange facility was a bold move. He is passionate about western classical music and wanted to develop this art form in the Sultanate. Although Oman has a rich history of traditional music and dance, there is no other performing arts centre of this scale in the region. And with no established audience base to draw from, the Royal Opera House Muscat has had to build it from scratch. Even the majority of non-technical staff working in the opera house had never been exposed to this kind of cultural environment before taking up their new posts, so the challenge of cultivating a theatre-going culture exists at every possible level.

To get it right, the client (the Diwan of the Royal Court) knew that it would have to rely on the expertise of international experts, both in the design of the building and in helping to get the right artistic programming that would attract audiences.

"Theatre Projects worked on the development of the project with the Diwan for more than 10 years," explains David Staples, chairman of Theatre Projects. "We advised the client on the concept and brief for the new facility, and then assisted with an architectural competition to select the design team." Advisors from the Kennedy Center then took over to help in the programming and operations of the building.

A melting pot of cultural influences

The relationship between a visionary client and international design and cultural experts was just the beginning of the global dialogue for the Royal Opera House Muscat. The eclectic programming of the centre highlights how the facility aims to showcase the world's best classical performers alongside traditional regional performance types.

The centre's goal is to celebrate the traditions of all people, whether they are prestigious names such as Plácido Domingo, the Mariinsky Ballet, the Vienna Philharmonic, Renée Fleming, or Yo-Yo Ma, popular regional acts such as Syrian singer Oman Sarmini and the Traditional Arabic Ensemble, Cairo-born oud master Ammar El Sherei, or the Sultan of Oman's own orchestra, the Royal Oman Symphony Orchestra.

The Royal Opera House Muscat is truly a trailblazing venue, working hard to promote world culture on its stage. After performing at the opera house in November, Yo-Yo Ma described the building as "magnificent", proving that the venue is already popular with artists.

All photos on this spread courtesy of Royal Estate Affairs and Royal Opera House Muscat

(Clockwise from bottom left) **Carefully manicured landscape gardens surround the building; the architecture is inspired by classic Islamic design; the exterior is made with locally sourced Omani desert rose stone; the foyer has high ceilings and a grand staircase; the unique auditorium has a regal red and gold colour scheme**

Timeless building, modern twist

Architecturally, the building is designed in the classic Islamic style, embracing some of the traditional forms and details of grand buildings from around the region. Architects Wimberly Allison Tong and Goo (WATG) designed it with traditional Arabic design elements such as porches, terraces and sculptural tower forms, built with local construction materials (Omani desert rose stone) and stucco wall coverings. The building is set within an 80,000m² plot of land and surrounded by carefully manicured landscaped gardens, creating an impression of elegance and grandeur.

Inside the building, exquisite attention to detail is displayed in every element – from the intricate handmade ornaments to the crystal chandeliers specifically designed for the opera house and the gold leaf inlaid in the hand-carved wooden decorations. Even the foyer is impressive, with its bright and airy atmosphere, high ceilings, grand staircase, and elegant design.

But the jewel in the crown lies at the centre, the auditorium, which with its regal red and gold colour scheme is more than just aesthetically beautiful. What makes it so special is its versatility and the technology hidden behind its decorative walls.

Versatile auditorium design

The auditorium is a multi-form room designed to accommodate a wide range of performance types in a technically and acoustically perfect setting. To achieve this, Theatre Projects worked painstakingly with WATG, Acoustic Dimensions, and other specialists to create an innovative auditorium capable of rising to the challenge of the centre's programming demands. The room they created has two basic configurations to match the event being presented.

In 'opera mode', the auditorium seats 1,100 audience members. A traditional horseshoe shape, the room features a proscenium arch, fly-tower, and orchestra pit. The stage is generously proportioned, with side stages for scenery and sets associated with large-scale opera. What's unusual about the staging in this format is the forestage lift; it is a dual-level elevator that sits across the proscenium line, so the safety curtain lands onto it. Overstage

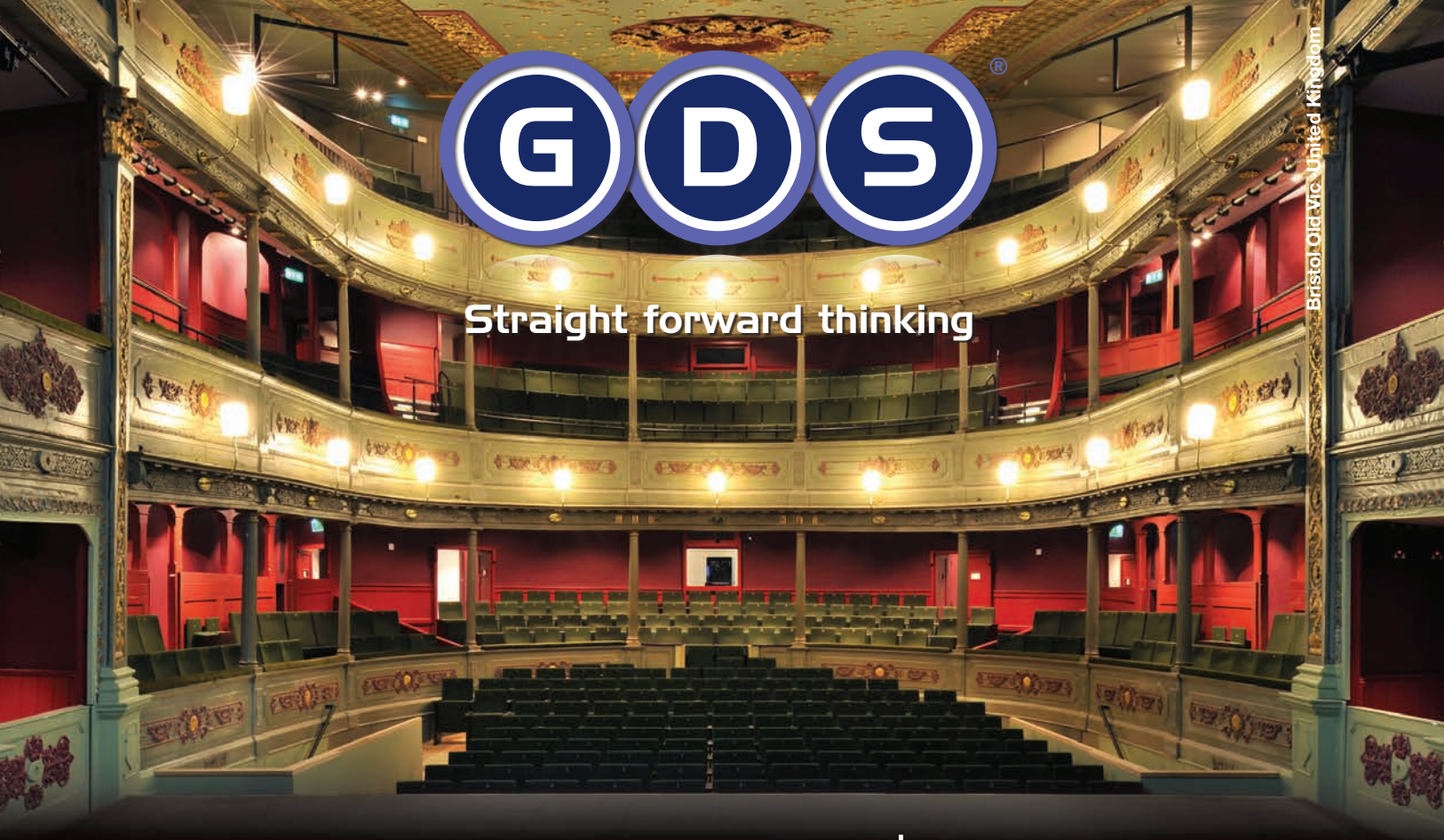

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Photo courtesy of Royal Estates Limited and Royal Opera House Muscat

BY ROYAL APPOINTMENT

The auditorium features a variable acoustic environment, custom-built motorised diamond track and front-of-house curtains provided by J&C Joel. In all, 36 acoustic motorised roller banners were installed behind wooden fretwork panels in the venue's VIP boxes. Roller banners were also installed above the hall's control box to mask the acoustically reflective glass windows when required. Acoustic panels were also fitted at high level and on the auditorium's rear walls, while 144 acoustic wool serge curtains, hung from E Rail tracking within each of the ROHM's reverberation chambers as well as the rear stage and concert shell areas, provide an effective sound baffle. Acoustic curtains are situated up high and – where access is restricted – suspended from remotely operated motorised tracking so they can be easily deployed.

The bespoke front-of-house curtains were manufactured from a custom Vegas Velvet Velour measuring 22.5m wide and with a drop of 12.5m. These featured a 1m-high panel of intricate embroidery made to a design supplied by the Opera House's creative staff. The curtain is raised with a motorised diamond track that was engineered to allow both traditional traveller and tableau front-of-house curtain opening.

full-power flying is provided with bars at 250mm centres to support fully staged productions. The winches are housed in an upper-level machine room, leaving the stage grid clear for point hoists, temporary suspensions, and cable reels for stage lighting.

Amazing transformation

Using advanced automated stage engineering systems, the room easily transforms into 'concert mode'. In this format, the room becomes a classical shoe-box concert hall with parallel side walls and a high, flat ceiling. This configuration creates a visually and acoustically ideal environment for all types of music, and the audience and the musicians share the same space. To create the right environment for classical music performances, a 500-ton 'concert shell' with variable acoustics is moved into place on tracks from the rear of the stage; the stage proscenium has to lift up through the lower grid so the concert shell can move into place.

The dramatic transformation that takes place on stage to switch between the two room configurations is also reflected in the auditorium design. Variable acoustic devices were designed to meet the needs of the different performance types that take place on stage. These include flown ceiling panels (with duplicate interior finishes behind) and rotating side panels that – when coupled with large acoustic doors in the side stage area – can provide additional reverberation chambers. Within the auditorium, a series of integrated banners and drapes maintain uninterrupted interior finishes while providing the acoustic adjustment required.

The concept of the room reconfiguration from 'opera' to 'concert' mode was such a radical idea for the client to accept that the Theatre Projects team built a full working model to illustrate the room transformation. "To complete the transformation, several major engineering feats need to happen," explains Jerry Godden, project director for Theatre Projects. "Firstly, the front seven rows of seats are removed and stored under the stage using seat wagons. The overstage machinery is brought to its upper operating positions and the iron safety curtain is locked. Then the 14.8m pillars in front of the

Image courtesy of Andrew Putler Photos

Model of the auditorium, as developed by Theatre Projects (above)**; technology is carefully integrated backstage** (top)

Photos courtesy of Royal Estate Affairs and Royal Opera House Muscat

The auditorium set up in 'opera mode'

proscenium are moved sideways and the seating 'towers' immediately in front of the 14m-wide proscenium arch move backwards and rotate 15˚ from their parallel position to widen the stage opening to 18m. Finally, the concert shell – which includes a full 30-ton Klais pipe organ built into it – is moved 19m forwards from the rear of the stage, linking it with the auditorium to form a single room. The concert shell is a self-sufficient unit taking power and data over fibre optics when in position."

"We designed the production lighting systems to cater to the opera and concert modes, and to allow a seamless changeover between the two," adds Tom Davis, director for Theatre Projects. "Within the auditorium, we used Sinewave dimming to achieve the critical listening environment and noise criteria that are acoustically required. The audio, video, and communications systems run building-wide, linking the main auditorium with a second performance space, foyers, and roof-top terrace. Just off stage right, a communications room acts as a central hub for all of these systems, linking dual-redundant fibre networks across the building. We provided dedicated loudspeaker systems for the opera and concert modes, hiding the main arrays within the moving ceiling behind trap doors. Side speakers are hidden within folding proscenium panels, enabling a consistent reset when the users move between the two distinct modes of the theatre."

Integrating technical facilities with the finishes in the auditorium (from the marble floor to carved hardwood circle fronts displaying the royal crest) proved to be a challenge. Facilities panels are hidden behind rotating or folding sections of the interior design. The circle front bars were designed in demountable sections, which enables their removal, if required.

The room is as beautiful as it is technical, with patrons of the opera house unaware of the level and sophistication of the technology inside because it is all carefully hidden from view. Even the stage tracks – which carry the concert shell forward – are completely covered by special panels when they're not in use. One technological gadget that visitors can enjoy, however, is the luxury of the subtitle seatback screens provided throughout the auditorium. These touchscreens allow patrons to select from a variety of languages to read subtitle translations for the operatic production on stage. It is thought this is the first time that this service has been implemented in Arabic, giving audiences an additional way to enjoy the spectacle of opera.

The legacy

Although the multi-form nature of the theatre design of the Royal Opera House Muscat is remarkable, what will invariably make this arts centre successful is how it realises its ambitious vision. The design of the auditorium plays a key part in helping the venue to achieve its artistic and 'bigger picture' goals.

The Royal Opera House Muscat has the very real potential of adding Oman to the international circuit of world-class performers and orchestras, with its varied artistic programming potentially placing Muscat firmly on the world's cultural map. More importantly, though, it has the opportunity to educate its visitors and patrons about different cultures, and inspire new local talent. ■

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As good as new

A challenging three-year renovation project at the Santa Barbara City College drama-music building has resulted in a modern facility capable of staging 21st century performances

All photographs by Ciro Coelho

Wheelchair access has been improved inside and outside the theatre buildings

The Santa Barbara City College (SBCC) drama-music complex is home to excellent theatre and music departments, as well 'The Theatre Group at SBCC' – a professional, community and student collaboration that produces a variety of theatre and musical performances. However, built in 1977, the aging facility, comprising a 400-seat Garvin Theatre and a 100-seat Jurkowitz Theatre, presented numerous challenges for modern performances – physically, technically and acoustically – and was in desperate need of a makeover.

In 2009, a renovation team, led by John Sergio Fisher & Associates, embarked upon a major upgrade that would restore the complex to a 'like new' condition and yield numerous improvements for the performers, the students and the audience. A participatory process involving all users was employed to determine the exact programme for the modernisation.

The renovation required much ingenuity due to limitations of physical space and theatre systems. The Garvin Theatre did not have a proscenium wall or a sufficient fly loft with a gridiron and the hall's reverberation time of 1.3 seconds was not at all suitable for the music programme. The Jurkowitz studio theatre's lighting positions, accessed by moving catwalks, were in poor condition and dangerous to use. Accessibility in both venues was completely inadequate.

Technical and physical overhaul

Firstly, the team raised the fly loft in the Garvin Theatre and added gridiron-facilitated motorised rigging for 31 line sets and six double purchase counter-weight sets.

To enhance the reverberation time of the halls, convex-shaped wall panels and box boom lofts were created. The installation of stage level panels on tracks enables reduction or expansion of the volume. Much of the ceiling was gutted (except for the existing catwalks), increasing the acoustic volume to achieve a reverberation time of 1.7 seconds, which is suitable for music. Existing adjustable acoustic draperies and pockets were restored and increased in order to enable reduction of the reverberation time to one second for plays and sound-reinforced musicals.

For orchestra performances, new shell towers and ceilings were installed, which have resulted in acoustics deemed as "amazing" by the head of the music department.

All photographs © Jim Brady

Triple decker

In August 2011, the San Dieguito High School Academy in Encinitas, California, opened a brand new, US$8 million Performing Arts Center, which was six years in the making.

The contract for the design of the centre was won by JSFA in 2007, after the firm put forward a proposal that worked in harmony with the original 1930s campus designed by Lilian J. Rice, using the same materials and colour palette.

The 16,000ft^2 building has three performance venues: a 60-piece music rehearsal hall, a 200-seat black box theatre and an amphitheatre. It is divided into a music wing and a drama wing with a practice courtyard in between. The theatre contains a moveable telescoping seating system with upholstered seats on casters. The system enables end stage, traverse, ¾ round and theatre in-the-round seating configurations, and easily and quickly disappears into a flat floor at minimal labour expense.

The theatre also has large sliding doors, which open out to a natural grass 500-person amphitheatre and its stage. The surrounding catwalk in the black box theatre contains adjustable acoustics draperies, which, when gathered, enable a reverberation time of 1.6 seconds for acoustic music performances, and when fully deployed, an RT of 1.0 seconds for drama and sound reinforced musicals.

Exterior lighting catwalk with reflectors for the amphitheatre (top left)**; music rehearsal hall** (top right)**; tension grid and movable telescoping seating in the black box theatre** (above)

Functional architecture

Concrete masonry unit construction prevents low frequency wave absorption and simultaneously provides proper sound transmission loss and high mass thermal retention. The curving catenary roofs and curving exterior lighting catwalk for the amphitheatre stage makes the building an icon for the performing arts and a gateway to the campus. The roof curves, convex to the performance venues, disburse the sound waves eliminating the need for internal reflectors.

The administration, faculty and students are said to be delighted with the simple beauty of the complex, its functionality and the acoustics. ■

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The team also created orchestra shell tower storage and additions to the dimmer room, as well as a new orchestra pit lift that allows for 30 more seats or a stage thrust.

Meanwhile, the studio theatre travelling catwalks were replaced with a tension grid that covers the entire space, enabling complete, safe flexibility of lighting positions.

To bring the theatre's technical capabilities up to scratch, state-of-the-art lighting, sound and automation systems were added to replace the aging theatre's equipment.

Access all areas

To improve accessibility within the halls, particularly for disabled patrons, the audience chambers were gutted and reconfigured to provide a cross-aisle and eleven wheelchair positions.

The existing lobby was expanded to include a concession area and a bridge from the new elevator, making the existing control rooms accessible by wheelchair. The new, accessible lobby with skylights provides a level entrance both to the Garvin Theatre, cross aisle and stage, and to the Jurkowitz Theatre. Wheelchair accessibility requirements were exceeded and new elevators facilitate wheelchair access to the catwalks and control booths. This theatre is one of only a few in the country with such features.

In addition, the existing music practice modules were replaced and augmented with two new wheelchair-accessible practice rooms.

The building's inadequately sized restrooms were expanded – particularly the women's, which was tripled in size and now has double the number of fixtures than the men's.

Bright future

The three-year theatre modernisation project is now complete, with virtually all of the planned outcomes achieved. The college, the theatre and the music faculty users are said to been delighted to have entered the 21st Century.

With better facilities and equipment, The Theatre Group at SBCC is now able to perform a larger variety of technically complex and demanding shows, and kicked off its new era with a series of successful performances of *Avenue Q* at the theatre in July 2012. ■

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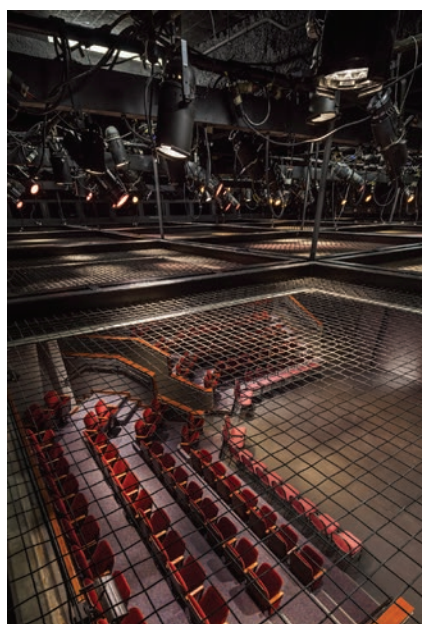
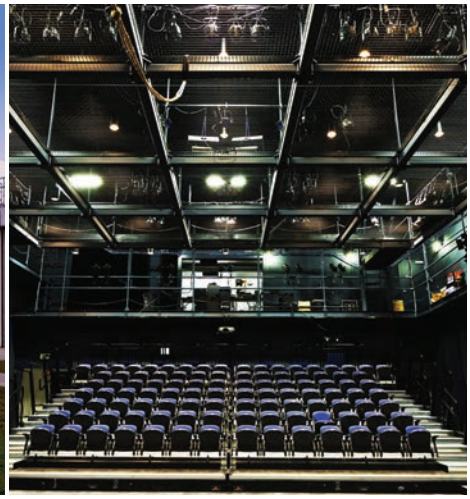
The reconfigured, cross-aisle seating configuration features 11 wheelchair spaces (above)**; tension grid for lighting support** (below)





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Entry court to the black box theatre lobby (top left)**; tension grid and movable telescoping seating in the black box theatre** (top centre)**; music rehearsal hall** (top right)**; exterior lighting catwalk with reflectors for the amphitheatre** (above)

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Back for the future

The revival of the historic Howard Theatre in Washington DC has brought culture, music and soul back into the community

For those who might not know, there once stood in the heart of Washington DC, USA, an icon of the black entertainment circuit (everyone played there), which over the years was not only a crucible for entertainers with DC origins, such as Duke Ellington, Roberta Flack, and the mainstays of go-go, but a true home for lovers of jazz, R&B and Motown. Before it was lost to the ravages of time, the Howard had opened a century ago in DC's historic Shaw neighbourhood to become one of the most important venues in the city and in the nation. Its early history eclipsed that of Harlem's famed Apollo Theatre in that it opened a decade earlier and while it was originally designed for African American audiences, it ultimately served as a cultural centre for all audiences and aficionados of contemporary music.

One could list an abundance of reasons as to why the Howard Theatre remained in decay for a quarter of a century, including the deterioration of its surrounding neighbourhood and major changes in the Washington music scene. Nevertheless, the Howard's glorious past and its historic role in the community kept a potential revival in the thoughts of many including city leaders in both politics and the arts. It was only when a rich new programme and a sustainable operational model were developed that the Howard's time could come again; re-created as a facility that recognises its own history but firmly looks to the future to once again be a national treasure.

(Clockwise from left) **The newly renovated, modern theatre interior; The front façade, which has been returned to its original appearance; The Howard Theatre in 1910**

Ambition and tradition

By 2008, developer Chip Ellis of the Ellis Development Group had begun his efforts to bring the Howard back. Little of the actual theatre remained except four brick walls, the skeleton of a balcony, a handful of historic photographs and a lot of memories. Although the Howard's special history would distinguish it from a plethora of new smaller music venues emerging across the country, the surrounding neighbourhood was being rebuilt and did not offer the same supportive amenities and population base that a more downtown location would. Ellis recognised that simply restoring and reopening the theatre would not be enough – he had to create a destination entertainment experience that would be unique in its presentation and could accommodate a wider range of entertainment options.

In order to realise this ambition, he brought in Martinez+Johnson Architecture who had assisted Ellis and his partners in their successful bid to control the property and had created initial concepts for the venue. Through intensive planning and programming discussions, Martinez+Johnson formulated an idea envisioning the facility as a reborn national cultural icon, whose success would again be measured as a generator of activity beyond anticipated evening performances.
A new audience chamber design would recapture the surviving 'bones' of the old theatre but offer a wide variety of seating and performance options, including 500 to 800 patrons and increased presentation flexibility. This would enable the venue to move beyond the tradition of proscenium style music performances and open up to accommodate varying audience sizes and different types of performance such as jazz, rock and gospel.

Martinez+Johnson quickly recognised that the building envelope was not large enough to accommodate the support features necessary for the facility to successfully operate in the 21st century. As examples: for performers, there was only an on-stage dressing room; for patrons, there was minimal lobby space, few amenities, and constricted circulation; and for operators, no offices and a difficult loading configuration. Since the structure was 'landlocked' on its flanking sides, the design team developed a solution through excavation under the orchestra level to create an entirely new sub-grade level that would house patron support facilities and a commercial kitchen to provide upscale dining. Ellis brought in Marcus Samuelsson, the chef of Red Rooster Harlem restaurant, to create the dining experience and the BlueNote Entertainment Group, managers of the iconic New York Blue Note club, to operate the facility. The extent and quality of these services distinguishes the Howard from comparable music venues and establishes a programme paradigm applicable to a new generation of entertainment centres.

Supported by fellow team members Schuler Shook Theatre Planners and Talaske | Sound Thinking, Martinez+Johnson led the 30-month

The view from the stage (above left)**; The new Howard Theatre main lobby** (above right)

design and construction effort, facing numerous challenges; shifting funding programmes and an ever-deteriorating building structure required the team to continually refine and adapt the project approach through design and construction detailing. BlueNote's involvement solidified presentation, while operational programming enabled the team to focus on rectifying physical deficiencies in the existing building. Extensive modifications including reinforcement of the building envelope to improve acoustical and thermal integrity constituted a major intervention. Combined with the new space under the building, these additions to the original venue established the foundation for the expanded performance capabilities of the new Howard Theatre.

A modern addition

The other major component of the project is a planned artist-centred complex containing classrooms, rehearsal rooms, libraries and recording studios, as well as a museum and gift shop, both commemorating artists who have performed at the Howard in the past and showcasing artists of the present day. Additionally, creating a permanent home for the Washington Jazz Arts Institute had been an important part of the project since its inception. To house these vital functions, the developers annexed property behind the theatre and Martinez+Johnson created a modern addition complementing the historic theatre.

Good will

As the Howard Theatre completes its first year 'back', the special synergies that have made it an instant success have been recognised as a virtual model for clubs and small theatres across the nation. The Howard had a name and a reputation, but neither had been catalysts for the revitalisation of the theatre until the public-private partnership between the city and a visionary development team was created, establishing a strong vision where commercial and artistic interests could work together. The developer and the design team created a living, breathing entity that reflects what is important in both the old and the new.

Gary Martinez and Tom Johnson of Martinez+Johnson believe strongly that the Howard model could work without a historic resource.

"Very little of the old theatre actually existed prior to the 'restoration' except for the physical site and a lot of good will," notes Martinez. "Combining a first-rate, 500-seat jazz club, a high-end restaurant, and an acknowledgement of both the surrounding artistic community and cultural tourism, established a multi-faceted venue where the arms all support each other. This could happen anywhere in the USA."

Clever solutions, along with well conceived planning and design, facilitate completely integrated operations and highly active venue programming at the Howard. The facility was recently compared to its most direct competitors and was found to offer almost ten times as many entertainment nights (not including regular gospel brunches, community-based entertainment and private events). The facility is used as a national presenting house as well as by the local artistic community, engendering a fairly constant stream of activity within the hallowed hall.

The re-energised Howard Theatre completes a process of healing its surrounding neighbourhood as now, on the same block, a high-rise office building and an apartment building are also under construction. ■

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New dawn

Three new theatres – different in design and contrasting in purpose – reach out to new audiences

Two opposite trends have dominated the theatre design and construction industry over the past decade. First, a nationwide boom in the construction of large, multi-hall venues, many of which have struggled to manage long-term operating costs and stay solvent. Then, in an abrupt change of course, the economic downtown halted many plans for construction as funding sources dried up. The stark realities of this boom/bust cycle make a current movement in New York City all the more striking. Three arts organisations, all established yet all very different, embarked on the construction of theatres ranging from 112 to 299 seats in the middle of a tough economy. The Lincoln Center Theater's LCT3 and Brooklyn Academy of Music's Richard B. Fisher Building have just opened in spring 2012. A third, Theater for a New Audience, is under construction and will open in spring 2013.

Each new venue stems from a desire to draw new audiences to theatre, yet the architectural response for each – all designed by H3 Hardy Collaboration Architecture – is as different as each organisation's mission.

New artists and audiences

Lincoln Center Theater is the flagship for arts in Manhattan. Since Lincoln Center's creation in the 1960s, the events staged at the 1,060-seat Vivian Beaumont and the 299-seat Mitzi Newhouse theatres have defined quality performing arts in the city and beyond. However, Lincoln Center Theater recognises that its audience is ageing and that to sustain its success into the future it needs to connect to new audiences and to support emerging playwrights. The 112-seat Claire Tow Theatre supports LCT3, Lincoln Center Theater's four-year-old emerging artists initiative.

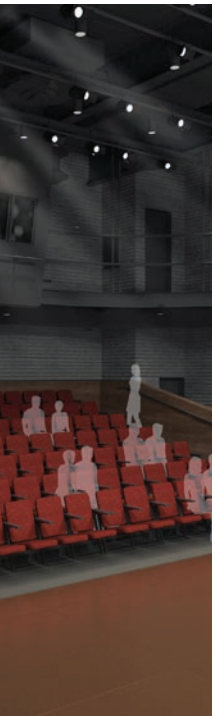
Across the river in Brooklyn, the Brooklyn Academy of Music (BAM) has made a concerted effort to reach out to the community. In doing so, BAM has transformed its once forlorn Fort Greene neighbourhood over the past 30 years. In partnership with H3, it has restored and expanded its historic campus to become an internationally recognised centre for the arts. With the 2,090-seat Opera House and 874-seat Harvey Theater, however, BAM lacked a smaller venue that allowed artists flexibility to experiment and engage audiences and the community in innovative ways. As the first new building on BAM's campus since 1908, the Richard B. Fisher Building fills this gap with the 250-seat Judith and Alan Fishman Space.

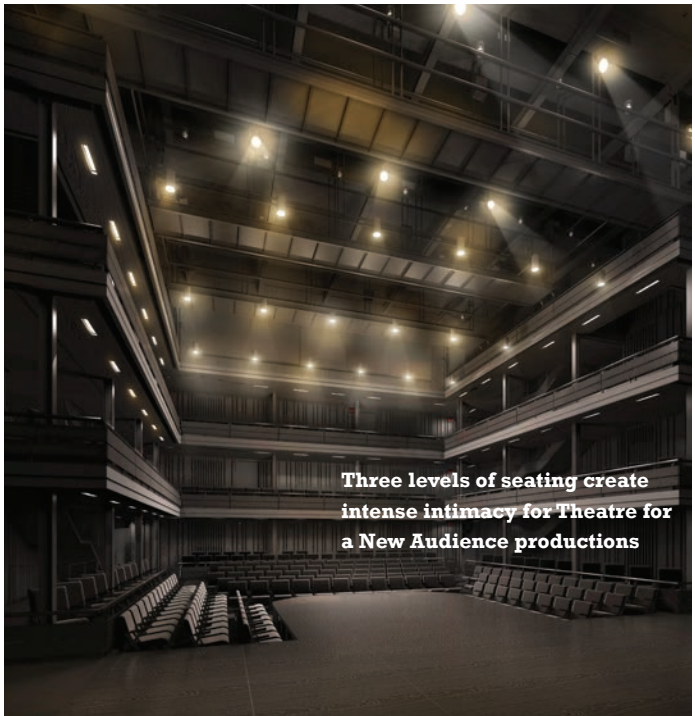
Part of the growth of BAM entails the city's creation of the BAM Cultural District, meant to establish a wider arts community in its Brooklyn neighbourhood. Theater for a New Audience (TFANA) is a critically acclaimed producer of classical plays, which has operated without its own home for more than 30 years. By making the significant move from Manhattan to the BAM Cultural District in Brooklyn, TFANA has its first opportunity to materialise its identity through architecture. The new building, with a 299-seat theatre as its heart, creates a fitting new home.

In each new building, rehearsal spaces with abundant daylight function as additional flexible venues. The rehearsal room connects to the backstage with a movable wall, enabling the creation of a smaller, 100-seat performance space. The ancillary spaces focus on inviting the community in, with a 100-seat rehearsal venue, an education centre and a rooftop terrace with retractable roof. All three buildings make food and drink a focus, allowing audiences to come early and spend time in the building before, during and after shows.

The Claire Tow Theater adds a small end stage to Lincoln Center's portfolio of venues

LCT3 provides a subtle addition to the roof of Lincoln Center Theater





Three levels of seating create intense intimacy for Theatre for a New Audience productions

TFANA's new home is the first theatre built for Shakespeare in New York City since the 1960s

The new Richard B. Fisher Building at Brooklyn Academy of Music is designed to invite in the community

Reflection of mission

Although all designed by H3, each of these three buildings looks very different, the character of each informed by the institution's mission and by the unique context of each site.

LCT3's design is a clear, contemporary expression of new activities necessitated by the growth and artistic aspirations of Lincoln Center Theater. After unsuccessfully attempting to put a third theatre in many locations within the existing Lincoln Center complex, including in the underground parking garage, the theatre decided that the only suitable location for the small-scale addition was on the roof of the Vivian Beaumont Theater. Respecting the rigorousness of Eero Saarinen's original design, the spaces are contained in a simple rectangular volume informed by the building's structure of 20ft concrete trusses. During the day, the addition appears only subtly at various points on the plaza. At night, the new volume comes to life, glowing above the existing roof and inviting curiosity.

BAM Fisher's design reflects its midblock position between the BAM Opera House and the tallest building in Brooklyn, the Williamsburgh Savings Bank Tower. It reuses the existing Salvation Army building and adds a six-storey addition reflective of the project's location in the BAM Historic District. The addition's façade provides a subtle, textural counterpoint that lets the historic Salvation Army building take centre stage.

H3's design for Theatre for a New Audience reflects the building's function as a laboratory for modern theatrical interpretation of classical plays. The simple form of the building belies its structural complexity and intricate acoustical isolation from the city's exterior and subterranean noise. The volume of the building projects outwards from its site, with the second-floor lobby dramatically cantilevering over the main entrance below to create a nearly seamless connection between the lobby and the planned Arts Plaza wrapping the front of the building. Cloaked in gunmetal grey metal panels, the exterior skin appears as a seamless, opaque surface in contrast to the front façade's glass curtain wall suspended from above.

Small, unique theatres

The 112-seat Claire Tow Theatre at Lincoln Center complements the scale of LCT's existing venues and offers a practical way to present new ideas to smaller audiences. After considering a block box, LCT3 settled on fixed seating, so that artists could focus on the art rather than the effort and expense of shaping the theatre. Artistic experimentation can now become an integral part of Lincoln Center Theater.

BAM Fisher's 250-seat Judith and Alan Fishman Space is totally flexible, with movable seating and a tension grid. The theatre allows for any form of experimentation, engaging audiences in any imaginable way. Each production planned in the theatre's first season uses the space in a different configuration.

TFANA's 299-seat theatre is a traditional courtyard form interpreted in a contemporary language. Based on the National Theatre's Cottlesloe in London, its three levels of seating create an intensely intimate theatrical experience. The finishes and furniture in the main stage are all black, with no visual distraction from the activity on stage.

Environment and operations

Although each organisation's goals for the new small theatres are different, an aim for sustainability is a parallel. Each project is born out of an aspiration to sustain success now and into the future, with an eye towards solidifying connections with the next generations of audience and artists. H3's design approach supports economic sustainability with environmental responsiveness to minimise operating costs. These strategies range from LED lighting to green roofs to careful organisation of thermal mass. But beyond that, each design manifests the evolving identity of each organisation and supports its current and future programming. ■

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Lincoln Center Theater, LCT3

Close encounter

The Performing Arts Center and Wangari Maathai Hall on Soka University of America's Southern California campus have been fine-tuned to host a variety of performances in a highly intimate setting. One could compare its 1,200-seat multi-purpose hall, the centrepiece of the project, as a meticulously crafted instrument, with precise natural acoustics and sightlines designed to deliver an excellent audio and visual experience for performers and audiences alike.

The new complex – located on a sloping site on the private, non-profit university's campus – features the multi-purpose hall, a 180-seat Black Box Theatre, support spaces and classrooms. Envisioned in the school's campus masterplan and representing the institution's first addition since the campus was largely completed eight years ago, the project marks the first real performing arts spaces for Soka – an educational facility founded on the Buddhist principles of peace, human rights and the sanctity of life.

The university, in planning for a performing arts and teaching facility, wanted to create an exciting, innovative environment for both the campus and the broader community.

"The goal was to design a world-class space that from exceptional acoustics to architectural finishes would serve emerging and preeminent artists and the campus community, create highly memorable experiences for audiences, and complement the understated elegance of the campus", explains Archibald Asawa, the university's CFO as well as vice president for finance and administration.

The new performing arts complex at the Soka University of America has been attuned for acoustic perfection and functional versatility in an intimate setting

Photographs courtesy of Nick Merrick, Hedrich Blessing Photography

Two adjoining buildings comprise the Performing Arts Center and Wangari Maathai Hall: an L-shaped academic building and a multi-purpose hall. The academic building's top three levels feature classrooms and offices that wrap around the Black Box Theatre. The first level is back-of-house space, including dance studios, which provides support for performers.

The centre has been designed to blend in with the school's ensemble of buildings, yet simultaneously stand out as a unique structure. Like other campus buildings, the Performing Arts Center is clad in tan plaster stucco and features travertine marble accents and a red terracotta roof. However, the lobby of the hall – the more public of the project's two buildings – is surrounded by glass, permitting natural light to flood the space.

"We wanted to make sure the centre was a good neighbour and extended the architectural language of the campus, but also that it made its own statement," explains Doss Mabe, design partner with ZGF Architects.

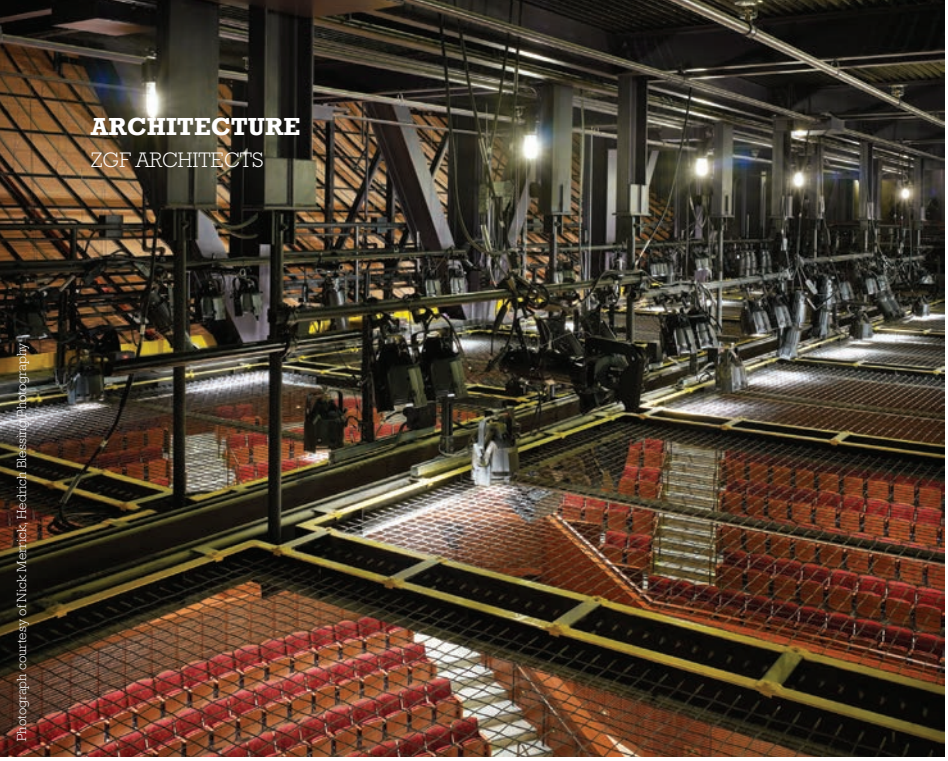
The notion of intimacy is a hallmark of the multi-purpose hall. The project team and client approached the design from the inside-out, with sightlines and acoustics taking centre stage.

"We started with the audience experience, and the bond between the performers and audience, because this is what makes performances enjoyable and memorable," adds Mabe. The decision to create seating 'in-the-round', with the audience encircling the stage, evolved as the project team investigated ways to optimise natural acoustics without reliance upon amplified sound. In effect, similar to an outdoor venue carved into a hillside, the multi-purpose

Photograph courtesy of Nick Merrick, Hedrich Blessing Photography

The glass-walled Soka Performing Arts Center glows at night (above); **The 1,200-seat multi-purpose hall with tiered seating** (below)

Photograph courtesy of Nick Merrick, Hedrich Blessing Photography



[Photograph courtesy of Nick Merrick, Hedrich Blessing Photography]

Dual-level rigging and lighting grid over the stage in the main hall

hall's stage is located at the bottom of a 'hill', with the majority of seats on terraces that rise to the lobby. The site's natural slope supported such a layout well.

"The acoustics and the sightlines are the core of this project," continues Mabe. "The public spaces – the lobbies and support spaces – are a threshold between the campus and the experience of the hall's inner core."

Although in-the-round, tiered seating was favoured due to the variety of performances to be held at the hall. The space is designed to be flexible, with reconfigurable stage and seating made possible by hydraulic lifts and seating 'garages'. These features ensure intimacy, ease of circulation, optimum sightlines, and strong audience-performer relationships for music, theatrical performances and convocation needs.

Tuning the hall

Renowned acoustician Yasuhisa Toyota, president of Nagata Acoustics America (who provided acoustic services for the Walt Disney Concert Hall in Los Angeles and many other worldwide projects), said the Soka hall's layout ensures audience members see and hear performances at the same time that they see each other's faces, enhancing both acoustic and visual intimacy. Toyota, in close collaboration with Soka, ZGF and Auerbach Pollock Friedlander, fine-tuned the venue's materials, dimensions and shape – elements central to both acoustic performance and architectural aesthetics. Specially designed walls placed after every seven rows of seats, for example, reflect sound back into their respective seating tier.

Weight and density also play a key role in acoustics. The outer walls of the hall are layered with conventional building materials – such as concrete, gypsum board, plaster and cherry wood – to provide isolation from outside sounds, while reflecting sounds inside. Slatted wood, meanwhile, was used for the interior wall design to cover the acoustically geometric shapes behind. A heavy ceiling, designed to reflect sound, is stepped up and features two elements.

"Conventional materials have been tuned to perform almost like a musical instrument, with the help of state-of-the-art technology," Mabe explains. A good example is the dual-level rigging and lighting grid over the stage, which represents a unique application of theatrical architectural structures conceived by Auerbach Pollock Friedlander. The lower grid is a tension-wire lighting grid that provides safe access and flexibility for lighting positions; the upper grid is a heavy, load-bearing grating gridiron that provides safe access and flexibility for hanging scenic, lighting and sound systems over the stage. Motorised pipe battens allow rapid set-up and striking of overhead elements – a necessity for a hall designed for music and drama performances.

High performance strategies

Sustainability was a central component of the earliest discussions about the project, which has now received LEED-Gold certification through the US Green Building Council. "We wanted to make a real statement about sustainability," Asawa says. "To have a big dream and then see it come to fruition is amazing."

The performing arts complex is expected to consume about 25% less energy than if it had been built to conventional building codes. Photovoltaic panels on top of the centre will generate an estimated 7.5% of the facility's energy use, while fixed sunshades on the centre's exterior are designed to reduce heat in the main lobby, while retaining visibility. Meanwhile, vegetated green roofs on top of both the Performing Arts Center and the Black Box Theatre portion of Wangari Maathai Hall help to manage and treat stormwater runoff. ■

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Fast forward

Research and innovation is seeing arts venues evolve to meet the changing needs of society – with advanced technology and versatile design creating a more immersive experience

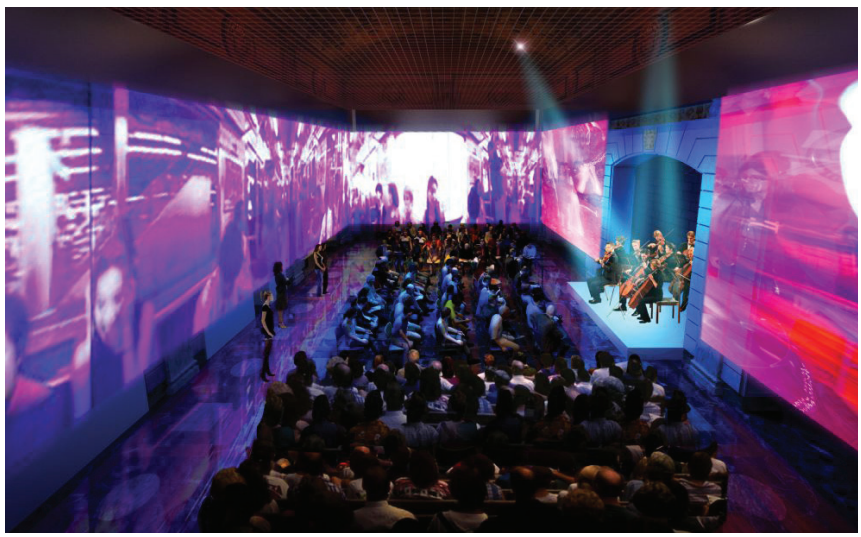
Around the world, arts venues face a broad range of challenges due to significant cultural, demographic and technological change. It's an accepted fact that capturing younger and more diverse audiences is crucial to long-term success in the arts.

Future generations will have very different expectations of where and how the arts will be presented, and what form they will take, which is particularly true in the performing arts. Fluid movement between fixed cultural spaces and temporary, unusual, non-traditional and 'pop-up' environments is increasingly common, and this is set to continue, expand and become even more varied.

Descriptors such as 'immersive', 'multi-sensory' and 'multi-dimensional' are increasingly used to describe not only the qualities sought in spaces where art is presented, but also the experiences themselves. This is a critical reaction to the rigid, formalised nature of performance spaces, that has been the mainstay of cultural life in the performing arts for the second half of the 20th century and the first decade of the 21st century. Rapid advances and changes in technology will continue to have a fundamental impact on how artists conceptualise and create work, how it is performed, what buildings must do to support it, how audiences use it, and how cultural institutions gather data and learn from it.

Arguably, in many fields of artistic endeavour, aspirations for works are increasingly influenced by the promise of the part that technology will play. As a result, cross-disciplinary collaboration between artists, engineers, scientists and designers of all types is rising, not only in the creation of the art works themselves but also in the creation of new spaces in which to perform them.

The Issue Project Room in Brooklyn, New York



Photograph courtesy of WORK Architecture Company

Team work

Arup has always been closely linked to design for the arts. For decades, in fact, the firm's designers have worked with artists in many disciplines to create instantly recognisable works around the globe. Its innovations in acoustics, audio-visual, lighting and theatrical design have facilitated a wide range of projects, from one-off events to temporary, semi-permanent and permanent installations.

The company's work follows a proud tradition of cross-boundary collaborations. Perhaps most famously, Varèse, Le Corbusier and Xenakis collaborated on the Phillips Pavilion in 1958. In 1970, French president Georges Pompidou asked

Photograph courtesy of Andre Costantini

The Arup SoundLab in New York facilitates collaboration between architects and artists

Pierre Boulez to found an institution for music research. IRCAM (The Institut de Recherche et Coordination Acoustique/ Musique), which opened in 1977, continues to be an important centre for exploring the boundaries of acoustics and music.

Academic programmes in acoustic research were also expanding around this time, including the University of Southampton's Institute of Sound and Vibration Research (ISVR) and McGill University's Computational Acoustic Modeling Laboratory. Taking hold at a time when home computers and early synthesisers were making the software and hardware for electronic music creation more accessible, these programmes attracted students interested in the boundaries between acoustics, sound, music, video, lighting and architecture. These institutions have been responsible for critical innovations in the field, such as software programmes used by many cross-boundary artists (e.g. MaxMSP).

A new sound

In the mid-1990s, the team at Arup in New York created the first full-scale ambisonic installation outside a research institution, the Arup SoundLab. Alongside it they developed a range of pioneering tools for listening to and visualising sound. Over the past 12 years, the Arup SoundLab has had a profound impact on how acoustics is considered and integrated into the design process for buildings (for the performing arts and beyond). It has not only enabled a more proactive dialogue for designing buildings, but also put the technology into the hands of artists, allowing collaboration, creation and performance of new multimedia art works in a way not possible before. In addition, it has provided the ability to capture and document works in 3D sound and video, and repurpose them for a range of venues, both real and virtual.

Arup's collaborations with a diverse range of artists – such as Ai Wei Wei, Philip Glass, Lou Reed and the Orpheus Chamber Orchestra, and in venues from Carnegie Hall to SFMOMA, the Whitney and the British Film Institute – have given the firm a solid understanding of the breadth of ambition of today's artists. As a result, it is able to help arts organisations understand and respond to current and future needs.

The firm's close collaboration with academics in many of the aforementioned institutions has kept the firm on the leading edge of technology. These schools are taking bold steps to harness the greater desire for multi-disciplinary collaboration between artists, engineers, musicians, psychologists and scientists. The result: breakthroughs in the arts,

Photograph courtesy of Rice University

Photo courtesy of Arup

The Twilight Epiphany project at Rice University in Houston, Texas, USA (above left)**; 'The Smallest of Wings' – a sound art installation at Broadgate Arena in London, UK** (above right)

science, engineering and design. Arup has helped to shape, programme and design new spaces for cross-disciplinary collaboration, including Belfast's Sonic Arts Research Centre, the Experimental Media and Performing Arts Center at Rensselaer Polytechnic Institute and Virginia Tech's Center for the Arts. Other important centres around the world include the University of York's Music Research Centre; Germany's Zentrum fur Kunst und Medientechnologie Karlsruhe; the University of California, Santa Barbara's Allosphere; and programmes at Stanford, Berkeley and McGill. These institutions have all created new spaces that challenge conventional wisdom about room typology, creating collaborative performance environments that harness technology to provide audiences with new ways of interacting with space.

Onward and upward

Although many cultural institutions have been more cautious than educational centres in experimenting with new building types, some groundbreaking projects have been developed.

In 2004, the Sage Gateshead Hall Two placed 3D sound, video and immersive audience experiences at the heart of its design. The venue's unusual, almost circular shape allows a screen to be deployed around a centrally located audience and electronic sounds (or musicians) to be placed anywhere around the space. Legendary electronic group Zoviet France played the inaugural test concert. Over the years, the client's investment in modular architecture and digital and analogue infrastructure has paid dividends in terms of programming flexibility – and in allowing the centre to rent its space for various events, an important revenue source.

Current projects extending this vocabulary include the Issue Project Room and the Original Music Workshop. New York's Jerome Robbins Theater, built to host both the Baryshnikov Dance Foundation and The Wooster Group, also took an innovative approach to room design, as well as audio-visual and theatrical systems. A floating seating plane enables sound and video to come from all directions, enhancing the palate of natural acoustics that both companies exploit to create highly immersive performances.

Earlier this year, the new Twilight Epiphany project (a collaboration with Rice Shepherd School of Music, James Turrell and Thomas Phifer and Partners) blurred the line between building, performance and installation art, and music pavilion. It allows the music school to perform both traditional and experimental works within the space. An invisible 3D sound system embedded in the walls enables the space to be used for new musical works and performances to be tailored specifically to it.

These collaborations provide a glimpse of a much larger range of projects that are merging art and science, and demonstrate the directions artists are taking technology and explorations of space. They provide insight into how traditional presentation can be combined with the new, the emerging and the future-oriented, giving an exciting taste of arts buildings of the future. ■

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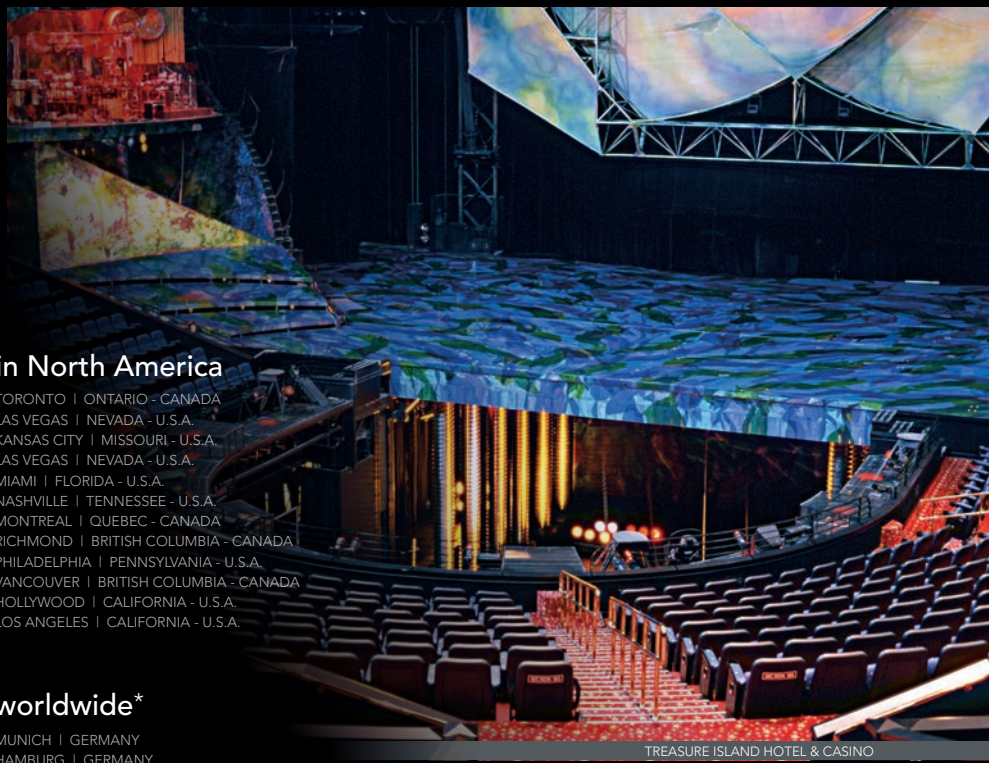

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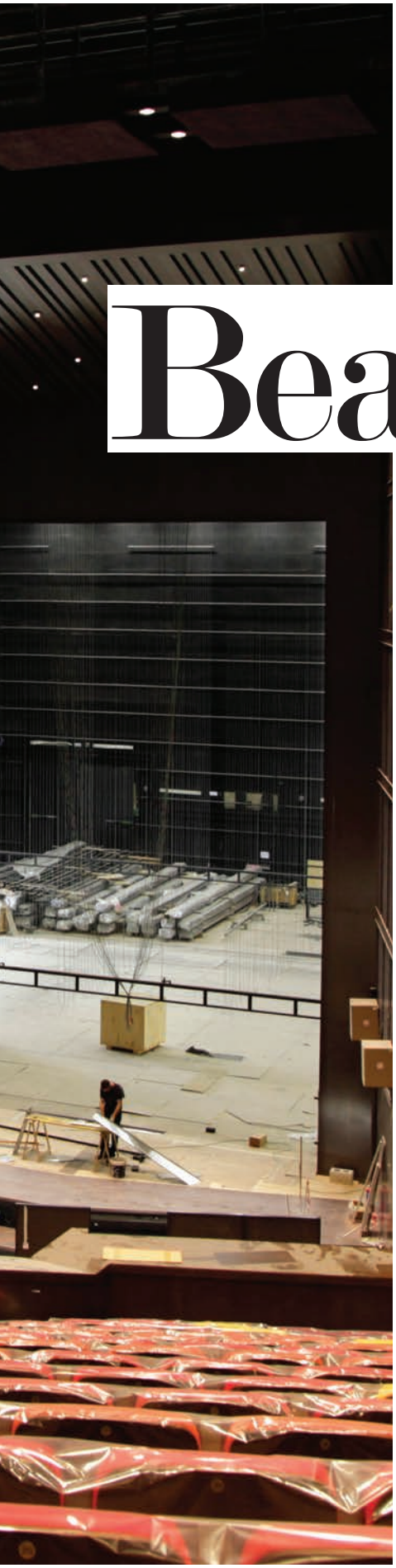


Beauty within

Capacity and functionality have been exploited to create a state-of-the-art, multi-functional creative space for performers in Seville

Everyone in Seville, Spain remembers the Universal Exposition of Seville (Expo '92) that took place on La Isla de la Cartuja (Cartuja Island) on the other side of the Guadalquivir River. Organised to celebrate the 500th anniversary of the discovery of the Americas by Christopher Columbus, it was known for its numerous spectacular large public spaces and its thematic pavilions equipped with the latest in audio-visual technology.

Today the site is divided between an R&D technology park, a theme park, the Auditorio de Sevilla (formally the Rocío Jurado Municipal Auditorium), and the Teatro Central theatre. In 2004, the Centro de Innovación Tecnológica del Entretenimiento (CITE) emerged with the goal of fostering technological innovation in the field of performing arts and entertainment in the renamed Auditorio Al-Ándalus. This allowed the Sociedad General de Autores y Editores (SGAE), the main collecting society for songwriters/composers and music publishers in Spain, to bring all of its stage specialities under one roof. The building also serves as headquarters for the ARTeria performance space network.

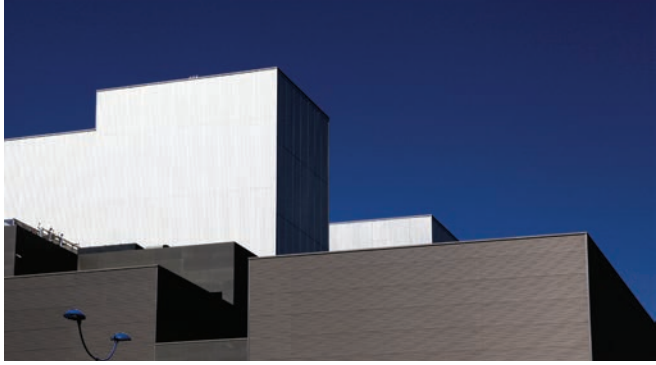
The Auditorio Al-Ándalus covers more than 14,000m^2 and is a dedicated space for creativity, training and innovation in the performing arts. The venue is equipped with the latest technology in each artistic field, making it a point of reference throughout Europe. The entire building is based on the same functional concept: optimising spaces, installations and passageways so that its operating capacity directly benefits the quality of the activities carried out within it, from maintenance to customer service and, most importantly, the show itself.

In 2006, García Diéguez Consulting (GD Consulting) took on the role as speciality stage consultant for the Auditorio Al-Ándalus. Much attention was given to the architectural programme to define the spatial configurations and ensure the mechanics worked perfectly. The project was divided into four main areas, the first being access for performers, staff and goods, including dressing rooms, a rehearsal room, a secondary hall and storerooms. The second area was offices, including a restaurant, cafeteria and a terrace bar. Next was the public entrance, which includes a shop, refreshments bar, ticket booths and the Cubo Hall. And lastly, the auditorium, including the main hall, stage tower, storerooms, technical booths and a VIP box.

Flexibility in design

All stage areas have been equipped to respond to different needs with great flexibility and efficiency, the best example showing this being the main hall. This space is more than 22,300m^3 with a variable capacity of between 2,000 and 3,500 spectators. It accommodates the third and largest seating riser system ever installed in Europe and just the second one in Spain. Utilising independent moving platforms, 1,000 preset seats can be rapidly deployed from their storage position below the floor to their open position automatically, using Gala Systems' Gala Venue system, transforming the space into the desired configuration. The Gala Venue system consists of a set of individual rows of self-guided seating risers driven by 132 Gala Systems Spiralift mechanical lift columns. It also features fully

DESIGN
GD CONSULTING



The hall accommodates the largest seating riser system ever installed in Europe

programmable, multiple seating configurations, which are accessible through touchscreen controls that enable fast and easy seating transformation. This state-of-the-art, event-specific venue reconfiguration technology ensures that the centre is used to its maximum potential, transforming stall configuration from theatre to opera, to Shakespeare, to cabaret, to rock concert, or even to a completely flat floor, in fewer than 15 minutes. The seating riser system is very compact and provides a solid, vibration-free structure comparable to a permanent floor. GD Consulting is a specialist in this system's design and has huge experience and training relating to its functionality.

Customised sound

The hall's reverberation times have to be modified significantly each time the space is reconfigured, in order to suit the requirements of each event. To facilitate this, the entire hall underwent an acoustic treatment to make it is as 'dry' as possible, at which point a complex variable acoustics system (Meyer Sound Constellation) was installed. This comprises a matrix arrangement of 246 loudspeakers and 66 microphones, all of which are controlled by the latest-generation processors (D-Mitri, Digital Audio Platform) configured in accordance with the stalls' presets.

These factors strengthen the hall's capabilities further and represent stage resources of the future. The installations encourage innovation among the authors and professionals that use and train in the centre.

A grid has been devised for the ceiling above the stalls, complete with the loading and hanging capacities needed for an ideal distribution, which limitlessly facilitates any work proposed for the hall.

GD Consulting's stage design has more than 800 dimmer channels distributed throughout the halls, as well as a stage tower, offering versatility and a large number of possibilities for lighting and creating effects on the stage and over the hall.

Now, more than ever, the stage tower is a mechanism for transformation and creativity. It includes 65 eight-line motorised flying bars, with an adjustable speed up to 2m/sec and a load-bearing capacity of 1,000kg/bar – a high-capacity, powerful piece of equipment that offers designers more possibilities.

The stage tower is complemented by a platform system and cover upstage. The lifting platform is 4 x 18m, running 7.5m, and is combined with a sliding cover of the same dimensions that goes under the stage, which is extremely useful for a venue where productions and scenery are continually changing.

The complete package

The other halls are no less sophisticated, the secondary one also being a multi-functional space for small productions, events and cinema. This features a retractable stand, providing the capacity for up to 450 people, which when folded away allows up to 400 people at standing events. The area is specially designed for high-quality 4K cinema, with state-of-the-art viewing and acoustic conditions. Furthermore, it is equipped with motorised systems for suspending loads from the hall ceiling, such as trusses, scenography and textiles.

With access at the same level, the rehearsal room is specially designed for auditions, rehearsals and filming – a multipurpose room that can accommodate orchestras and actors, and can even be used as a set for television broadcasting. It is linked to a recording control booth that communicates with the rest of the halls and with the centre's recording and broadcasting studios. Located on sector A's upper floor, these studios have various functions. The recording studio even has views of the Guadalquivir River and is linked to a fully equipped booth and a post-production studio, all of which are linked to a server and content management system, which can rebroadcast through radio, television or the internet.

GD Consulting designed the venue with the future of performing arts very much in mind. It is a versatile and secure system that adds value to the most ambitious futuristic shows, a platform for communicating shared knowledge created in Seville to the rest of the world. ■

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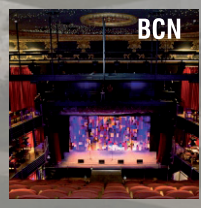

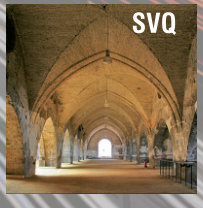

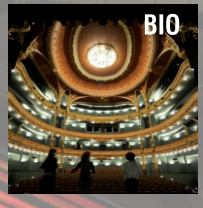

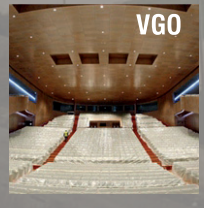

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The art of space

The new performance rooms at Stavanger Concert Hall are unique in purpose but complementary in design

The Stavanger Concert Hall Dome at Bjergsted Cultural Park opened its doors 30 years ago, and has since continued to provide Norwegian music lovers with an extensive programme of musical variety. To further expand the scope and potential of the venue, the Stavanger Concert Hall Authority opened two new concert halls on the site in September 2012, as well as a 10,000-capacity outdoor amphitheatre and entrance plaza. The collective complex is called the Stavanger Concert Hall.

The design contract for the new concert halls was awarded to Ratio Arkitekter in 2003, after the firm claimed first prize in an international architecture competition. Ratio is also responsible for the interior architecture, as well as the landscaping, together with Sundt & Thomassen Landskapsarkitekter.

Purpose and flexibility

The new concert halls are equally sized rooms, designed for entirely different functions and expressions. The Fartein Valen orchestra hall is designed for natural, non-amplified music, particularly for the Stavanger Symphony Orchestra, and has a reverberation time of more than 2.2 seconds. The hall has 1,500 seats dispersed on parterre and three balconies, including 100 seats on the choir balcony.

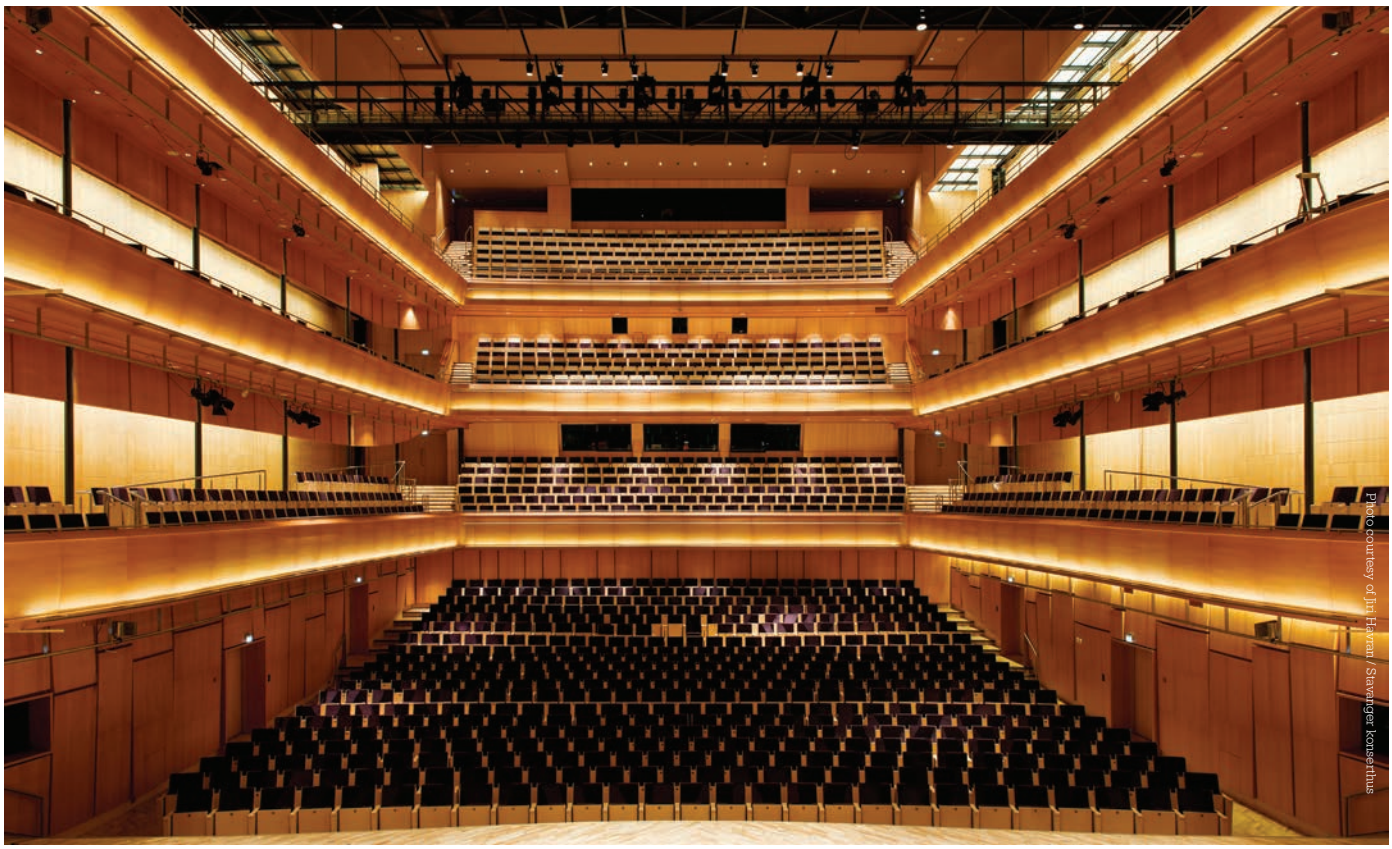
The other hall, Zetlitz, is a multi-purpose room tailored for electronically amplified music, able to accommodate a wide variety of events from rock and jazz, musicals and dance to conferences and banquets. This hall has 850 seats in the traditional theatre proscenium configuration and can hold up to 1,900 people with a flat-floor setup, where the back stage can be utilised for performances.

The Stavanger Concert Hall is encased in a double-layer glass façade (left)**; the interior public areas are designed to feel spacious and airy** (right)

All photos courtesy of Jiri Havran/Stavanger konserthus

DESIGN

RATIO ARKITEKTER



The new Fartein Valen orchestra hall is designed for natural, non-amplified music and has a soft, warm atmosphere

It is a requirement of the venue that both halls be able to function at the same time – a very loud rock concert in one hall and an acoustic chamber music concert in the other, for example. This need dictated that the building should be a split construction, all the way down to the foundations, in order to avoid structural noise pollution. Furthermore, heavy construction and sound locks have been placed on both sides of the sound division.

The two complementary halls are expressed architecturally as two separate boxes placed beside each other. The orchestra hall is cocooned like a fragile violin in a strong case of concrete, clad with red concrete elements. It is covered on the inside with oiled and tinted maple, and has a soft, warm atmosphere. The red concrete box also contains administrative offices and artist areas with a number of different soundproof rehearsal rooms and guest wardrobes.

The multi-purpose hall is built as a robust metal enclosure within an open glass box. The interior is clad with deep blue and black metal panels, with steel mesh on the balconies, giving it a technical and strong character. The glass box also contains a public foyer with ticket sales booth, restaurant, shop and bars for intermission refreshments, and connects to the outdoors with granite flooring and detailing inspired by the waterfront environment.

Design considerations

Sound insulation of the venue was of paramount importance. The close proximity of the building to Stavanger's active harbour means that the halls need to be protected from outside noise, while its position near urban areas means that the venue's neighbours need to be shielded from loud rock concerts. In addition, the strict requirement for low-noise ventilation requires extra large ducts and ventilation grids, and some areas are also moisture controlled.

The glass façade is double layered, and natural thermal flow adds to the ventilation during particularly warm periods, while the air space provides added insulation in the cold season. The stage machinery is among the most advanced in Europe with, for instance, a 1,000m^2 movable ceiling, and movable telescope seating on air cushions. These enable the hall to convert from theatre to flat floor – or any other stage configuration – in the shortest possible time. ■

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Retuned and revived

The renovation of Hamer Hall at the Arts Centre Melbourne has seen the creative integration of advanced technology into a traditional and demanding building

Every concert hall of a certain age will at some point need to consider how to remain relevant going forward. Serving as a home for acoustical symphonic music alone can no longer be the desired standard. The renovation of Hamer Hall within the Arts Centre Melbourne is an example of how a traditional concert hall, one with very little technical support for any type of event apart from acoustical symphonic music, has been successfully upgraded. Designed 30 years ago as a 'symphonic music only' venue, it now has to support pop and rock music, film, circus, magicians, and a diversity of acts requiring full rigging, lighting and amplified sound support.

In addition, Hamer Hall needed to be faster, easier and safer to operate. Turnovers happen very quickly, with multiple performances in a single day; for instance, an orchestral matinee followed by a rock show in the evening. All of these requirements combined to create a challenging and sometimes seemingly contradictory client brief that required close collaboration between the Arts Centre's representatives and the design team (including theatre planners Schuler Shook), and which has resulted in a considerable expansion of Hamer Hall's flexibility and technical capability.

Enhanced acoustics

The entire stage area has been covered by a series of automated acoustical reflector panels, each of which is the full width of the stage, 3m deep when deployed and only 800mm deep when folded away for amplified events. Each reflector also includes a central spine – essentially a tall box truss – that contains and supports all of the automation and orchestral lighting. There are wings on both sides of the spine that fold from horizontal to vertical. When they are fully deployed, a single continuous acoustical surface is created that can then be tilted up and down stage – including the attitude of the reflector section below the spine – as per the acousticians' direction. When the wings close, they are completely vertical and fold up similar to a book for discreet storage.

Schuler Shook's design allows for very fine-tuning of the ceiling as per the exacting requirements of the acousticians. Each full-width side wing of each reflector, as well as the centre

panel, can be controlled separately, enabling the acousticians to create numerous surface shapes to fine-tune the stage for different performance types. Manufactured by Jands, the acoustical reflector featured an innovative wing panel design that included an aluminium honeycomb interior completely encased in a fibre-glass resin, similar to the hull of a boat.

Rigging support

All of the new rigging equipment and safe access required significant intervention. The existing ceiling space simply didn't have the room to support even a portion of the new brief. To add to the challenge, Hamer Hall is a heritage-listed building, and the design team was only allowed to create connections to the existing building that could eventually be recovered if needed.

After many discussions about more modest incursions into the hall, it was decided that a full walkable grid was required to support all of the new functions. To provide this support, a structural grid – very similar to a normal theatrical gridiron – was constructed over the stage with clever architectural precision to make it visually appealing and acoustically transparent.

The grid floats below the heritage ceiling and is supported by four modest structural connections to the walls, which support the entire mass of the grid plus all of the rigging loads.

The architects clad the audience-facing sides of the grid in a bronze-coloured mesh. When the acoustical reflector is deployed for orchestral events, the grid is completely hidden behind the reflector panels. And when the reflectors are folded, the reflector surfaces draw the eye away from the black steel structure, at the same time acting like theatrical border curtains to mask battens and other technical elements.

The grid itself is very open for complete access, and incorporates numerous functional amenities including automated battens, rolling trolley beams to pick up touring loads, a full complement of chain hoists, acoustically sealed winch rooms, sliding tracks for stage lighting cable reels, microphone reelers, and automation to move the main speaker clusters up and down stage in addition to raising and lowering.

Advanced automation

All mechanical components are operated via a fully integrated Waagner-Biro control system.

The refurbished 2,400-seat venue is now one of the most technically sophisticated concert halls in the world (left)**; completely redesigned seating layouts now meet Australia's current disabled access requirements** (centre)**; technological improvements allow the hall to successfully support everyone from operatic sopranos to rock bands** (right)

The new Technical Zone allows rigging line-sets to be flown through the acoustical reflector (left)**; pianos and other equipment can be moved from the basement store to the stage quickly and easily** (right)

The entire system is SIL-3 compliant and operates all of the functions of the acoustical reflectors, the stage lifts, the batten hoists and the speaker hoists with integrated e-stops, interlocks and collision avoidance. It allows a single operator to control multiple automated systems easily and safely.

The collision avoidance scripts are particularly complex, due in part to the need for the reflector wings to automatically fold to vertical in the event of a fire emergency, to allow sprinklers below the grid to service the stage. Also, these scripts help prevent collisions between the reflector panels and batten-mounted scenery.

The control system components include Waagner-Biro CAT192 control desks and CAT110R wireless controllers, so that the system can be operated easily and safely from multiple locations. The main batten hoists and reflector hoists are a zero-fleet-angle design manufactured for Hamer Hall by ASM and fully integrated by Jands.

Loading logistics

Hamer Hall's stage is two storeys below the dock level and was previously serviced only with a very small dock and a single passenger lift large enough for just three or four road cases. At stage level, the only access to the stage was via two low-ceiling wings.

Schuler Shook planned a new freight lift and loading path that took the full collaboration of the entire design team to realise. The dock was expanded to twice its original size and reorientated to work better with the existing adjacent roadways. A new 24m^2 platform lift was shoe-horned into the building by creating a shaft through several existing spaces, landing at stage level adjacent to a large staging area that accesses the stage through two 3m-wide doors at the rear of the stage, thereby avoiding the cramped wings.

Lighting design

Schuler Shook also designed a new stage lighting system that includes dimming from State Automation, and which utilises reverse-phase control dimming technology that is very quiet and efficient and less expensive than sine-wave dimming. This dimmer includes integral relays that bypass all of the internal circuitry of the dimmer card, so that a single dimmer module can be used for an incandescent profile, or a moving light with a simple change to the dimmer monitoring software. No swapping of dimmer modules for relay modules is required.

The new main control console is a PRG V676, selected by the Arts Centre lighting staff after testing competitive products. The new control system is based on ACN protocols and is fully redundant to create a robust control network. The Ethernet distribution between data rooms is via a ring-and-spoke fibre-optic network, which includes multiple paths to each switch.

Storage

Creating storage was a difficult task. The stage is underground and the surrounding spaces are fully utilised as dressing and rehearsal rooms, so it wasn't possible to expand the building or repurpose nearby rooms for storage. Eventually, Schuler Shook found space in a very unlikely place: the bottom of the choir lift platform.

The stage has an existing orchestra pit lift at the front of the stage and a large choir lift at the rear of the stage. The latter has a very deep well that has been transformed

into a moving storage room. The new storage space was essentially hung from the bottom of the lift platform, creating a lift with two floors – one for the stage and one hidden behind the lift fascia for storage. The storage room is able to load at the stage and basement levels and can be utilised to move pianos and other equipment from the basement store to the stage very quickly and easily.

Access for all

Like many venues built 30 years ago, Hamer Hall had very modest disabled access to the auditorium, and it required cumbersome equipment to provide even minimum access.

Schuler Shook completely redesigned the seating layouts to expand the areas where wheelchairs could safely be accommodated. Disabled access was expanded on all three levels of seating and was distributed as widely as possible. In addition, swing-away arms were provided on some seats to allow partially abled patrons easier access to aisle seats.

Demand for innovation

It was because the client brief for Hamer Hall was so demanding that the outcomes were so innovative and satisfying. The Arts Centre technical and operations leadership and staff understood very clearly what was required to ensure the continued successful operation of their concert hall, and were heavily involved in all testing, prototyping, and decision making. Following this renovation, Hamer Hall has become one of the most capable and technically sophisticated concert halls in the world. ■

www.schulershook.com

Different by design

Innovative seating solutions that are challenging the status quo are also improving the auditorium experience for audiences around the world

As 'standard' auditorium seating design has remained largely unchallenged over the past few decades, many modern venues are struggling to achieve operational efficiency and meet audience expectations in terms of accessibility and comfort. Although traditional designs may seem 'good enough', an innovative thinker and inventor from the USA believes that modern auditoria deserve better.

"Innovation is the key to real progress," asserts Mauricio Olarte, the owner and founder of Miami, Florida-based Series Seating. "Auditorium chair design has been stagnant for a while, with companies offering chair designs that look and operate the same as they had 50 years before. I find that unacceptable," he says."We focus on new design and have a team of designers dedicated to finding innovative seating solutions."

By challenging the status quo and bringing about necessary design changes to auditorium seating, Olarte has been a tireless vanguard, and is making a real difference to major performance venues around the world.

On the move

"Industry standards for removable seats have always been crude in visual appearance and their anchoring systems have often been difficult for facility management staff," Olarte says. "Often, removable anchoring systems only last five years. I wanted to change that."

Olarte and his team have developed a number of removable seating options including an innovative 'Out-In System', which allows a complete seat unit to be removed by a single individual in 10 seconds, without the use of any tools. It also employs a system that locks the seat into the floor without the traditional threaded insert anchors, which can spin out or show thread damage over a relatively short period of time. Other notable differences include the option to forego double armrests, a simple cart to roll the chair into storage and the ability for one person to remove the seats quickly.

Jupiters Casino Theatre in Queensland, Australia needed to be able to move 233 of their auditorium chairs in the lower orchestra quickly, to transform the area into a dance floor. Additional criteria in their selection mandated the chairs be securely fastened to the floor and look identical to the rest of the auditorium seating. The theatre chose to install the Series Out-In System, which has enabled the entire seating area to be removed swiftly by one person, without tools.

Flexibility has been achieved at Jupiters Casino Theatre in Queensland, Australia

The Axis Tablet Arm saves space at the Frederick P. Rose Auditorium at Cooper Union

Saving space

To address the common issues regarding space and positioning experienced with conventional tablet arm chairs, Olarte developed the anti-panic Axis Tablet Arm, for which the closure system is rated for one million cycles. Whether in use or stored, the tablet's motion does not intrude into the user's personal seat space, the adjacent user or aisle. Even with the largest tablet size option, the arm's unique motion allows it to be stored within a very tight overall chair envelope dimension. In addition, the size options of the Axis tablet allow for left- or right-handed individuals to use any chair, negating the need for designated left-handed seats, which complicates layout design.

Cooper Union, one of the USA's oldest learning institutions dedicated exclusively to art, architecture and engineering, recently completed construction of a new US$155 million educational building. The institution selected the Axis Tablet Arm for its high-use Frederick P. Rose Auditorium and has found the solution to be highly beneficial.

Series has also installed the Axis in lecture spaces at the National Geospatial Agency near Washington DC, as well as various universities and high-end primary and secondary educational facilities around the world.

Access for everyone

Beyond wheelchair locations, venues with accessibility requirements may also require modified aisle end panels that allow a disabled person sideways access into the seat (this includes wheelchair, semi-ambulant or obese patrons).

"Again, these have been crudely achieved in typical industry designs, which push some clients to accept aisle ends that have occasional lift-up arms with no aisle panel, creating a 'missing tooth' effect when you look down the aisle of decorative end panels," Olarte explains. "The Series team exhausted the possible solutions and came up with designs that allow easy access into the seat, provide long-term maintenance-free performance, function as aisle lights, and maintain the full visual aesthetic of the decorative aisle panels."

Custom seating provides increased flexibility at the Winspear Opera House, in Dallas, Texas

Series recently designed a custom transfer panel for the Winspear Opera House in Dallas, Texas, USA. "Our Series chairs at the Winspear allow us to accommodate literally anyone," reveals Russell Read, director of operations at the AT&T Performing Arts Center. "We've recently had a 6ft 10in, 550 lb man enjoy a performance! We sat him at the end of a row with a transfer panel. It's so nice to give folks the option of the arm opening for access into the chair, without having to remove anything and having it look just like the rest of the aisle ends."

Quiet operation

Even though gravity-lift seat systems have become the widely accepted standard for high-end auditoria, many seat manufacturers still utilise interior mechanics to assist and help operate the seat lift.

"We have created a gravity-lift seat system that provides a truly quiet seat operation – under 30 decibels," Olarte explains. As a point of reference, the noise generated by a person standing up from a seated position is about 40 decibels. The design eradicates the need for future maintenance or adjustment as there are no inner mechanisms or components that can fail. The seat design also eliminates any pinch points, which is commonplace in many of the older gravity-lift seat designs that are still being produced today.

A very busy man

In addition to Dallas's Winspear Opera House, Olarte and Series Seating have provided customised solutions to a large number of US venues over the past 30 years, including the Guthrie on the River, Minneapolis, Minnesota, the Adrienne Arsht Center in Miami, Florida, the Cobb Energy Center in Atlanta, Georgia, and the Palladium Concert Hall in Indianapolis, Indiana. Internationally, the company has also provided solutions for the Perth Concert Hall in Western Australia, City of Dreams Theater in Cotai in China's Macau, Jupiters Casino Theater, Surfers Paradise, Queensland, Australia, as well as Teatro Colon in Bogota, Colombia.

Series Seating also has a busy time ahead with contracts in hand to supply tailor-made seating solutions for several US venues, including the Broward Center AuRene Theater in Fort Lauderdale, Florida, Dr Phillips Performing Arts Center's Disney Broadway Theater in Orlando, the Tobin Center for the Arts, San Antonio, Texas, and the University of Minneapolis Northrop Hall, Minneapolis, Minnesota. Elsewhere, seats will be supplied to Conservatorio de Musica, San Juan, Puerto Rico, Teatro CorpArtes, Santiago, Chile, and Brisbane City Hall Galley Theatre in Queensland, Australia. ■

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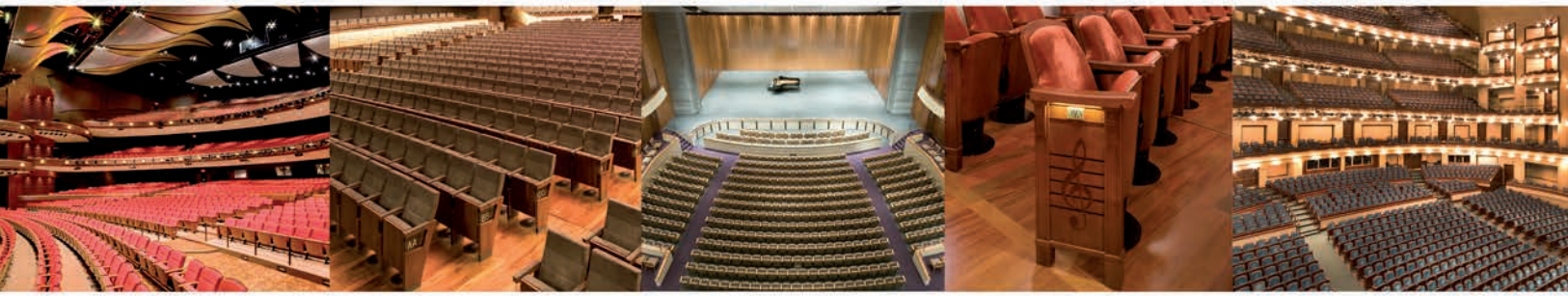

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Are you sitting comfortably?

Most days at the Baylor Charles A. Sammons Cancer Center begin with a multidisciplinary conference on the 10th floor auditorium, replete with stylish, durable and ergonomic seats from Dauphin

The Baylor Charles A. Sammons Cancer Center in Dallas, Texas, opened its doors in March 2011. The 10-story, 467,000ft² facility is the largest outpatient cancer centre in North Texas and was built by MEDCO Construction at a cost of some US$350 million.

Having already received Gold-level LEED Certification from the US Green Building Council, the new addition to the Baylor Health Care System is state of the art in every way, with advanced technology and integrative therapies provided for all cancer types. "We call it a cancer centre, but actually the patient is the centre," says Dr Alan Miller, chief of oncology, Baylor Health Care System, and director of the new medical centre. In a world where it's commonplace for cancer patients to have to travel to several different locations for treatment, the Charles A. Sammons Cancer Center offers everything under one roof – treatment, comfort, science and hope.

The building was designed by Dallas-based architects Perkins+Will. An important part of the brief was to create a peaceful and comfortable interior with natural lighting and earth tone colours, in doing so ensuring a soothing and welcoming atmosphere for patients and families experiencing extremely difficult times. The exterior features a curtain-wall façade of glass fibre-reinforced concrete, stone, glass and metal panels, and a spectacular sky bridge that connects to the inpatient areas of the Baylor University Medical Center campus. So although aesthetically designed, it is highly functional in order to help treat up to 300,000 people a year.

Seats for learning

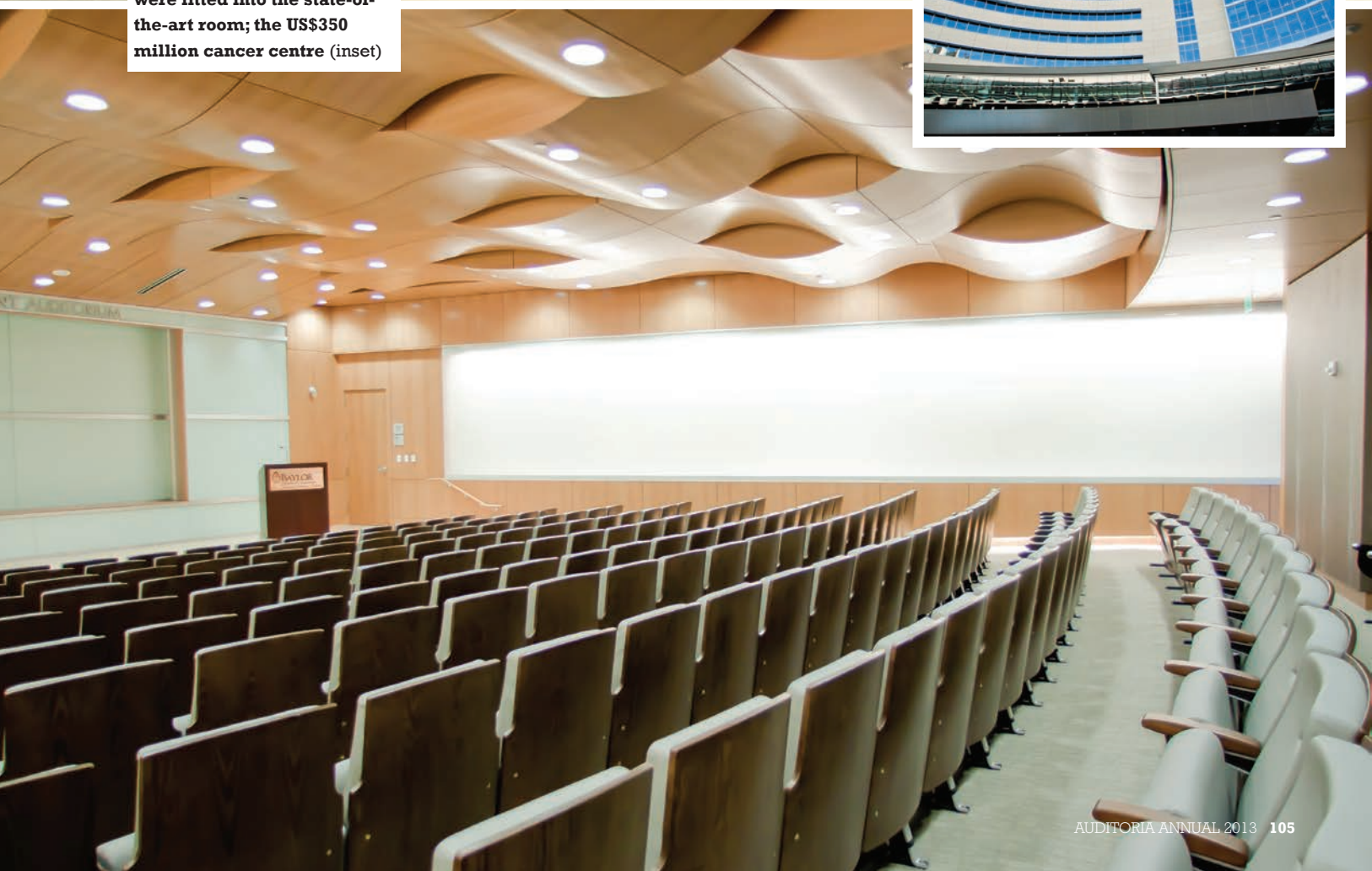
The Charles A. Sammons Cancer Center is much more than a space for treatment, however. The new building boasts a fully appointed cancer research facility, while on the 10th floor there is an advanced conference centre that will host physician conferences, hospital events, board meetings, public health and cancer education classes, guest speaker appearances, doctor-patient Q&A sessions, and other programs to enrich and educate medical staff, patients, family members and care providers.

Numerous donations from physicians and corporate institutions helped to fund these new facilities, integrated into which is a 200-seat auditorium with amphitheatre-style seating. US$1.8 million alone was received from the

BACK ONCE AGAIN

Baylor Health Care System is clearly impressed with everything about the Anax seat from Dauphin, as COO Stuart Rogers-Brown reveals they're also fitted in the Beulah Porter Beasley Memorial Auditorium, which is on the first floor of the Truett Hospital on the Baylor Campus. "The auditorium hosted many, many lecturers in the time from being built in 1972," Rogers-Brown says. "But after 40 or so years of continued use, the space was in need of updating in terms of design, seating and electrical to meet today's standards, as well as adherence to the requirements of the Americans with Disabilities Act (ADA)." The fixed seating set-up of Anax helped to accommodate the electrical requirements that keep the wiring in the ground or through the set-up itself. "This makes for a neat and tidy appearance time after time, which is very important for rooms with a high turnover," explains Rogers-Brown. In all, Dauphin supplied 271 seats for the new auditorium.

(Above) **The Tom Hunt Auditorium; 201 seats** (below) **were fitted into the state-of-the-art room; the US$350 million cancer centre** (inset)



The durable Anax seat (above)**, as fitted in the Beulah Porter Beasley Memorial Auditorium** (below)**, is ideal for rooms with very high volumes of traffic**

Hassie Hunt Foundation [in the oil business, the Hunt family go back generations in the area and were rumoured to be the inspiration behind the TV series *Dallas*], while US$250,000 was received from former Baylor patient Tom Hunt before he died of leukemia in 2008, hence the new room being named the Thomas M. Hunt Auditorium in honour of his memory.

Ideally suited

Stuart Rogers-Brown, COO of seating specialist Dauphin – which provided the 201 Anax seats for the project – is especially proud of his company's involvement in the Tom Hunt Auditorium. "We're manufacturing and installing seats for all types of facilities, large and small, from stadia to performing arts projects, but we're increasingly working on projects like this one at Baylor," Rogers-Brown reveals. "We have worked with architects Perkins+Will before and on this particular project we had around four months to customise and produce the seats and get them installed. It was a tight time schedule, but nothing we're not used to. And clearly when the project is a medical facility as important to the community as the Baylor Medical Center is – and to cancer research in general – there was no room for any errors or delays on our part."

The Anax seat was selected as a result of it being ideally suited to the client's needs, particularly in terms of ergonomics, aesthetic and acoustic properties. "Acoustics are vital for a performance space for obvious reasons, but I would argue that they are more so in this sort of an environment, when you consider what will be presented within this room – new solutions for cancer treatment, the unveiling of the latest research, presentation of white papers, or perhaps even demonstrations of new operating theatre techniques. There is a direct correlation between comfort and attention span, so whether you're a Baylor medical student or a physician hearing about the latest radiotherapy treatment, what they're actually sitting on is vital.

"The Anax product is high-tech in its design and features durable hardwood armrests that are available with optional writing tablet and an anti-panic, tip-up seat with gravity-activated lift," Rogers-Brown adds. "The electrical requirements of the auditorium were easily accommodated, while the wood under-seat cover and seat back helps for sound absorption."

This attractive seating solution also comes with an equally appealing pricetag, while an adjustable aluminium stanchion design offers high flexibility for all types of floors. With a square back that features a rigid moulded aluminium frame, Rogers-Brown reveals that Anax is also available in medium- and tall-back versions with standard or decorative wood profile.

"The installation was a bit of a challenge because the building was still under construction and contractors were all trying to get in and out at the same time," he says. "The lifts in the building were especially in demand, particularly by us as we had to get the 201 seats and all the requisite floor fixtures to the top floor."

The conferences that will be held in the new facilities are, Dr Miller concludes, the nuts and bolts of Baylor's Sammons Cancer Center, directly contributing to high-quality patient care and learning at multiple levels. "Through our ongoing commitment to cancer care, cancer education, and research and clinical trials, our aim is to continue making strides and these new facilities will help us achieve our goals," he says. "It's really exciting and is going to revolutionise the ability to take care of cancer patients." ■

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Bold comfort

Many of the world's leading architects and designers regard artisans Poltrona Frau as the seating supplier of choice. Why? A longstanding tradition in blending innovation and technology to create some of the most sophisticated and functional seating solutions available

Architectural creations such as Armani Fifth Avenue, Strasbourg's Zenith Music Hall and the Ferrari HQ and research centre in Maranello are three contrasting yet typically daring works from the emblematic portfolio of Rome-based studio Fuksas. Partners Massimiliano and Doriana Mandrelli Fuksas are revered for their capacity to surprise, and are among numerous elite architects who have worked with designers from other walks of life to allow audiences to view their work in other forms, such as jewellery (think Gehry and Tiffany, Oscar Niemeyer for H. Stern, etc.).

Minimalist design

This is not unfamiliar territory for Fuksas, having already collaborated with Mimmo Paladino on the bold 'Islands' jewellery collection for Short Stories. It was especially fitting that Fuksas would join forces with Italy's Poltrona Frau, however, by designing a new auditorium seat for the conference hall of the National Archives of France in Paris, a distinctive Fuksas building with all of the firm's contemporary hallmarks.

"The seat is a well considered, minimalist design, offering style and comfort while maximising audience capacity – even in the most limited or awkward of spaces," feels Alberto Gullini, director of Poltrona Frau Contract and Fixed Seating. And although at the time 'Carla' was created specifically to complement Archives Nationales, it has since been made available for use in other auditoria, concert halls and theatres.

Carla is ideal for any environment that calls for pleasing aesthetics and superior comfort. Built from a wooden framework, its side panels and seatpans are designed to provide enhanced ergonomic support, assisted further by tensioned, interwoven elastic straps padded with non-deformable fire-resistant foam. A customisable tilt-angle backrest delivers optimal viewing comfort, while an internal counterweight mechanism supported by durable nylon bearings ensures the silent return of the seat to its unoccupied position, a prerequisite for any performance space. "The seats can be installed in straight rows or along the radius of an arc," notes Gullini. Additionally, an interlocking system promotes rapid assembly (or dismantling for maintenance) and the seat is anchored to the floor by a scratch-resistant, epoxy powder-coated metal base using steel or plastic toggle bolts.

Atop of the innovative mechanics, the seats are upholstered in Pelle Frau, an exclusive collection of quality leathers, or alternatively from a range of attractive fabrics. They can also be equipped with tablet arms and lighting, while row and seat number plates are available in a variety of materials, including metal.

Seat of culture

Poltrona Frau's Tangram seat was developed by architect Daniel Libeskind, who rose to prominence as a result of his utopian designs on paper, symbolic and philosophical inspirations that have generated much discussion within the architectural community. His complex creations only started to come to constructed fruition at the start of the 21st century however – the Jewish Museum in Berlin being a particular triumph and considered one of the most important cultural landmarks to be built in recent times.

As the architect in charge of the World Trade Center masterplan in New York, it's not surprising that the American, Poland-born designer has brought a similar contemporary vision to the design of the Tangram seat. "It combines the functional requirements of auditorium seating with the sumptuous comfort of a lounge chair," Gullini believes. Boasting all the ergonomic and mechanical specifications of

(Clockwise from main)
The '815 Series' at the Giometti cinema chain; the stylish, minimalist 'Carla' seat; the ergonomic 'West End' model; and the open-framed 'Lille' design

the Carla seat, the same options are also available in respect of upholstery coverings, too – overall an ideal solution for all sizes of auditoria yet sufficiently individual to suit any environment.

Refreshing and spacious

Poltrona Frau's architectural collaborations continue with the Snøhetta-designed 'Lille'. The creators of buildings such as Oslo's Opera House, which features the seat, many commentators consider Snøhetta's genius to lie in how its architecture engages; how its designs consider a structure's social experience; how users enter, pass through and live in a building. This philosophy extends throughout all areas of the award-winning Operahuset.

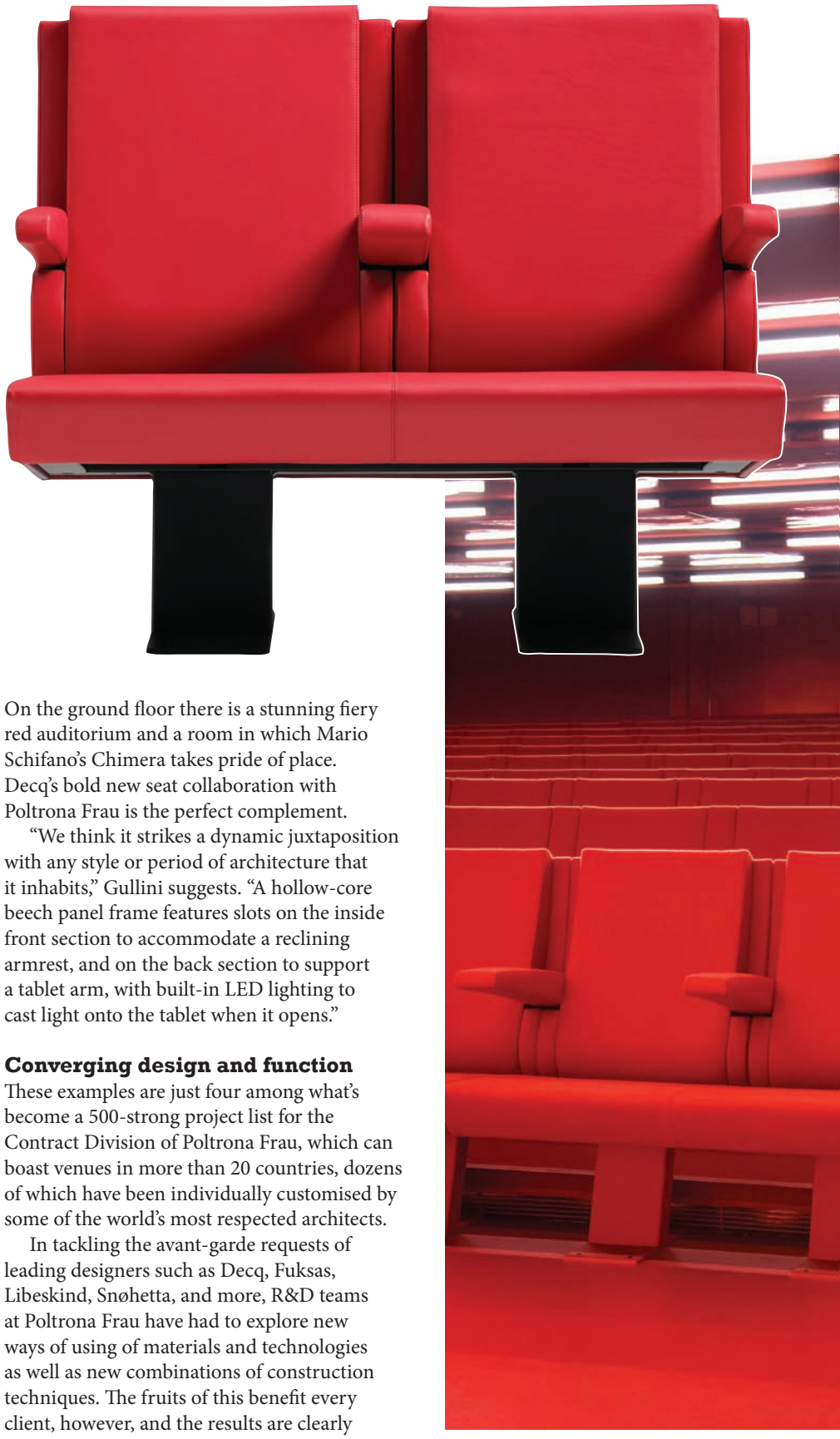
"The Lille allows for a variety of seating arrays," says Gullini. "Simple yet elegant, the open-frame design of the side panels and armrests means that when the seats are unoccupied there is a refreshing transparency and spaciousness to the look and feel of any room that they occupy."

The side panels are constructed using vacuum-dried oak hardwood with a clear varnish coating, while the back and seat panels are built from hollow-core beech panel frames and moulded to provide ergonomic support. The dark colour of the timber is particularly suited to Oslo's cultural centrepiece, the wood providing a rich, warm and intimate feel to the space and the orange-red fabric offering an important visual counterpoint. Display screens are also incorporated in the seat backs so patrons can opt to read the libretto of the Norwegian Opera and Ballet in other languages.

Timeless creation

Built to the same high specification and quality as Lille, Tangram and Carla, the Rome2005 seat created for the 2010 extension to Museo di Arte Contemporanea di Roma (MACRO), the Italian capital's museum of contemporary art, offers a streamlined, high-tech and modern aesthetic.

Odile Decq's glass and black basalt pavilion has added a further 10,000m^2 to the former Peroni factory (which was transformed into a museum in 1999), complete with exhibition rooms, a multi-level roof garden for open-air exhibitions, a bookshop, and reading rooms.



On the ground floor there is a stunning fiery red auditorium and a room in which Mario Schifano's Chimera takes pride of place. Decq's bold new seat collaboration with Poltrona Frau is the perfect complement.

"We think it strikes a dynamic juxtaposition with any style or period of architecture that it inhabits," Gullini suggests. "A hollow-core beech panel frame features slots on the inside front section to accommodate a reclining armrest, and on the back section to support a tablet arm, with built-in LED lighting to cast light onto the tablet when it opens."

Converging design and function

These examples are just four among what's become a 500-strong project list for the Contract Division of Poltrona Frau, which can boast venues in more than 20 countries, dozens of which have been individually customised by some of the world's most respected architects.

In tackling the avant-garde requests of leading designers such as Decq, Fuksas, Libeskind, Snøhetta, and more, R&D teams at Poltrona Frau have had to explore new ways of using of materials and technologies as well as new combinations of construction techniques. The fruits of this benefit every client, however, and the results are clearly

The streamlined Rome2005 seat (left) **in-situ at the Museo di Arte Contemporanea di Roma** (below)

seen in the ever-expanding Stage collection, which aptly demonstrates that buying 'off the shelf' doesn't necessarily mean a compromise on quality, comfort and functionality. "Seats in the Stage collection are stylish, cost-effective and functional solutions for any auditorium environment and are uniquely customisable by accommodating features such as armrest tables, lighting, numerous floor fixings, all of which are flexible enough to suit every budget, purpose and aesthetic," Gullini says.

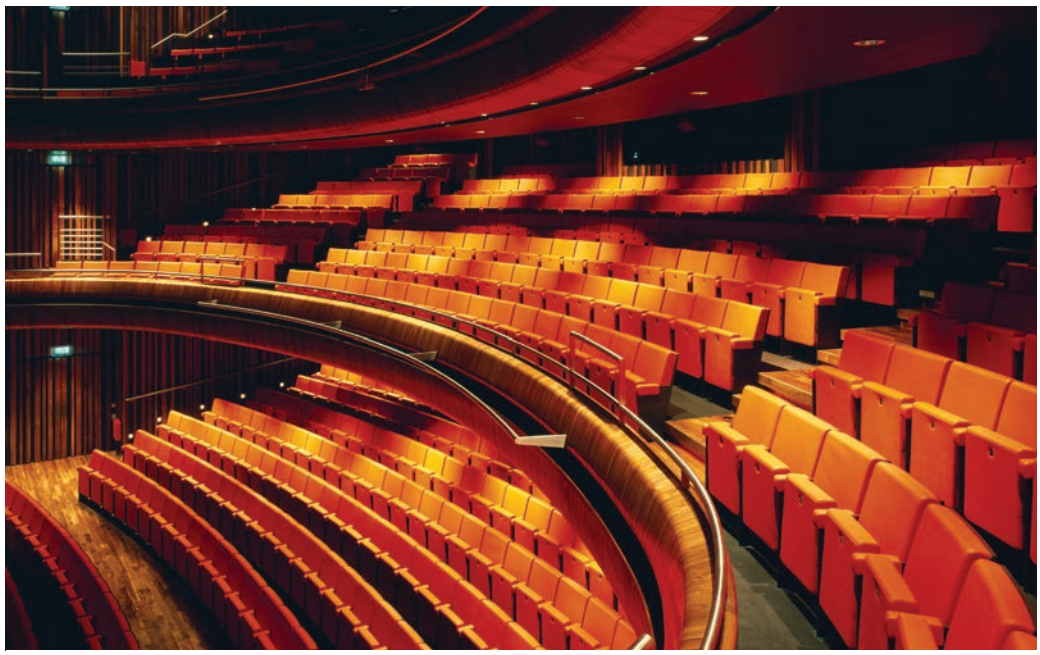
The latest highlights within the Stage collection are the Piero Lissoni-inspired West End and the 815 Series from Severini Associati, both leading Italian designers and architects. "For clean, simple lines and rounded edging, look no further than West End," the Italian says. "Its features belie a clever ergonomic design that delivers unwavering comfort."

The 815 Series, meanwhile, was originally developed for the Giometti cinema chain and offers modern chic. Subject to the usual approvals, designers, architects and specifiers can select from a variety of materials; cup holders, for instance, can come in methacrylate, metal or rigid polyurethane. "An LED-based lighting system also offers an alternative to the standard seat numbering system, which projects the number of the seat onto the cinema floor," Gullini reveals. A luxury version of the seat is also available with double-width armrests, side headrest and a distinctive gold-finished cup holder.

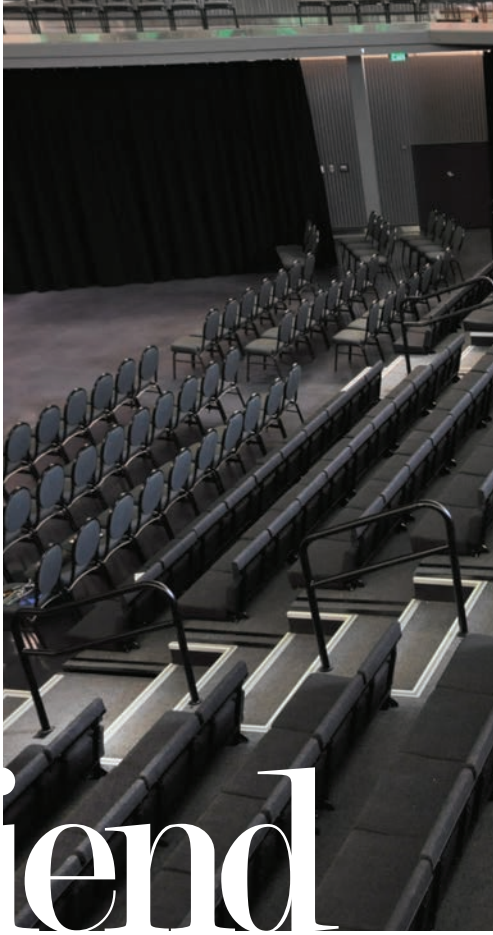
"The Neos design by Keith Williams emerged from the development of a standard seat for the 2011-built Marlowe Theatre in Canterbury, UK," continues Gullini. "The outcome is a minimalist, stylish, modular seat that effortlessly complements the classic sweeping curves of the traditional horseshoe-style auditorium."

Whether the clients are specifiers in the contract sector or architects and designers, they're all universally impressed by Poltrona Frau's impeccable service that spans from the very outset of a project right the way through to installation. And although the company's seats are almost infinitely customisable for any given environment, there is one binding agent that links the products and keeps clients coming back for more: Poltrona Frau's meticulous Italian eye for design and built on a philosophy of innovation and quality. ■

www.pfgcontract.it



Stylish modular seating in horseshoe configuration at the Marlowe Theatre in Canterbury, UK



Flexible friend

A university student centre has kicked off its 50th anniversary celebrations with the reopening of newly a renovated theatre featuring a specialised, flexible seating system

This year, the Lory Student Center at Colorado State University (CSU) is celebrating its 50th anniversary as 'the centre of student life'. The university, which was originally founded in 1870 as the Colorado Agricultural College, is now among the leading research institutions in the USA.

The Lory Student Center originally opened in April 1962 and comprises 160,000ft² of amenities, including student facilities, restaurants, events spaces and a multi-purpose theatre. In June 2010, the University Board of Governors approved a project that would see the revitalisation of the theatre, including modern LED lighting, improved technological facilities and a brand-new seating system. After a year of reconstruction, it reopened on 24 August 2012. The renovation, though, is just the first part of a larger, ongoing modernisation project at Lory Student Center, which includes the refurbishment of the existing space and the addition of around 40,000ft² of new space.

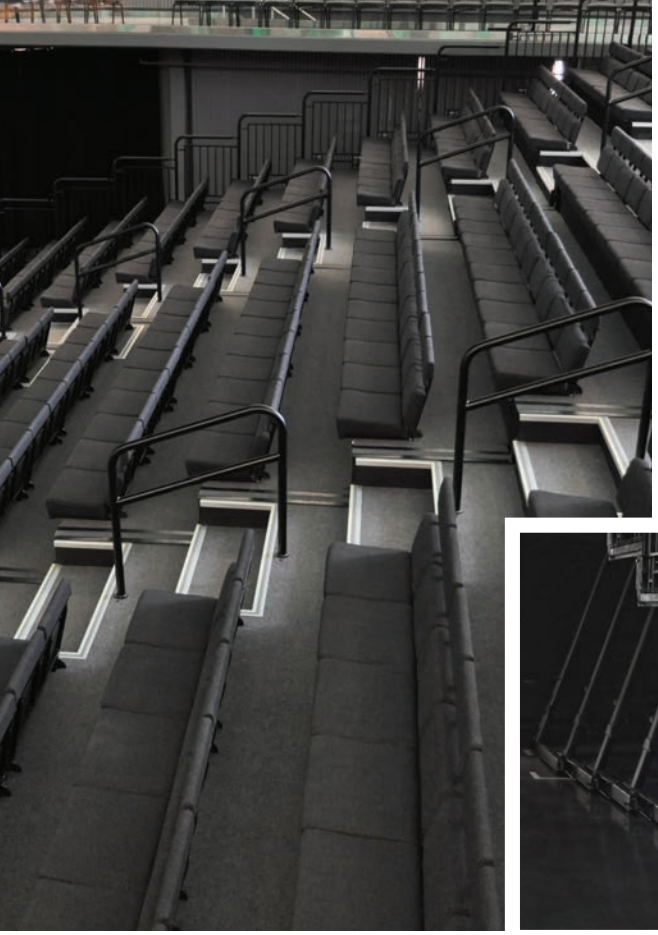
The revived venue, designed by Aller-Lingle-Massey Architects working to a masterplan by Perkins+Will, called for a flat floor that would provide versatility for a range of events, either in a clear open space or with seating able to accommodate up to 500 people.

To find a suitable solution, the project team turned to Steeldeck, a UK-founded staging and seating specialist that has worked on many similar projects both in the USA and back in the UK. Steeldeck suggested a solution for the theatre that consisted of three independent, retractable seating units formed from a modified version of its A Pack seating system, each floating on air castors. The units can be retracted and moved to storage alcoves when not required, then positioned and extended to create either a full end-stage auditorium or a lower-capacity thrust-stage setup, either one in conjunction with loose seating at floor level.

Knowledge is power

"Our solution for the Lory Student Center Theater was based on the experience we have gained over many years of devising solutions for these types of projects," explains Steeldeck's Philip Parsons. "We started with small, manually operated installations at Rose Bruford drama school and Kingston University, both in London, and have progressed to larger, more complex projects, for instance at the University of Exeter's new Tremough Campus in Cornwall and Hampton School in London, where we created Britain's first curved retractable seating system with fully motorised tiers, a system designed by Giles Favell.

"All of this experience made us confident that the Lory Student Center Theater project could be achieved, despite the doubts that



were voiced by some larger companies about the feasibility of moving such large units manually.

"We are not the biggest player in the field but we're of a size that enables us to give every project the personal attention it deserves," Parsons continues. "By teaming up with the architects and theatre consultants, we can work together to solve the specific problems presented by each venue, and create practical solutions that suit each individual building. We make sure that each solution is built to the highest standard and then we approve it personally before handing over on site."

In addition to the smaller, intricate venues that Parsons has worked on, he is also proud of the equally personalised solutions his company has found for larger-scale projects.

The Hydro Arena in Glasgow, designed by Foster+Partners, will be Scotland's largest entertainment venue when it opens in 2013, and will feature a customised version of Steeldeck's curved A Pack retractable seating.

In New York, the company's versatile Steeldeck platform formed the basis of a complex structure created with consultants Fisher Dachs Associates to transform New York's Park Avenue Armory, most recently for the New York Philharmonic.

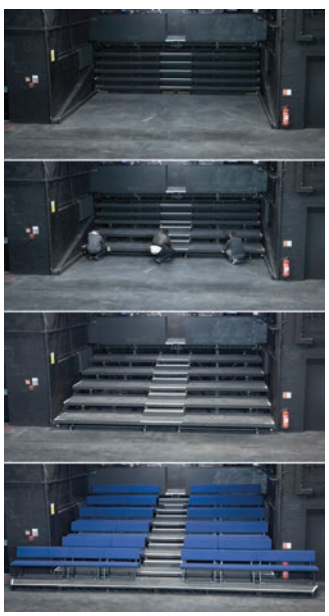
Back in Colorado, the new seating system at the Lory Student Center Theater has so far received an overwhelmingly positive reaction from staff and students alike. Technicians in particular are pleased with its speed of deployment and ease of use. "We recently had a very last-minute change of schedule in the room," recalls Jason Rogien, assistant director for events services at the centre. "Fortunately, I had already handled the units once or twice and with the help of two student assistants I was able reset the risers, bridging plates, guardrails and seats in just an hour."

Great reception

Alan Antolak, senior project manager for Adolfson & Peterson, the main contractor for the project, has also expressed his admiration for the Steeldeck solution, while the CSU facilities project manager, Tracey Abel, agrees it has met the needs of the Lory Student Center perfectly. More important has been the reaction from those who ultimately use the theatre – the students – which has been equally enthusiastic. "These seats are awesome! Really comfortable," commended an anonymous freshman overheard by staff at a CSU orientation event. For Parsons, impressing the students – possibly the harshest of critics – feels like the biggest achievement of all. ■

www.steeldeck.co.uk

(Far left to right) **Seating system created for Park Avenue Armory in New York; retractable seating units at the Lory Center theatre; easy deployment of the units; the Lory Student Center welcomes around 18,000 people through its doors every day; seating solution at the Rose Bruford drama school** (below)



Behind the scenes

The Theater am Hafen revamped its control systems to increase functionality, improve safety and enhance audience experience

(Right top) ***The Lion King* at Theater am Hafen, Hamburg; the show programme and multiple cues are controlled using the cue interface** (right bottom)

Disney's *The Lion King* has been enchanting audiences in Hamburg for more than 10 years, transporting more than eight million visitors to the fascinating African landscape. To coincide with the show's 10th anniversary, its organiser, Stage Entertainment, wanted to install a new control system at the Theater am Hafen, which is located in the port of Hamburg. EAE Coswig was contracted in 2011 to replace the existing, tired control system at the theatre with a new-generation version.

System upgrades

The theatre opted to upgrade to EAE's ARTEA SR system, which provides a number of benefits in terms of increased functionality, dynamics and flexibility compared with the old machines. With regards to safety, the ARTEA SR system also meets all requirements according to EN61508 with safety integrity level 3 (SIL3).

ARTEA SR comprises a purpose-built axis control unit (ACU), along with three servers and three real-time networks, which ensure reliability and safety. As a result, the failure of server components, network or ACU components will never again cause problems. In addition, the automatic switch processes guarantee that even active transformations can be completed without interruption. The standby function is unnoticeable to audiences, but the operator is informed about the respective process with a clear note on the control system screen.

Data is processed in the system via simple connections to the ACU in the place that it is generated, which results in a highly dynamic play of real-time control – a prerequisite for bringing a stage to life.

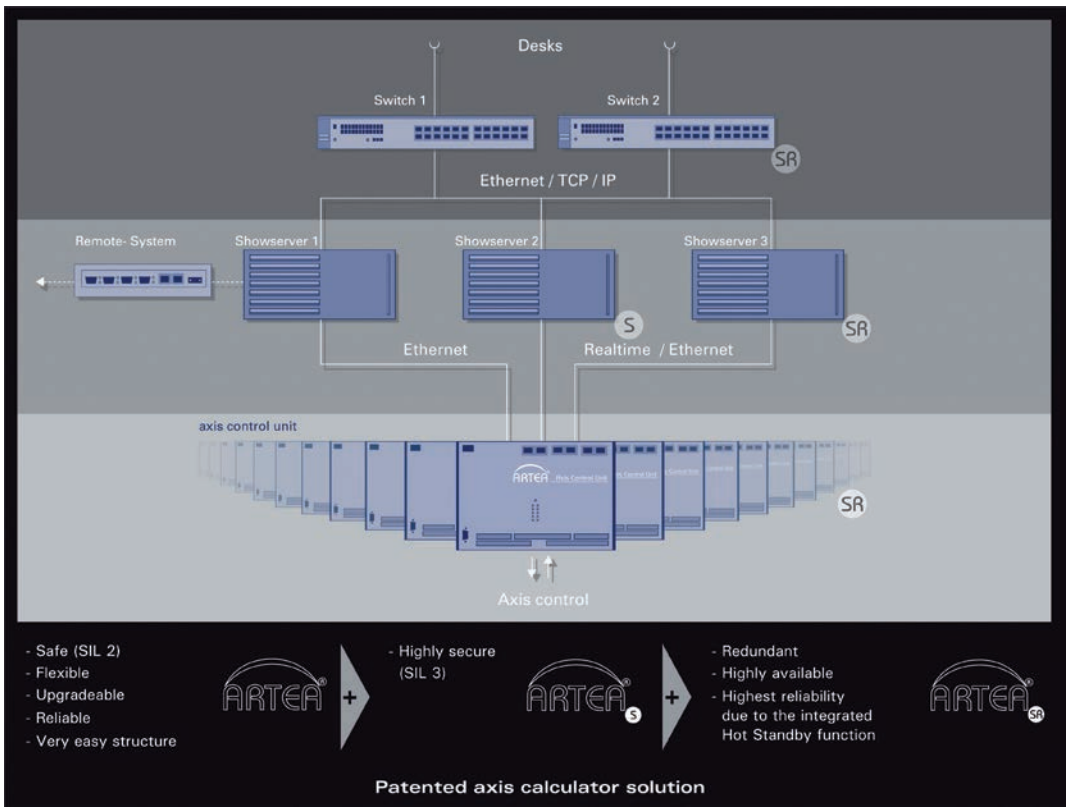
Design considerations

The new system uses well-crafted control desks, which are designed to be user friendly and provide easy handling. The desks have a new surface design that has been created to look modern, with contemporary colour gradients and shapes. More importantly, the surfaces have been adapted to accommodate the working conditions in theatres, with bright text and vibrant colour contrasts incorporated to facilitate visibility and operation in dark environments.

The displays have also been upgraded to be more energy efficient, incorporating LED backlights and increased technical quality to make the units more durable and environmentally sustainable.

In addition to the visual changes of the ARTEA screen surface, various new functions have been introduced. Particularly important is the cue user interface, which increases

Shift	Cue	Aktiv	Name	Achsen	Kommentar
Y	6.1	C1	Upstagepack Preset Akt 1	MZ24▼, MZ25▼, MZ26▼	
Y	6.2	C2	Wolke 3 Preset Akt 1	MZ18▼	
Y	6.3	C3	Sonne Vorposition	Sonne▼	
Y	6.4	C4	Sonne Preset Akt 1	Sonne▼	
Y	6.5	C5	Wolken 1 & 2 Preset Akt 1	MZ10▼, MZ15▼	
X	6.6		----------		
Z	6.7	C6	Sonne obere Showpos.	Sonne▲	
Z	6.8	C7	Wolken obere Showpos.	MZ10▼, MZ15▼, MZ18▼	
Z	6.9	C8	Züge Preset Akt 1	MZ01▲, MZ02▲, MZ03▲, MZ04▲, MZ05▲, MZ06▲, MZ07▲, MZ12▲, MZ13▲, MZ14▲, MZ16▲, MZ19▲, MZ20▲, MZ21▲, MZ23▲	
X	7		--------Beginn Akt 1---------		
A	8	C1		MZ10▲	
A	9	C2		MZ15▲	
A	10	C3		MZ18▲	
A	11	C4		Sonne▲	
B	12	C5		MZ02▼, MZ03▼, MZ10▲	
B	12.7	C6		MZ03▲	
C	13	C7		MZ03▼, MZ04▼, MZ10▼	
C	14	C8		MZ02▲, MZ03▲	
D	16.1	C1		MZ04▲	
E	17	C2		MZ02▼	
F	18	C3		MZ01▼, MZ02▲	
G	19	C1		MZ01▼, MZ07▼, Jungle Border▼	
G	19.5	FH2		MZ01▼	
G	20	C3		MZ22▼, MZ25▼, MZ26▼	



The control system comprises a purpose-built axis control unit (ACU), along with three servers and three real-time networks

serviceability and flexibility at the theatre. The interface extends the previous concept of the control system to make it mobile for increased flexibility. It also enables Stage Entertainment to programme the show while simultaneously creating cues that run using the software and hardware cue button. This gives the operator options when deciding which version to work with.

Timely completion

Stage Entertainment wanted to install the new system onto 26 drives of overstage machinery for *The Lion King*. These drives correspond to one construction type, only in three different sizes, hence a decentralised control solution could be realised.

The challenge was to complete the system reconstruction within a period of only one week due to the large number of shows taking place; a longer reconstruction period wasn't possible because an extended show cancellation period was deemed unacceptable.

The assembled system components included two Command series operating consoles, 26 decentralised control cabinets, one computer cabinet and four plug-ins. In addition, 20 cue push buttons were mounted into the operating consoles, which allow the concurrent selection of multiple scenic transformations, meaning that a control lever is no longer necessary.

A week before Christmas, the shows finished and reconstruction began at Theater am Hafen. During this week, the old control system was disassembled and the new one connected. Furthermore, new position encoders were installed and the overall system was then commissioned. Simultaneously, the new system was approved by an expert and the load-measurement system was reset. It was at this time that the advantages of pre-commissioning the decentralised system at EAE in Coswig truly became truly apparent. The reconstruction was carried out in two shifts and as a result of the detailed preparation work that had already been undertaken,there were no major problems experienced.

On 23 December 2011, the new control system was thoroughly checked by the theatre personnel during a final rehearsal, and the test proved to be a complete success. The first live performance with the new control system subsequently took place on 26 December 2011, and EAE was present to support the customer throughout the show. For the company's staff it was a very successful evening, with 2,000 enthusiastic spectators as witnesses. ■

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Staging masterpiece

A Korean theatre is the debut venue for an innovative stage wagon system that enables flexibility within limited stage space

In 2007, the Korean government commissioned the first sewage treatment plant to be built in the centre of Yongin City. To avoid subjecting an unpleasant environment on local citizens, the facility was disguised in the basement level of a building, and above it a cultural and leisure facility was developed.

A local company, Egaplan, designed the art and leisure centre for the complex, the Yongin Arpia, which comprises a theatre, observatory, gym, swimming pool, an open field for football and a running track. Wholly funded and owned by the Korean government, the complex is part of a much larger city redevelopment plan, which additionally includes the development of nearby residential buildings as well as a huge department store.

The theatre part of the project, which began in 2009, was designed to be a multi-purpose venue that would be used for a variety of musical shows, plays, classical music, pop concerts and special events, necessitating the need for a turntable on stage. Due to the limited space, though, a smart mobile stage wagon system was required to achieve the desired flexibility. In order to achieve this, the subcontractor, Se.one, contacted its German partner HOAC.

The stage wagon system has an integrated turntable (opposite); **the Yongin Arpia complex is part of a larger redevelopment plan for the city** (below)

A novel idea

HOAC's developed solution, the advanced stage wagon system, consisted of three stage wagons with an integrated turntable. Instead of using the 'cassette' technique, though – where the turntable rotates as part of the system on the stage wagon – the rotation takes place directly on the stage floor, resulting in a shorter, lighter system that requires fewer materials. Its overall size was determined by the stage dimensions, which resulted in three wagons measuring 15m wide x 5m deep. The turntable has a diameter of 9m and is centred within the 15 x 15m area. The complete system has a total height of 215mm, including 21mm plywood decks.

These dimensions were realised with the HOAC FrameSystem, using the standard 16 2/3 profile. The aluminium frames were welded according to the German DIN 4113 (soon DIN EN 1090-ff) and were connected with the HOAC LinkBlock. For all wiring, specially defined openings were made in the frames and the brackets were pre-mounted in place to seat the drive units. For a smooth movement, triple caster units with a static load capacity of 500kg were installed to enable minimum rolling friction. The wooden plywood decks can be placed separately and are locked to the system frames.

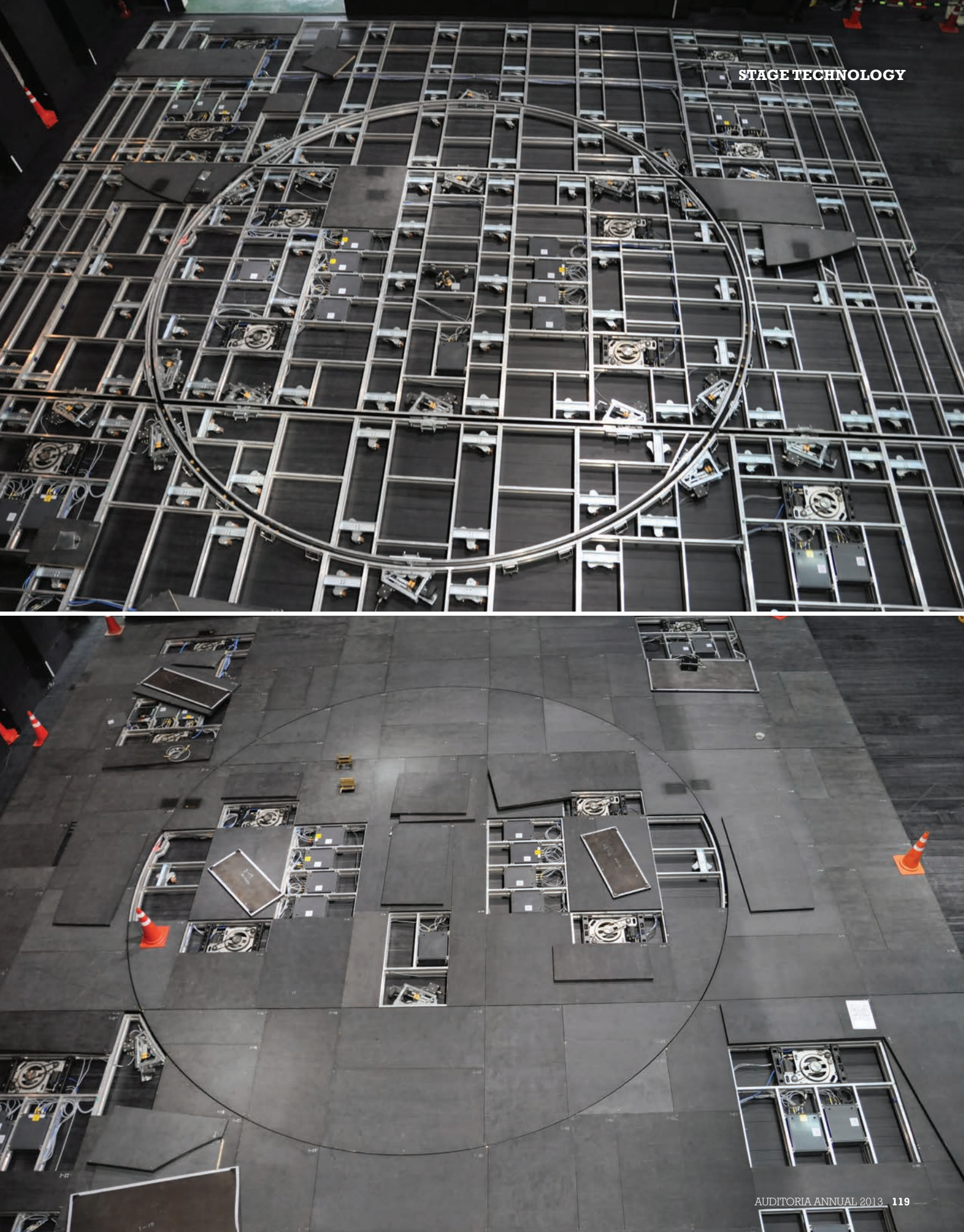
Technical considerations

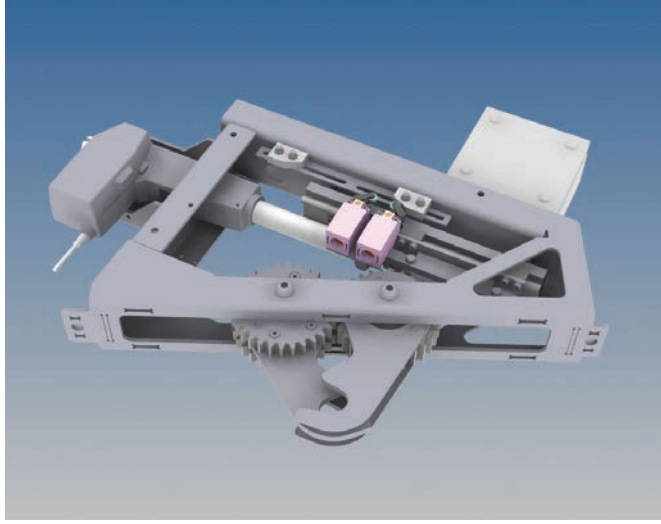
This new idea raised some technical questions. How, for instance, can the tolerances between the turntable and stage wagons be managed? How is it possible to switch from the turntable function to the stage wagon function? Can we let it rotate while the stage wagons are moving and how would we manage all the different connections?

The automation of the wagons was realised using advanced system technology from Visual Act in Sweden, and the construction was managed by HOAC. This allows free and programmable motion in any direction without tracks or other mechanical limitations. Standard motions (such as moving from side stage to meet the stage elevators) are programmed in advance and can be activated by the operator at any time.

The three stage wagons can operate individually or can be locked together using 16 automated HOAC LockingDevices, which are driven by an electrical cylinder. When the three stage wagon units are connected, the drive units and machinery from the centre wagon are used to power the turntable.

As the turntable is placed directly on the stage floor, it is mechanically guided





The Yongin Arpia theatre is a multi-purpose venue (above left)**; the HOAC LockingDevice enables the stage wagons to be joined together** (above right)

by small casters placed along its perimeter and can therefore operate at any position. The advanced algorithm of the Visual Act control system allows the turntable to rotate as the entire stage wagon system moves in one direction. Positioning of the turntable is accomplished by using a scanner that reads barcodes placed on the surrounding wagons (the accuracy of this positioning system is ±3mm).

Each 15 x 5m stage wagon contains four drive units that have a maximum speed of 0.45m/sec and a total load-moving capacity of 2.75 tons. Each unit includes two servomotors that provide for locomotion and steering in tandem, which also enables rotation of the wheel at standstill without any damage to the stage floor.

Each drive unit is placed in an individual lift cassette actuated by pneumatic cylinders. The cassette has two functions. First, the use of pneumatic cylinders will press the wheels of the drive unit against the stage floor, which guarantees even pressure on the floor and means no wheel spin will occur. It also ensures sufficient traction while eliminating the risk of overload and ensuing damage.

In addition, the cassettes can be used to lift the drive units, enabling the stage wagon to continue to operate even when a drive unit has failed. As an ultimate back-up, all drive units can be lifted up and the complete stage wagon can be pushed manually.

Each stage wagon has control cabinets on board, which contain the control and navigation computers, a power supply and an emergency stop. The integrated amplifier cabinets each include four intelligent servo amplifiers; the servos work together with the control computer to dynamically position the stage wagons. Each wagon also contains three 120VDC sealed battery packs providing a total of 39Ah of power, which allows for a full day of operation based on overnight charging in the parked position.

All three stage wagons are equipped with laser scanners at both ends to ensure position repeatability of ±5mm. The laser navigation system uses a set of reflectors placed in the perimeter of the stage area. A second set of reflectors is in place to allow for motion on the lower level, created by lowering the stage and compensating elevators. To achieve this accuracy, a minimum of three reflectors must be detected by the laser scanner.

The positioning of the three stage wagons above the compensating elevators can be achieved with an accuracy of ±3mm, using magnetic sensors placed in the stage floor.

Operator control

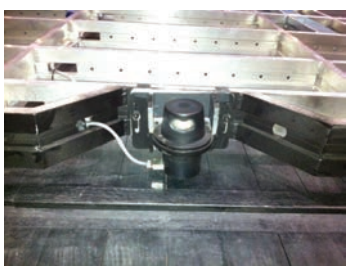
All movements are planned at the operator desk either using CAD software or by entering the coordinates of the stage. Also, predefined positions can be selected for defined movements. Programmed motions are downloaded to the wagon controllers over a radio link to allow for real-time operation. The operator has full control of the motions from a joystick on the operator desk. A wagon or a combination of wagons can be operated in 'free mode' using a three-axis joystick to control and combine motion along the *x*, *y* and rotational axes. In addition, a handheld control can be plugged directly into a single wagon to allow direct control for maintenance or back-up operation.

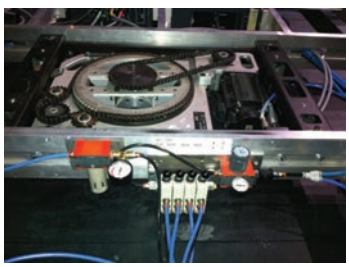
The modular design of the HOAC FrameSystem enables the user to create smaller mobile stage wagons, which creates more flexibility in the system. The smallest mobile battery-driven stage wagon that the Yongin Arpia theatre can assemble has a base unit measuring 2 x 5m.

Contracted in 2010, HOAC and Se.one realised the project in spring 2012. At the time of press, it was still to be decided which show would open the theatre in September, but with this stage wagon system in place almost any performance would be possible. ■

www.hoac.de

Visual Act Laser scanner integrated in HOAC FrameSystem (below)**; Visual Act drive unit in Airlift cassette** (bottom)





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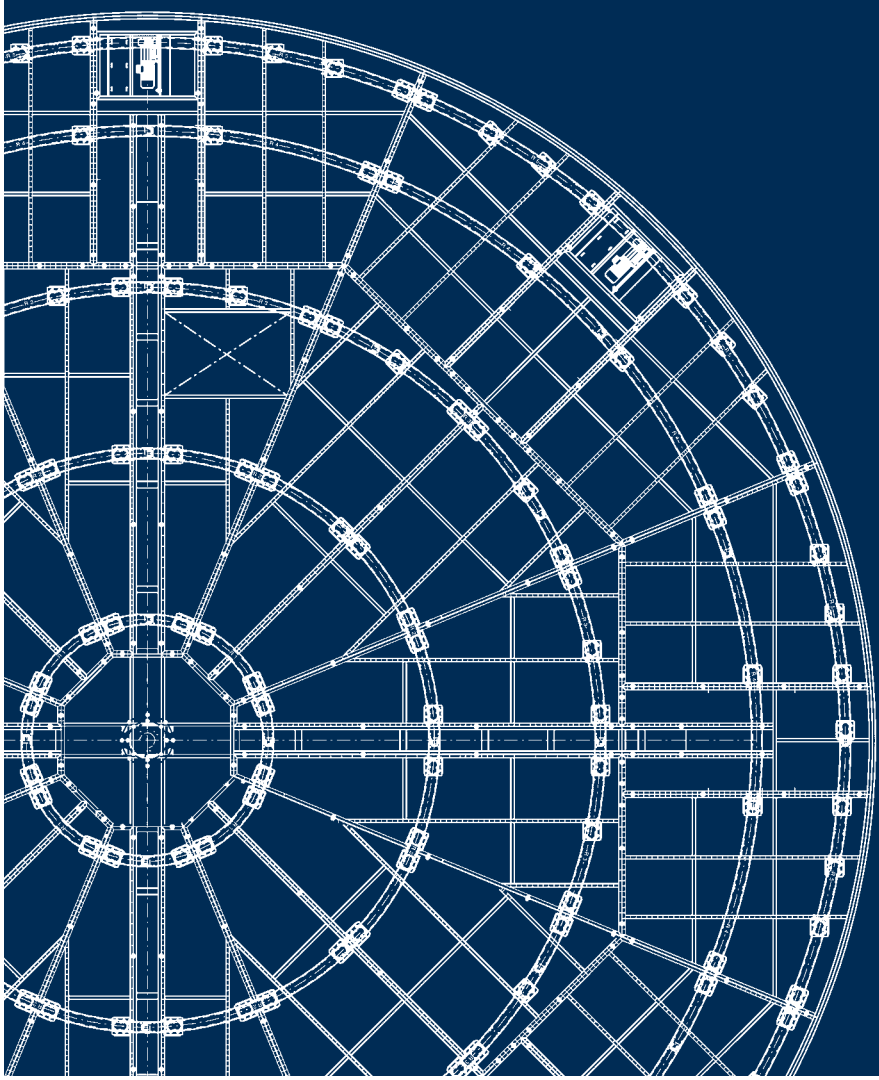

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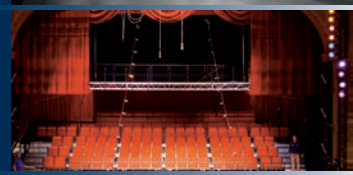

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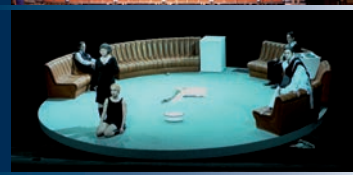

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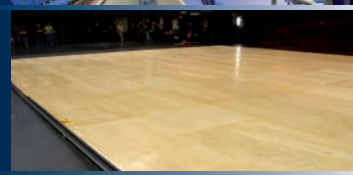

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Class act

A sophisticated auditorium at a prominent educational institution in the UAE required innovative solutions to facilitate optimised sound quality and flexible functionality

The new Abu Dhabi campus at Zayed University features modern, versatile, architecturally impressive buildings (opposite top)**; the brand-new auditorium has been optimised for a variety of potential uses** (opposite bottom)

Zayed University was originally founded in 1998 with campuses located in Dubai and Abu Dhabi. Established to offer four-year baccalaureate degrees to young Emirati women, it is one of three government-sponsored higher educational institutions in the country. Today, with some 10,000 international students currently enrolled at the university (both male and female) – and the potential for further growth in the future – Zayed University is one of the UAE's most important educational institutions.

In 2011, the university opened its brand-new Dh3.7 billion (US$8 billion) Abu Dhabi campus, at a new location in Khalifa City. The 213,000m^2 site, which is spread over three campuses, has a potential capacity for 7,000 students and incorporates 28 buildings, one of which is home to a 1,000-seat auditorium/events space, known as the Sheikha Fatima bint Mubarak auditorium.

Adaptable environment

Designed to be a modern, versatile space, the auditorium required the flexibility to host a variety of events and functions, while ensuring optimum acoustic quality and clarity at all times. The university called upon J&C Joel to provide suitable acoustic, drapery and stage machinery solutions that would maximise the potential of the space. After thoroughly analysing the specific requirements of the venue, the company recommended a combination of stage dressings, rigging systems and stage machinery, as well as an acoustic shell to encase the stage.

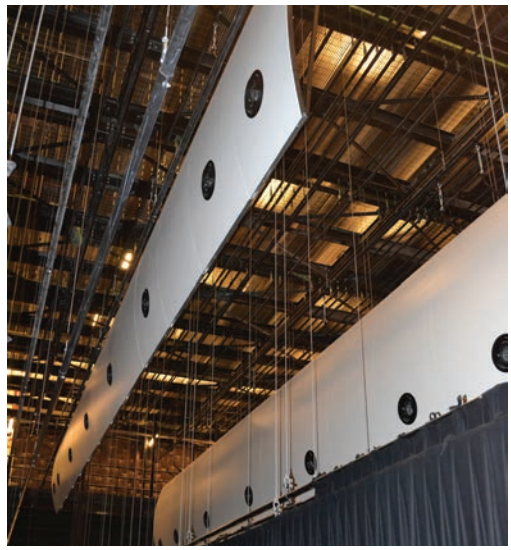
Front-of-house curtains were manufactured for the auditorium from a grey heavy velvet velour (VELH021), which was custom dyed to match the colour of the hall's architectural features. The curtains are suspended from motorised Unibeam tracking.

In addition, J&C Joel manufactured stage masking curtains from black standard wool serge (WS001) and hung them from 12 dead-hung suspension bars above the stage floor. Stage backdrops were manufactured in the shape of a 12m-wide white cotton cyclorama canvas (CAN041) and a white sharkstooth gauze (ST014), and these were mounted on suspension bars to the rear of the stage.

In total, more than 50 suspension bars for lighting, scenery and stage drapery were installed above the stage, 22 of which are powered by motorised hoists capable of operating at a speed of 0.6m/sec and operated via a fully automated control system. A further 20 installed suspension bars can be raised and lowered using a seven-line manual counterweight system. Each is set with a safe working load of 750kg.

The auditorium has also been fitted with a complete lift system, incorporating four stage lifts and an orchestra lift that can be used in various configurations via a bespoke control system. Each lift is raised and lowered by six Serapid rigid chain LinkLift systems powered by a single motor.

For further sound enhancement, J&C Joel designed and installed semi-sprung acoustic flooring, which spans the stage, side wings and orchestra lifts. The flooring was constructed utilising rubber pads and acoustic wadding between the layers to reduce travelling sound. The stage floor behind the front-of-house curtains is black with a removable 'wearing' layer



Stage lift and American walnut acoustic stage flooring (above left)**; suspension bars and acoustic shell panel rigged about the stage at the Zayed University auditorium** (above right)

on which sets are placed, while the stage area to the front of the curtains has a black American walnut top finish and is used to stage prestigious events and ceremonies.

An integral part of the new university campus, the multi-purpose auditorium must be able to cater to a wide variety of events, including orchestral performances. For this purpose, J&C Joel installed a complete acoustic shell that encases the auditorium stage, which has been specifically designed to create the optimum acoustic environment for philharmonic performances. The shell consists of 10 customised aluminium extrusion frames to which reflective acoustic panels are attached. The panels are manufactured with an undulating surface that is designed to direct sound toward the audience. The top of the shell is sealed with a series of hinged ceiling panels hanging from suspension bars above the stage.

Creating a custom sound

A fully adjustable acoustic environment is an incredibly useful facet for a modern multi-purpose performance venue, and J&C Joel worked alongside acousticians to deliver a tailored environment that is optimised for live performances at the university.

In addition to the solutions that were effectively implemented in this particular project, there are a number of alternative, flexible and effective ways in which a venue can be optimised acoustically. These include acoustic curtains, acoustic motorised concertina banners, acoustic duvets and acoustic motorised roller banners. Any one, or a combination, of these acoustic solutions can be used to establish adjustable acoustics within a venue.

Acoustic curtains, typically used as perimeter or partition curtains, can be hung from motorised tracks at high level and deployed to reduce sound reverberation as required, while acoustic duvets can be track-mounted and stored in wall recesses when not required, rather than providing a constant sound baffle when permanently fixed to the wall.

Perhaps the most effective way of catering to a particular performance is to use either acoustic motorised rollers or concertina banners. These precision pieces of equipment can be deployed individually or in groups, and allow for total control over an acoustic environment, with built-in encoders ensuring total accuracy on each deployment.

Acoustic motorised roller banners are typically made with sound-absorbent wool serge and can be either single or double layered, depending on the requirements of the venue. These roller banners are a flexible and practical way of installing variable acoustics within any space, while acoustic motorised concertina banners are specifically designed to provide a high-end sound baffle for major performance spaces and auditoria.

Working in the same way as a Venetian blind clad in anechoic wool serge fabric, acoustic motorised concertina banners can be made to fit any size of venue and are specifically engineered to ensure silent operation so as not to detract from a performance. ■

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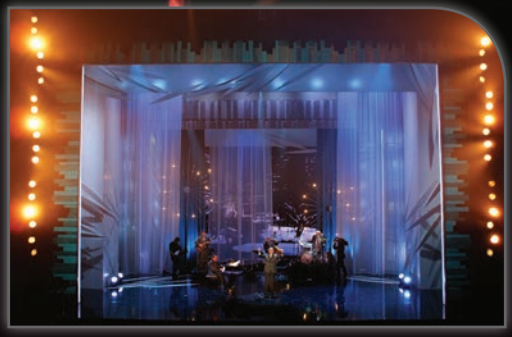

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J. R. CLANCY

That's entertainment

A new performing arts centre in Las Vegas has brought the spectacle back into the local community

World-class entertainment may seem like a mainstay in Las Vegas but the opening of the Smith Center for the Performing Arts in spring 2012 took the concept to a new level for residents of southern Nevada.

"This building is an institution for the indigenous people of Las Vegas – the local residents," says Paul Beard, chief operating officer of the Smith Center. "You have an entire industry here that serves the needs of visitors, but we didn't have a performing arts centre that served the needs of the community. This was the vision of our board of directors, and of our CEO Myron Martin."

The imperative was clear. The Smith Center must feature the finest in theatre design and acoustical flexibility. For this, Clark County officials called upon the talents of design architect David M. Schwarz, executive architects HKS Architects, theatre consultants Fisher Dachs Associates, acoustical specialist Akustiks, and rigging experts at J. R. Clancy.

The Smith Center provides a permanent home to the Las Vegas Philharmonic and the Nevada Ballet Theatre while also presenting touring companies and solo performers. The US$470 million centre houses three interior performance spaces: Reynolds Hall, a 2,050-seat concert hall; the flexible Troesh Studio with a variable capacity of 150-250 seats; and Cabaret Jazz, a concert venue with table seating for 240.

"Our goal was to serve these varying users and create a space that would allow them to perform as if it were a purpose-built hall," explains Adam Huggard, a senior associate with Fisher Dachs.

The disappearing shell

Creating such a hall requires the ability to convert the room smoothly from a theatre to a concert hall in fewer than two hours. One element made this task especially challenging: the very large acoustical shell.

"A Broadway show wants a crisp, amplified sound, and the orchestra wants a rich, resonant sound," explains Paul Scarbrough, principal with Akustiks. "We chose a shell that creates the sound chamber for the musicians. We had very specific criteria about the face weight of the materials in the shell and the articulation."

The CK Wegner shell has two major elements: a set of 12 40ft-high wall towers on wheels, and a 100,000 lb (45,500kg) ceiling system that rests above these towers, creating the illusion of a closed room. To be useful in a hall that hosts different kinds of performances each day, the ceiling and towers had to clear the playing area when not in use.

The solution involved a folding ceiling that can be deployed beneath the 89 counterweight linesets, and then can be stored out of the way. "It is a big frame that tips and flies away – so you can leave a Broadway show hung in the stage house and still deploy the ceiling," says Huggard.

"The rigging became the key to the shell's flexibility," adds Andrew McArthur, J. R. Clancy's onsite project manager. "There are three pieces involved. The first is a counterweight arbor with a drum winch that has an air parking brake, that moves the whole ceiling up and down."

To remove the shell from the stage, stagehands lower the ceiling almost to the floor, and then activate two winches on the gridiron in the downstage right and left corners of the ceiling. The back of the shell ceiling always remains attached to two I-beams on the back wall. "The winches pick the bottom up, so it becomes the front and the top," McArthur continues. "Both sides are double-purchased; as the ceiling pivots, the back is guided up the back wall."

Clancy's lead engineer, Greg Dale, translated this technology to the forestage canopy as well, which has to fly out when the orchestra shell is removed. Two lineshaft winches raise and lower the ceiling and rotate it into position.

"It was pulled off magnificently," confirms Beard. "The ceiling actually lives in the last 6ft of upstage space, so we have 50 clear feet for my rigging system and no breaks between linesets for tip and fly reflectors."

In addition to the rigging, Clancy addressed the need to build utilities into the shell. "We developed a way to distribute air," explains Scarbrough. "Clancy came up with some flexible fabric ducts that actually make the connection with the metal ducts."

"Just the number of trades involved in the orchestra ceiling – mechanical, fire protection,

structural, electrical, all trying to fit into the same space – we had lots of problems to work out," admits Huggard. "Andy McArthur did onsite coordination between trades. It formed a more collaborative environment."

"If all projects came together as nicely as this one did, it would be wonderful for all of us," says Mike Murphy, J. R. Clancy president. "The Whiting Turner contracting team was exceptional. The owner, Fisher Dachs Associates, David M. Schwartz Architects, and Akustiks worked in harmony with Whiting Turner and J. R. Clancy to complete the project."

Control and beyond

All the automated rigging in Reynolds Hall is controlled by a custom-designed variation of Clancy's SceneControl 500 rigging control system. SceneControl provides an intuitive touchscreen interface, an accurate three-dimensional display of the backstage area, and the capability to group sets of hoists for synchronised operation.

"We modified a SceneControl to follow specific sequences for each piece of equipment," notes Larry Eschelbacher, J.R. Clancy director of engineering. "So the whole process follows a sequence that cannot be changed. SceneControl also controls the orchestra lift, the acoustic curtains and doors, and the side and centre speaker clusters."

Beyond the stage, Akustiks specified a series of acoustical draperies that live behind

Smith Center dance studio (top left)**; the centre house curtain** (top right)**; hall set up for cabaret** (above)

the proscenium grillwork, cover the acoustic chambers along the upper side walls, and are arrayed along the rear walls of the house at the three uppermost seating levels.

"We came up with the idea of motorising the seating box doors, so we can open them all at the push of a button, venting sound into the antechambers beyond the boxes," Scarbrough reveals. "There, the sounds can be absorbed."

To give stage hands the best possible manual control of all the acoustic curtains, Clancy developed a new product, SureTrack, a closed-loop, chain-driven track system.

"The curtains are fabricated with hidden grommets on 4in centres, and SureTrack extends and follows wherever it has to go in the building," McArthur explains. "Then it serpentines like ribbon candy to the correct position."

Clancy provided seven different systems of SureTrack and curtains that can move in unison or independently. Five additional straight tracks live behind the false proscenium, and one more is installed on the hall's fifth level.

"SureTrack exceeded our expectations of the competitive product," says Huggard. "We knew that Clancy would support its products, and that the company would stand behind us."

Most importantly, audiences and performing artists are delighted with the hall, concludes Beard. "That response has been the most gratifying of all." ■

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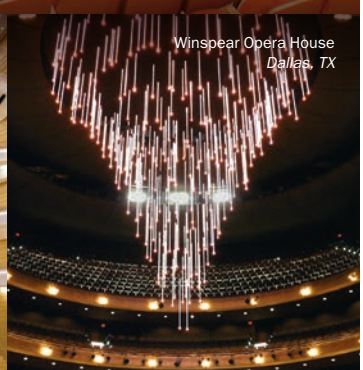
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Showtime in Shanghai

A large stage created big engineering challenges for the stage technology construction at the Shanghai Culture Square

The metropolitan region of Shanghai enjoyed an exciting cultural event when the Shanghai Culture Square opened its doors to the public with *Ultimate Broadway*. The all-star, highly demanding musical show proved to be the perfect way to showcase the stunning architecture and state-of-the-art staging technologies of the new theatre.

The stage equipment for the Shanghai Culture Square was built by SBS Bühnentechnik, which from the very beginning saw this project as an unusually complex challenge. The company was required to install overstage and understage machinery for a large, innovative and flexible theatre design, to supply stage wagons, and to find tailor-made solutions that would enable even the most outlandish show ideas to be realised by the stage equipment.

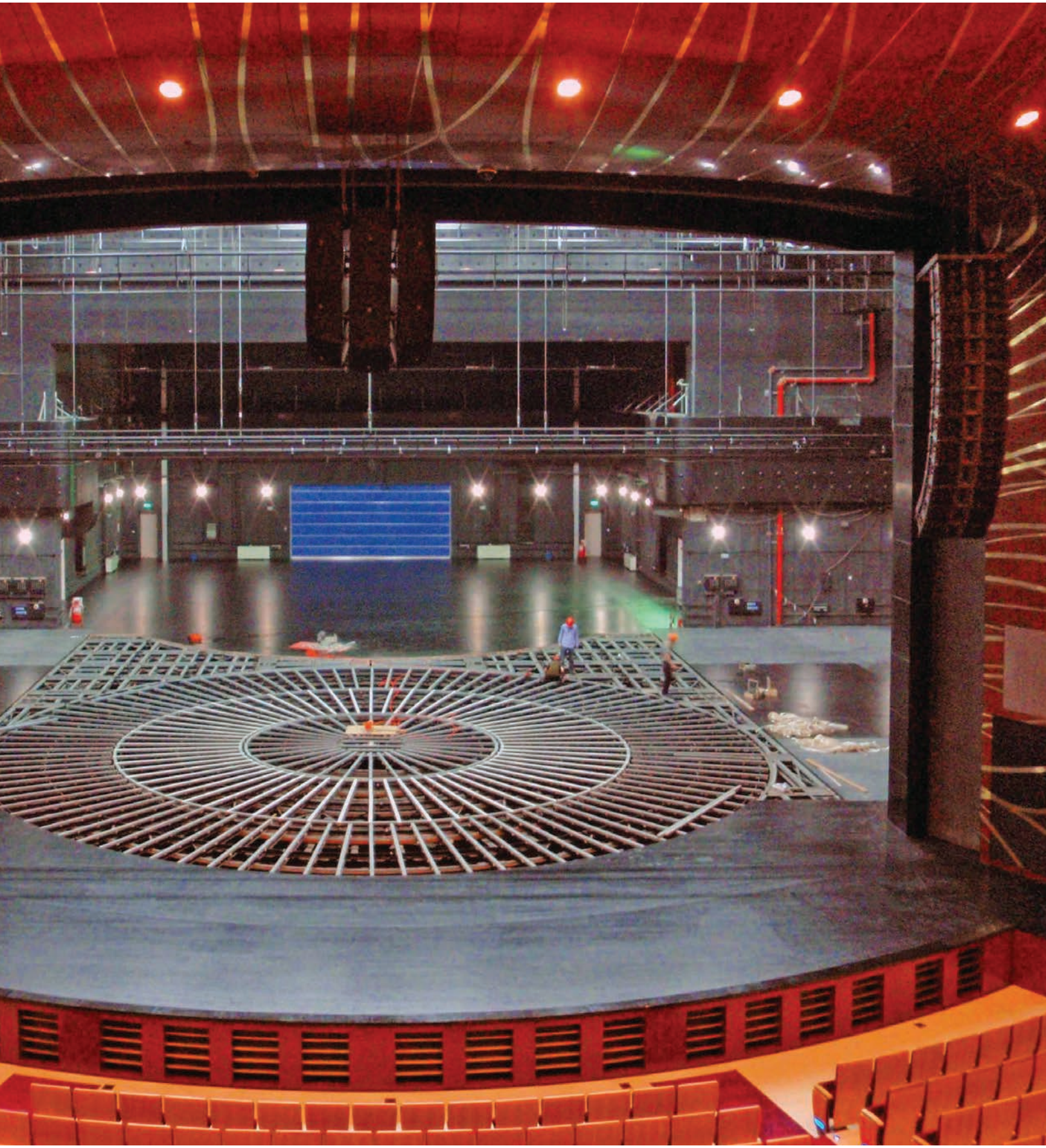
The stage itself is very large, with a total area of 2,100m^2. One third of this is the main stage, which is 35m wide x 22m deep, flanked by two fully equipped side stages of 19m width, thus together providing an extra 38m. The backstage area has a depth of 20m. The grid is 29m above the stage, and contains three fly floors.

In this huge country, you have to think big…

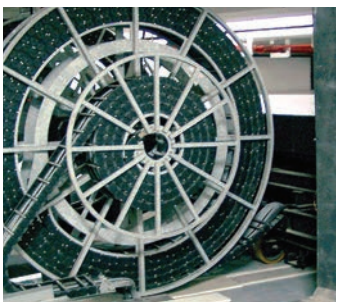
Feats of engineering

The stage technology had to be perfectly adapted to the huge stage dimensions in terms of degree and power of movement, loading strength and travelling distances. Although the overstage machinery follows conventional designs, under the stage things look quite different. A system of diverse wagons, mostly newly designed, all serve to guarantee flexibility and fast transformations on the show stage. Three large, functional wagons are parked in the understage area: a turntable wagon, a water wagon and an ice wagon, each weighing 125 tonnes – equivalent to 100 VW Golfs. Friction-wheel drives move these heavy loads between park position and the central elevator. Any collisions between these 'monsters' would be very dangerous. A laser-based path-measuring system ensures that this will not happen by precisely steering the simultaneous movements of the wagons. The system is so precise that turntable and water wagons can be operated at the same time with a separation distance of less than 0.5m.

Each of the three functional wagons is a masterpiece of engineering: the turntable wagon combines both rotary and lifting movements, the interior disc can be raised 0.6m, and the middle ring can rise by 0.3m. A third option is to raise the entire wagon using the lifting platform. The separate sections can be rotated at a maximum speed of 1m/sec (measured at the perimeter). The water wagon has a basin depth of 0.4m and a 14m diameter. It comes supplied with a large number of water jets and lights. The



The elevator is driven by 30 rigid chain lifts (above)**; the winding unit of the cable management system** (below)**; one highlight of the theatre foyer is the 300m² fresco entitled 'The Source of Life'** (bottom)



ice wagon has a concrete core that remains at a low temperature. The ice itself is created outside the wagon; travelling supply hoses ensure that the ice maintains its high quality, even throughout long performances.

Simultaneous transport of supply pipes (electricity, water, hydraulic fluid) to accompany all wagon operations is achieved as a result of a cable management system, which uses a retractable cable chain. This chain is raised along with the wagon up to stage level.

Range of motion

The impressive feats of engineering at this theatre include the elevator for the functional wagons and the stage wagons, which is driven by 30 rigid chain lifts arranged in all three axes on the underside. A set of three radially installed scissors raises and lowers the platform, allowing a load of 220 tonnes to be moved at 0.25m/sec.

The opening through which the elevator appears is covered on the main stage by a bridge wagon, encompassing the entire stage width of 19m. When in position, four side-stage wagons, each weighing several tonnes, can be moved over the stage area above the bridge wagon.

Each of the four side-stage wagons is 4.5m wide x 19m long and can travel up to 0.7m/sec to the opposite stage side. If two trollies were to meet, one sinks down to stage level and the other rolls over the top. Such a manoeuvre is permitted by the special drive system, in which the side-stage wagons are driven by horizontal rigid chains that can be disconnected at every position. The wagon is lowered while remaining entirely passive; the drives for the pin and couplers are contained within the stage floor.

The platform compensators are also important because they ensure a closed stage surface, regardless of the positions of the stage wagons. There are a total of 13 such compensators, the largest of which is 19 x 19m and is located backstage.

The fly system is another impressive feature, incorporating 60 bar hoists with a maximum lifting speed of 1.5m/sec, and alternating 750kg and 1,000kg payloads on the 24m-long bar. In between these are 10 lighting hoists, as well as five side lighting hoists on both the left and right. The complete fly system therefore ensures a high degree of flexibility, quick transformations and a diverse range of staging options.

Superlative control

SBS's Bühnentechnik's COSTACOwin control system provides the Shanghai Culture Square with a highly specialised software package and a powerful system to control all staging motions at the theatre. In all, 221 axes are controlled to a high degree of precision and reliability. The control centre supplied is the SCOUT-Eagle main desk, which is constructed to double its normal size and is installed in a control room on the left side stage. Meanwhile, a mobile SCOUT-Milan control unit at stage level and one in the understage area provide useful support to the main desk.

Looking forward

The experiences gained from the Shanghai project led to further product developments of the COSTACOwin. The new Version 5 combines improved performance with intuitive menu navigation, including 3D views. Switching between 'setup operations' mode and 'live performance' is a one-click action.

SBS Bühnentechnik has gained valuable know-how from its four years working on the Shanghai Culture Square. As a reference project, it demonstrates that the company is able to realise innovative and highly complex tasks, from project planning and construction to final installation, all within a set deadline.

Shanghai was followed by the Royal Opera House in Muscat, Oman, with a 500-tonne movable concert shell. This was followed by the modernisation of the overstage machinery in the Schauspielhaus Frankfurt/Main. The Shanghai project also played a considerable role in the company's acquisition of the contract for the complete new building of the world-famous Mariinsky Theatre in Saint Petersburg. ■

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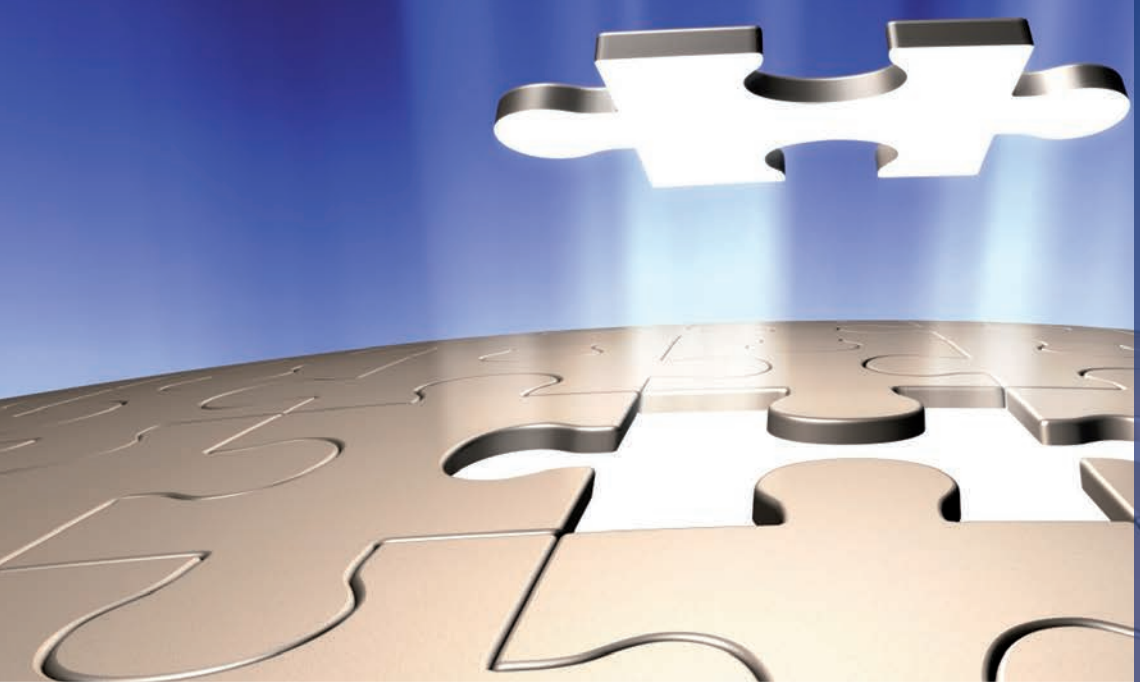

Royal Opera House Muscat
Stara Zagora Opera
Shanghai Culture Plaza
Jūras vārti Cultural Center, Ventspils
National Academic Opera and Ballet of the Republic of Belarus, Minsk
Grand Theater Wenzhou
Lithuanian National Opera and Ballet, Vilnius
Mariinsky Theater, St. Petersburg
National Convention Center Hanoi
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Another level

Innovative lift and stage systems can transform venues by enabling flexibility in function and adaptable design

The revolving elevators at the Wyly Theatre in Dallas convert the space from the lyric layout to in-the-round layout (below and right)

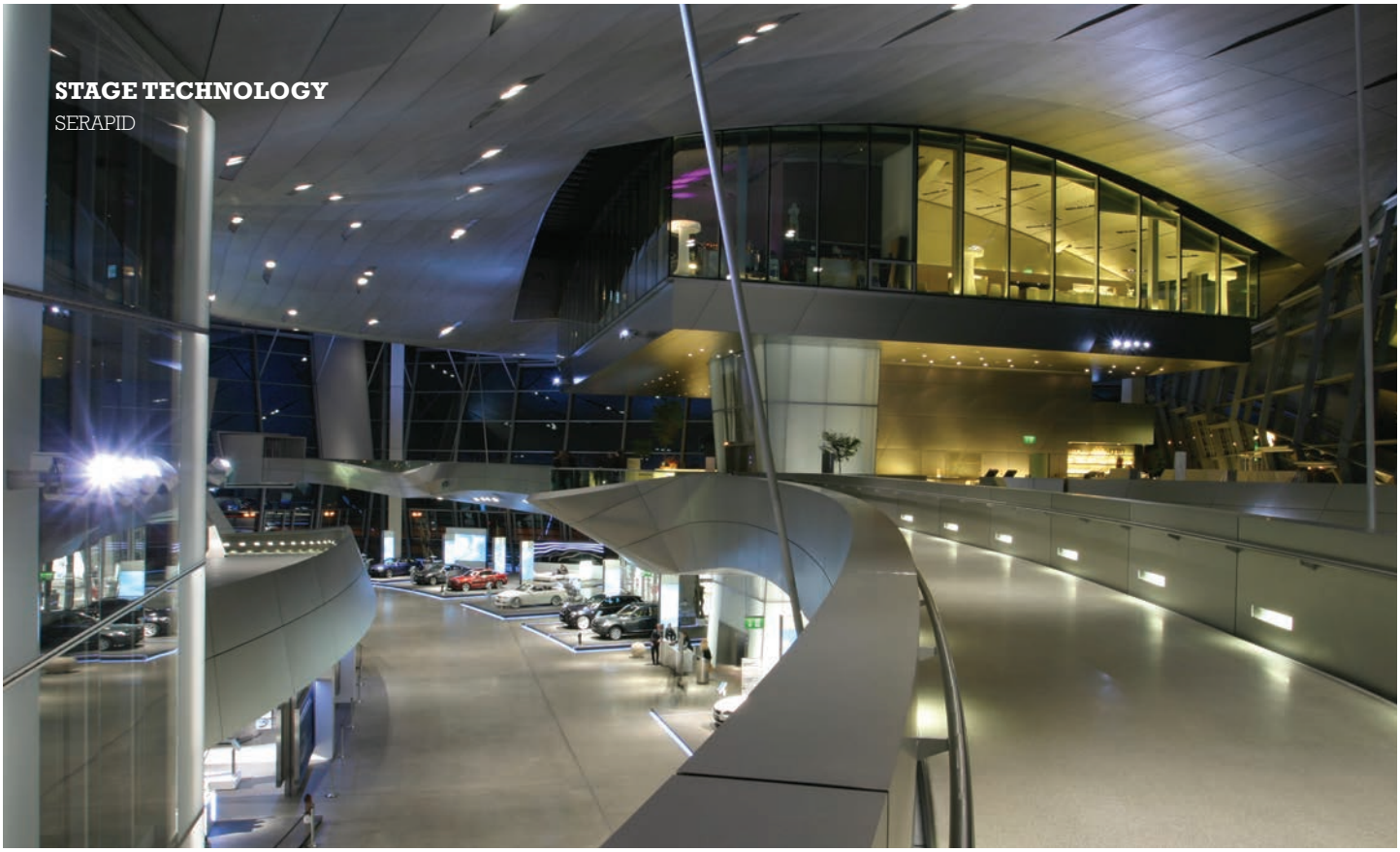
The global economic downturn has made flexibility a necessity for venue operators. In order to bring in sufficient revenue to survive and prosper, an increasing number of theatres, performance halls and congress centres are installing lift and stage systems that can create flexibility and multi-functionality.

Franco Parenti, a theatre in Milan, Italy – which had been converted into a cinema – feared that if it were to be restored as a theatre it couldn't survive on the revenue generated as a single-function facility. The client wanted to create some flexibility, enabling the venue to be used for exhibitions, congresses, conferences and banquets. Serapid was contracted to install seven elevators in the auditorium in order to achieve a rake. The upstage elevator at the front of the auditorium acts as an orchestra pit during performances, while a transport elevator moves seating wagons from the storage area under the auditorium floor and the stage. This was a cost-effective solution that allows a great degree of flexibility and did not require excessive labour.

The congress and conference centre in Darmstadt, Germany, required the flexibility to quickly change between various layouts. In response, Serapid installed large 'mother' elevators in the theatre, on top of which there are small riser lifts to achieve the rake. A large-scale Germanic installation, the venue relies on loose seating, which requires manual labour to deploy, storage space for the seats, as well as limiting the type of seating that can be used.

Munich's BMW World product launch and congress centre is used for a number of different functions including shareholder meetings, product launches, films and dinners, as well as a conventional theatre. The venue had achieved great flexibility through its installation of 33 lifts – one for each of the 27 seating rows in the auditorium, an orchestra elevator, which also serves product launches, four main-stage elevators and another passenger elevator. At the back of the auditorium there is an acoustic door, which opens onto the main concourse of the building, creating an extremely large main floor area. However, the theatre uses loose seats that require storage and extra labour, as well as being less comfortable.

The Wyly Theatre in Dallas, Texas, has installed a series of six elevators that revolve, so that the room can be converted from conventional lyric format to an in-the-round layout very quickly. A Serapid lift is used to move the seating wagons to/from the storage area and to transport theatre guests.



Munich's BMW World has achieved flexibility through the use of 33 lifts

Flexibility and function

All of these venues achieve flexibility through the use of lifts and seating wagons, or loose seating. However, with regards to storage, labour and seating comfort, a better solution was needed. In response, Serapid developed the QSX system – a very simple concept comprising both a lifting and rotating movement. The key part of the innovation is a spanning structure made of two deep section beams with cross members to take flooring. Each end of the beam is fitted with bearings and a ring gear.

The first of the two functions is elevation, achieved using a Linklift fitted in a telescopic column that provides both lifting, guiding and stability functions. The second is the rotating function; the beam can be rotated through 180º and has the hall floor on one surface and the seats on the other.

One of the key advantages of the design is that air conditioning can be ducted in the structure to allow air to circulate under the seats or into the foot wells and enter through vents in the flat floor. Electrical systems can also be distributed to the seats in order to provide lighting, translators, and so on. As two floor surfaces are available, different materials can be used for the presentation floor or the seating. The flooring at the top of the aisle columns cannot rotate, but both the manual system and the automatic system can add and adjust the tread height of the steps.

The system can handle both straight and perfectly curved rows, hence can meet the needs of auditoria that require variable rakes. The seats are bolted to a fixed floor, enabling any type of seating solution to be used. There are a small number of control axes, with one row being lifted by one set of motors and up to 20 seats being turned by another single motor. The motion for straight rows is very simple: just a straight lift, rotate and drop back down. For the curved rows, the seats need to pass one another with two different curved surfaces in a complex sequence of moves. Additional flexibility can be added by using double columns so that one section of a row can be raised higher than the others to form platforms at different locations.

The first installation of the QSX system is located in the Louis Vuitton Foundation in Paris, a building designed by Pritzker Prize-winning architect Frank Gehry to be quite radical. The flexible auditorium – which was conceived by Ducks Scéno of France – has straight rows but it required a great degree of adjustment with regards to the steepness of rake. The QSX system provides for controlled air distribution and cabling for architectural lighting. The system is very compact, making for easy access and providing storage under the auditorium. ■

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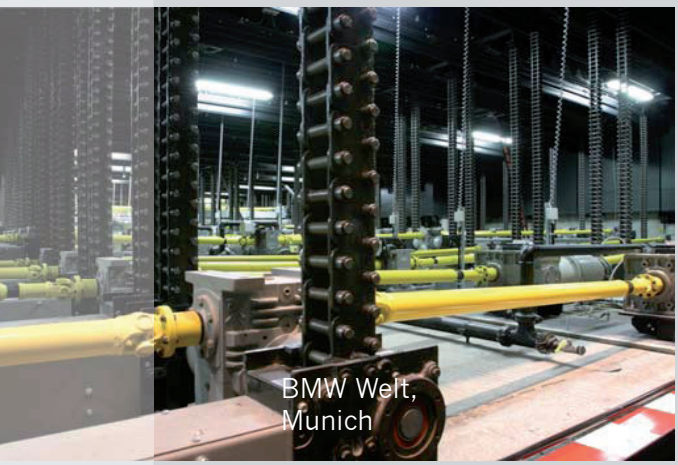
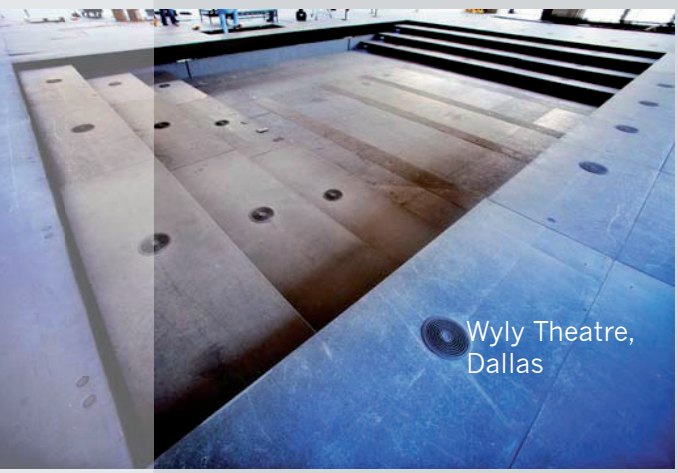
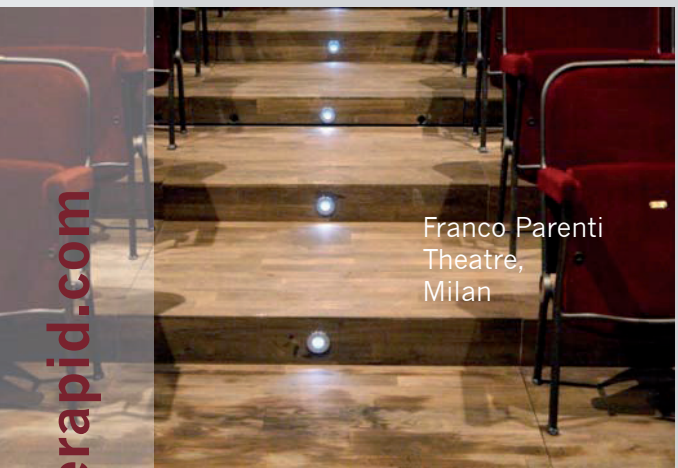


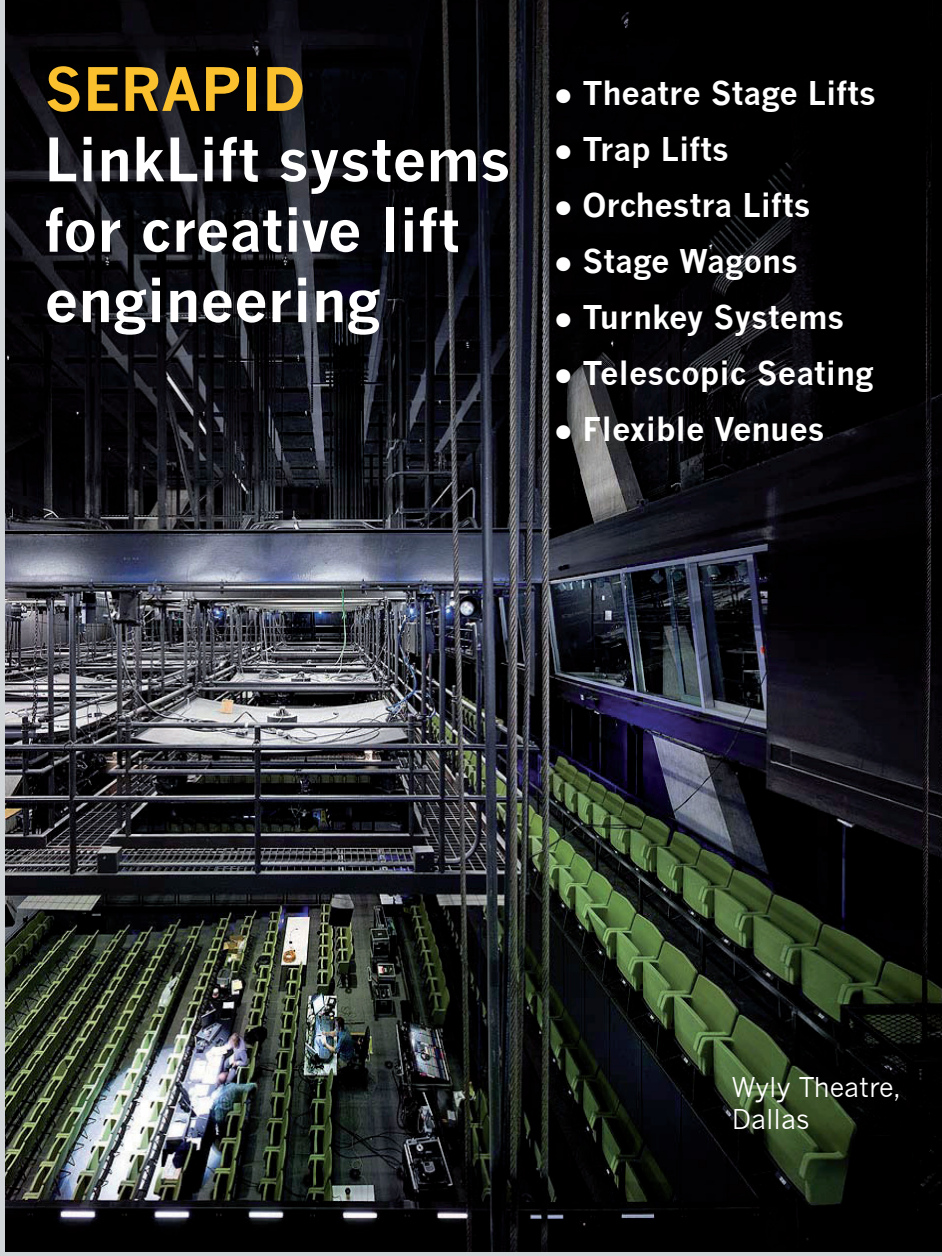
BMW Welt, Munich



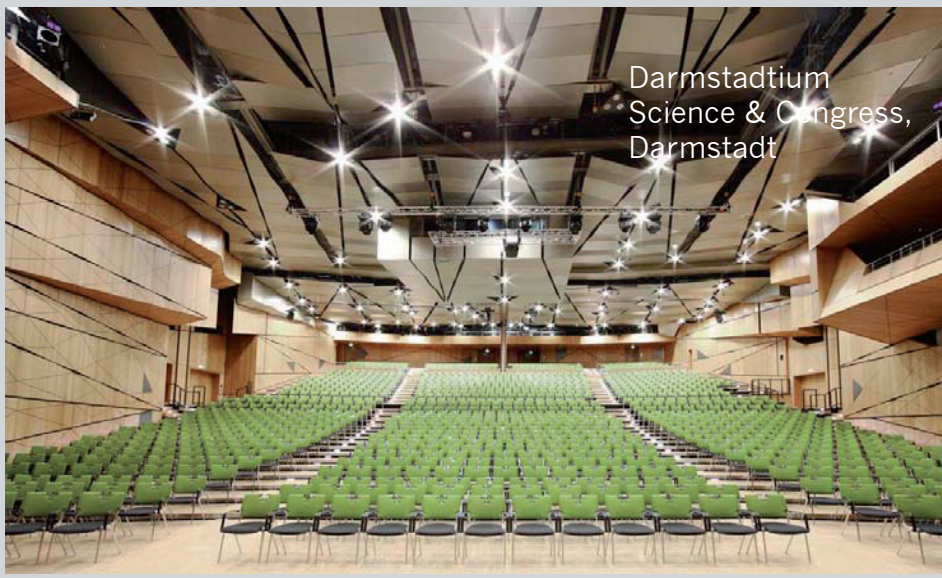
Wyly Theatre, Dallas



Franco Parenti Theatre, Milan



Wyly Theatre, Dallas



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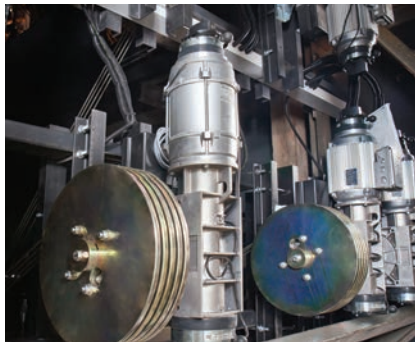

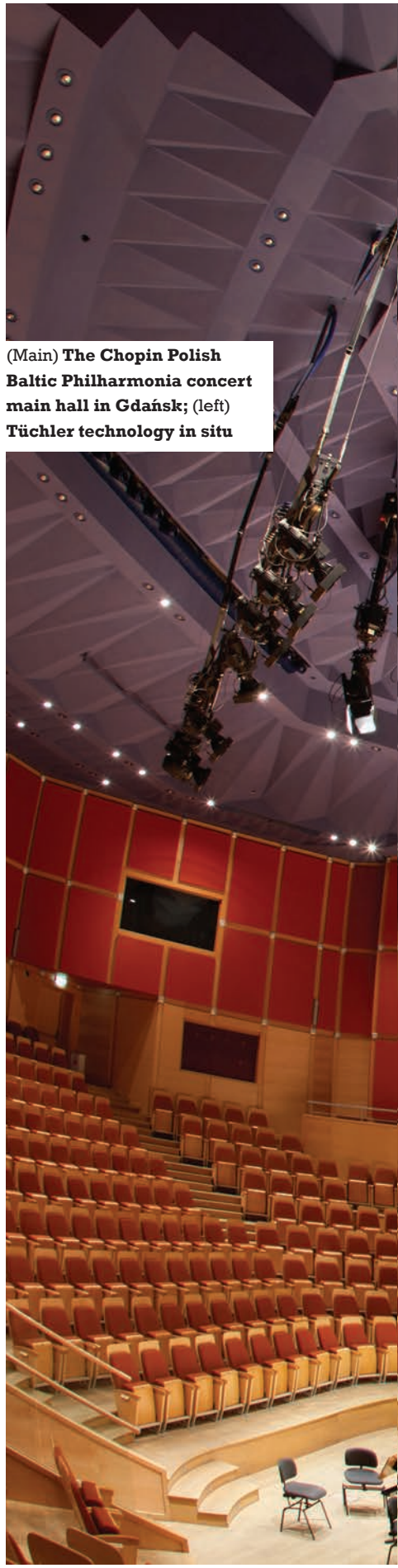

(Main) **The Chopin Polish Baltic Philharmonia concert main hall in Gdańsk;** (left) **Tüchler technology in situ**

Problem solved

Customised stage technology installations have enabled four European venues to meet some tough technical requirements

As technology continues to evolve and stage productions get bigger and more elaborate, theatres and performance venues around the world are under an increasing amount of pressure. To meet the demands of the industry and the expectations of audiences, both new and existing venues must facilitate and support the technology, equipment and quality requirements of modern performances.

Tüchler has been developing stage technology solutions since the 1990s and has introduced a number of innovative products including projection screens, stage floorings, LIFT-IT compact pile winches, ZOOM and HANDY stage platforms, XT and TT curtain track systems, RZ drape systems and TOPKAT chain hoists. The company also provides complete solutions for projects and has extensive experience within a wide variety of applications, for example installing an acoustic membrane absorber ceiling at the Aquatic Centre Graz in Eggenberg, a fly bar system at the Queen Elizabeth Hall in London, and a portable alternative venue at the Deutsches Theater in Munich.

Gorzów Wielkopolski Amphitheatre

The Polish city of Gorzów is well known for hosting the International Romani Gathering Romane Dyvesa, which is held every summer on the first week of July. The festival includes a series of concerts held in the outdoor amphitheatre in Siemiradzki Park, near the centre of the city. The festival wasn't able to take place at the amphitheatre this year, however, as the venue is currently undergoing major renovation works.

Among the many high-tech installations taking place at the amphitheatre, the lighting trusses installed by Tüchler are comprised of Eurotruss aluminium frames suspended by electric chain winches. These tailor-made units were uniquely constructed as curves to fit with the shape of the amphitheatre. Tüchler was also responsible for installing three horizontal lighting battens at the back of the stage, which are based on steel pipes with chain winches.

Chopin Polish Baltic Philharmonia

The home of the Chopin Polish Baltic Philharmonia lies within an old power station on the Motlawa river in Gdańsk, in the north of Poland. Built between 1897 and 1898, the site is composed of seven neo-Gothic buildings, which were adapted between 1996 and 2005 to become a concert hall complex. The new venue incorporates a main concert hall with 1,000 seats, a chamber music hall with 200 seats, two multi-purpose halls, a foyer; an

(Above) **The 2012 Vienna Life Ball; light trusses at the Rzeszów University of Technology** (below); **TOPKAT clain hoist** (bottom)

808ft² exhibition room and even a hotel that can accommodate up to 60 people.

The acoustics of the main concert hall were designed by Witold Straszewicz and Eve Więckowska-Kosmala, and the venue is equipped with the latest lighting and sound systems. To support venue operations, Tüchler recently installed three lighting trusses on TOPKAT chain hoists in the main concert hall. The power cables and control cables for each of the lighting battens are fitted with spring-loaded cable reels, while the final batten is used to carry a projection screen.

Rzeszów University of Technology

The Rzeszów University of Technology is a state-run higher education institution in the Polish city of Rzeszów in the south of the country. Enrolling approximately 13,000 students each year, the university is located on two campuses (Wincentego Pola Street and Poznańska Street), which together encompass approximately 33ha. The Poznańska Street campus is currently undergoing a series of renovations and new construction in an effort to modernise facilities and improve upon architectural aesthetics.

The redevelopment includes a brand-new lecture theatre, which features a complete stage system and controls from Tüchler. Three light trusses are also incorporated, which are powered by eight LIFT IT PW500 cable winches executed to BGV-C1 standard, as well as a number of light battens, full curtains and a screen.

Vienna Life Ball 2012

The Vienna Life Ball is Europe's largest annual charity event supporting people living with HIV and AIDS. The non-profit event, organised by charity organisation AIDS LIFE, has taken place in Vienna City Hall Square since its foundation in 1992 and aims to raise money for those people affected by the conditions, as well as raising awareness about the disease.

Growing bigger each year, the event has become a real tradition in the Austrian capital, the country's largest city, as well as a social highlight with a red carpet event, fashion show and musical entertainment that attract numerous international celebrities, as well as thousands of visitors and hundreds of media representatives from around the world.

The 2012 Life Ball took place on 19 May 2012, celebrating its 20th anniversary. The event – which was themed with fire, under the slogan 'Fight the Flames of Ignorance' – was heavily supported by a whole host of Tüchler's equipment, which contributed to making the event the most extravagant and successful yet. ■

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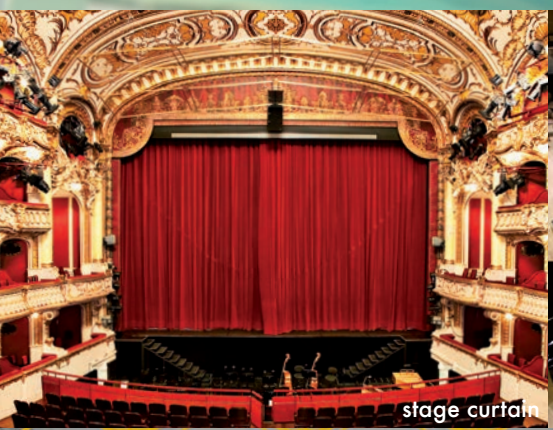
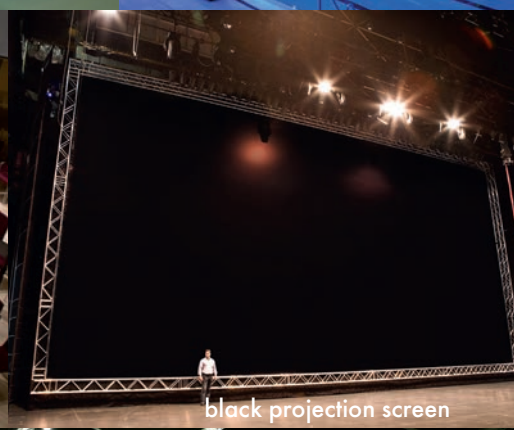
portable sprung floors | stage hoists | full installation


membrane sound-absorber


stage curtain


electric hoisting platforms as orchestra stand


black projection screen


moveable austrian curtain

Austrian ambition

Brimming with technology, the new music theatre at the People's Garden in Linz is set to become one of the best-equipped opera houses in Europe

In June 2009, the Bruckner Orchestra performed at the new music theatre at the People's Garden (Musiktheater am Volksgarten) in Linz, Austria. It was an unusual event as the performance – which took place in front of an audience of thousands of people – was not held in a concert hall nor on a stage – but on a building site. Far from finished, the new theatre was still in the middle of its construction phase.

Anticipated to be one of the most modern in Europe, Musiktheater am Volksgarten has been arousing intrigue since its conception by architects almost 100 years ago. The initial plans for the theatre in Upper Austria were never realised but the project experienced a revival of interest over the past 25 years, so plans were made to bring the concept to a reality.

When a cultural landmark of this magnitude is built, however, there's always a high level of public interest – which equates to a high level of political interest – so it can take some time to move from conception to groundbreaking ceremony. "It took an eternity to break ground on this project," remarked state governor Josef Pühringer at the ceremony in April 2009, "but even an eternity comes to an end."

Designed by architect Terry Pawson, the theatre is very ambitious and the expectations of both clients and the public are high. When it opens its doors, it is predicted that the state-of-the-art venue will have the means to stage performances that are technically impossible for other theatres to present.

Teamwork

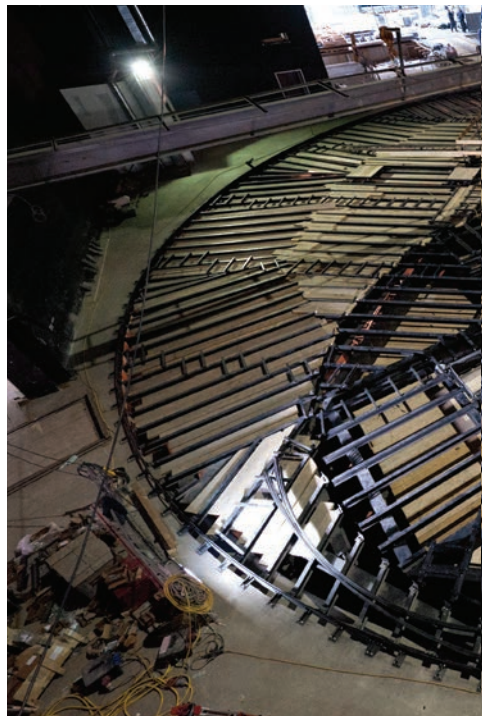
A team of highly experienced companies are collaborating on the project development, which includes architects, general contractors and subcontractors, civil engineers, structural engineers, consulting firms, various construction companies and stage equipment experts. All were involved in the planning stages and each has brought specialist expertise to the table. For the engineers, the biggest challenge is always the construction conditions found on site, as no two starting points are ever the same.

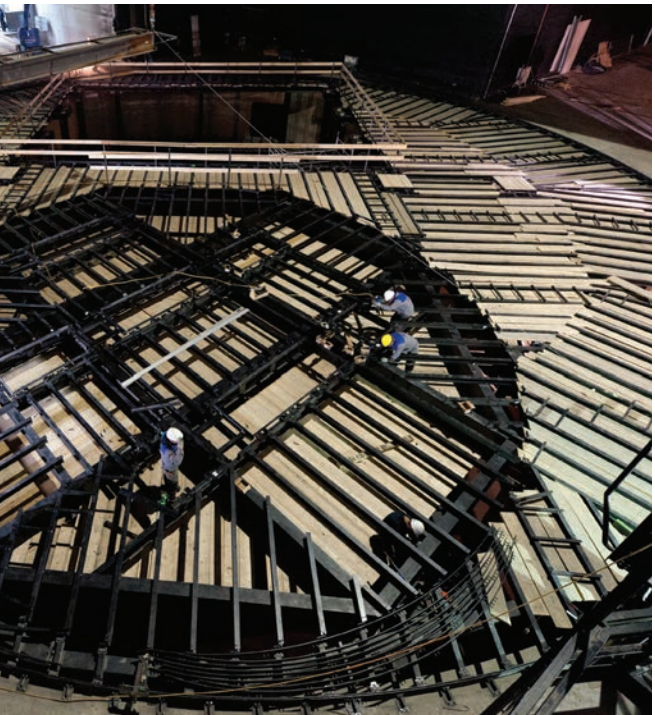
Complex architecture projects such as this require careful planning and the construction work must be perfect. Large stage system components must be assembled in the early phases of construction as once a phase is completed, some areas are difficult to access.

In this case, Waagner Biro was required to install the stage equipment after some 5,400 tons of reinforcing steel, 47,000m^3 of concrete and 120,000m^2 of formwork had already been used to build the shell. This meant that there were many technical hurdles to overcome, and a number of problems to resolve.

Revolving stage

With a diameter of 32m, the theatre's revolving stage is one of the largest in the world. However,

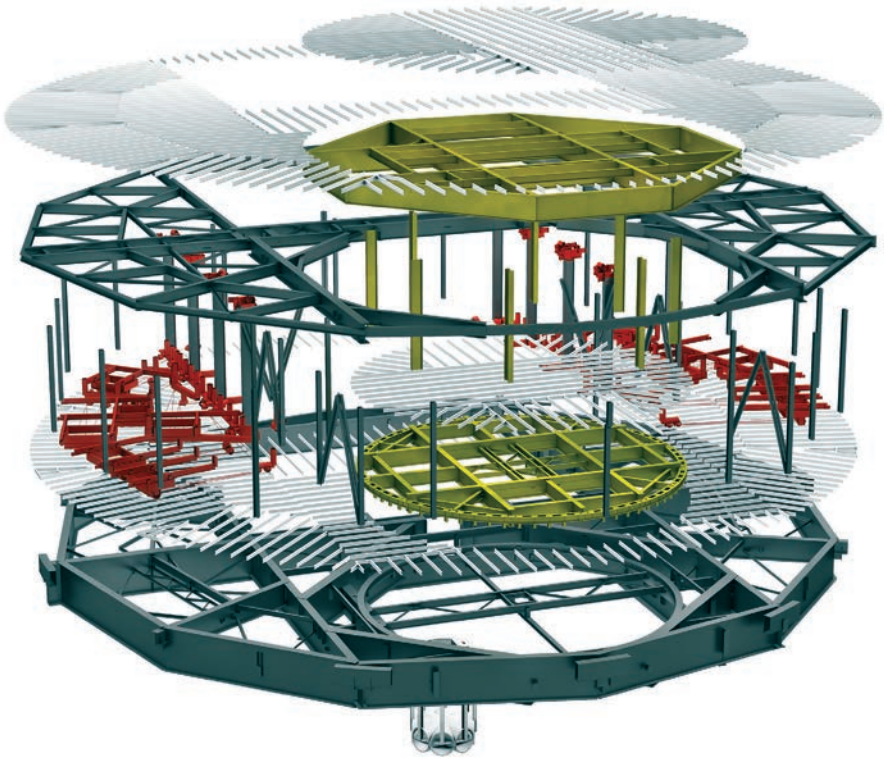


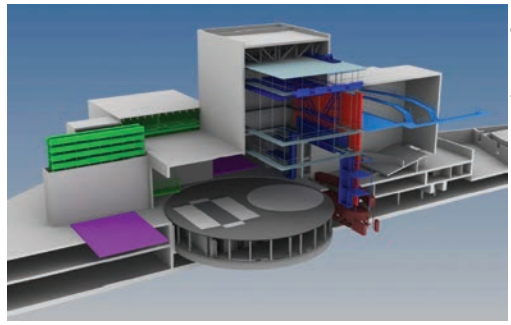


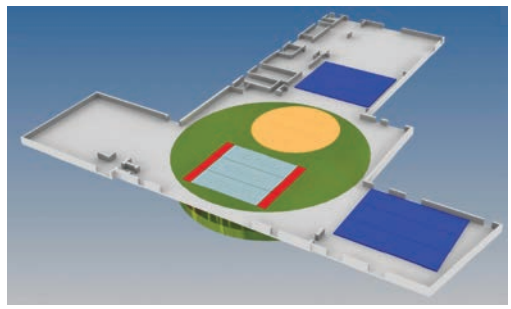
when installing this heavyweight piece of equipment, the engineers had to operate within an extremely shallow space as the car park is located directly beneath it. It's hard to picture the stage's magnitude – next to it, a man looks tiny – and yet just a few people can move the huge steel structure with muscle power alone, until the drives automatically set it in motion.

The venue's revolving stage is unique, not only as a result of its sheer dimensions but also due to its installed accessories. Integrated into the overall steel construction is a set of three double-deck main stage lifts with inclinable secondary decks and a smaller revolving stage for performance purposes. While the double-deck lifts and inset revolving stage have been designed for scenic performance – and thus with dimensions of 15 x 4m and a diameter of 15m

The technically advanced stage equipment will enable the theatre to host a variety of complex performances (above)**; the revolving stage has a diameter of 32m** (left)







Images courtesy of TPC

The complex structure of one of the world's biggest revolving stages (above left)**; 3D renderings of the music hall layout** (above right)

respectively are equivalent to standard theatre practice – it is uncertain whether the 32m revolving stage will only be used for transport purposes or whether it will also accommodate performance use.

Accumulator-powered stage wagons, which are suited for travelling the long distances between the back stage storage area, main stage and side stage, enhance the lower stage machinery in terms of electromobility. The low-profile stage wagons, which have an installation height of 200mm, are designed for movement in two perpendicular directions. The pit is designed to accommodate large orchestra configurations and is flexibly adjustable to suit various requirements by means of three lifts.

The upper stage machinery comprises 115 hoists and winches in various configurations. Here, Waagner Biro's super-silent winches are optimised for installation on the grid level and use specially developed low-noise-emission components. In addition, a FlexiFly modular line shaft hoist has been efficiently adapted to the geometric installation conditions and offers all the safety features of a standard winch.

A change of scenery

In addition to its state-of-the-art stage machinery, the new theatre will also benefit from great flexibility in terms of scene changes, due to numerous decorative sets that are installed in standby configuration, and can be brought onto the stage at the push of a button.

Right on track

Now, after a long start-up period, the construction phase is almost complete, the essential elements already installed so next comes some fine-tuning and testing of the system.

After the completion of the new music theatre at the People's Garden, the Linz State Theatre will have three performance venues in the city. The new theatre will have a capacity for about 1,000 people in its main hall for a variety of performances, including opera, operetta, musicals, ballet and dance recitals, children's opera, song recitals and choral concerts.

There will be extensive celebrations when this prestigious cultural institution opens its doors to the public on 11 April 2013. However, for Waagner Biro's engineers, the project will be far from complete: the company's contract includes ongoing maintenance and services to ensure that theatre lovers in Linz will continue to enjoy the venue for many more years to come. ■

www.waagner-biro.com

Sonic boon

From the Middle East to east Texas, full-stage acoustical shells are delivering impressive sound and beauty

The Donald and Eloise Bosch Center for the Performing Arts at The American International School of Muscat (TAISM), Oman, opened in May 2012. The facility was recently completed on the TAISM campus in Ghala. It encompasses more than 4,000m^2 of performance and audience space and seating for 522 people.

The theatre and its interior were designed by architect Navjit Singh Matharu, principal designer and owner of Toronto-based A+D Canada. He is also the design architect for the entire campus, which currently enrols 725 students from more than 50 nations.

The state-of-the-art theatre – which will serve as host to drama productions, choral and instrumental concerts, art exhibits, and all formal occasions on TAISM's campus – includes interior finishes of wood, stone, fabric and glass, designed for acoustical support, visual interest and low maintenance.

According to Tim Wilson, instrumental music teacher at TAISM, acoustics in the theatre was a top priority. Having successfully worked with Wenger several times before on other projects internationally, Wilson recommended that the company be selected for this project.

Wenger supplied the full-stage acoustical shell and suggested the involvement of an acoustical consultant and theatre designer. After evaluation, TAISM selected Threshold Acoustics and Schuler Shook.

"Acoustical shells require a number of coordinated elements, including the acoustician's criteria and client's expectations," explains Jody Kovalick, project theatre consultant with Schuler Shook Minneapolis. "Ceiling panels must hang from the rigging properly, and be easy to move and store. Built-in lighting, meanwhile, is coordinated with a theatrical dimming system."

The theatre seats 522 people

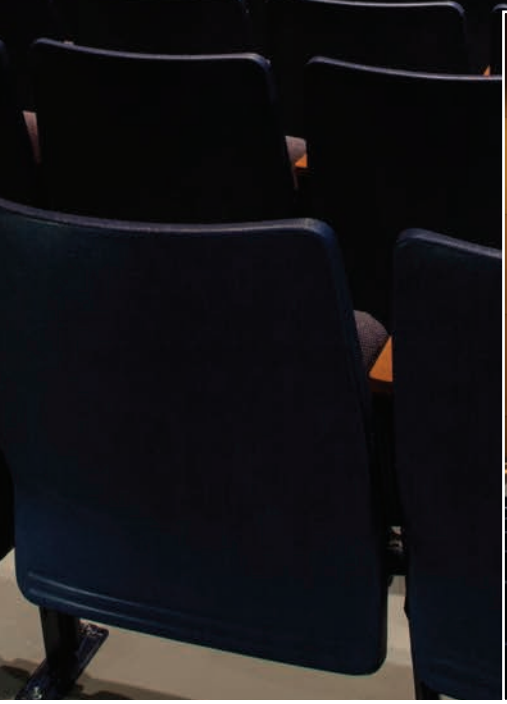
Together with Threshold Acoustics, Schuler Shook designed a multi-purpose theatre suited to TAISM's musical ensembles. The company also provided architectural lighting design and theatre planning.

"We worked together with Wenger to design and develop a shell support system," says Kovalick. During the shop drawing and construction process, information was coordinated to ensure that everything would work as designed.

Michael DiBlasi, partner with Schuler Shook Minneapolis, believes an experienced project team can often anticipate – and avoid – potential problems. "Whether differences in culture, material procurement or construction methods, asking the right questions can help minimise surprises," he suggests.

These skills were particularly important on the TAISM project because local partners were unfamiliar with theatre construction. Contributions from local firms were blended with outsourced elements from companies such as Wenger to achieve a successful result.

Acoustician Carl Giegold, partner with Threshold Acoustics, talked through ideas with Wenger and collaborated with the company



The Cynthia Woods Mitchell Pavilion is a flexible space that hosts up to 70 events each year

during the design process. He says some simple suggestions from Wenger helped manage the budget while meeting the acoustical and architectural requirements. To accommodate a wide range of performances, the option of multiple shell configurations was very important.

Giegold requested a double layer surrounding the honeycomb core of the 10 Diva towers – more mass to enhance the bass response. The three ceiling panels were standard to avoid overloading the rigging's manual counterweighted system.

"The Diva shell hits a sweet spot," comments Giegold. "It is lightweight enough to be manoeuvrable, but heavy enough to speak with authority and support the musical efforts on stage."

To enhance acoustical responsiveness, Giegold wanted an acoustic device to narrow the upper volume of the audience chamber. The narrowed volume creates soffits along the side walls that emphasise acoustic intimacy. Because the soffits are cantilevered from the side walls, they can support only limited weight. Finding a material heavy enough to serve acoustically without overtaxing the structure was thus a challenge.

Wenger adapted its laminated Diva-panel technology to meet the needs of the theatre. The custom panels were constructed of 1.9cm plywood either side of a 7.6cm honeycomb core. Overall, Wenger supplied auditorium panels totalling 217.4m^2 – approximately half the combined volume of the Diva shell's towers and ceilings. Additionally, the company provided more than 167.2m^2 of veneer for other theatre surfaces.

"We feel like we're completely surrounded by a Wenger shell; there's a natural warmth," says Kevin Schafer, TAISM's director. As a performer, Schafer claims projection requires less effort. "Your energy starts going towards being more musical," he adds.

"It's really important we can handle the shell ourselves because we're a K-12 school, not a university with a large operations staff," he explains. "That's the joy of working with products that are so well engineered."

Cynthia Woods Mitchell Pavilion

"We're probably the most diverse amphitheatre in the country," says Jeff Young, vice president of operations with The Cynthia Woods Mitchell Pavilion in The Woodlands, Texas.

This non-profit facility hosts up to 70 events annually, including a range of music concerts ('Rock to Bach'), opera, ballet and graduations. The venue has a seating capacity for 16,500 – 6,500 under the roof and 10,000 on the lawn.

When the facility opened in 1990, it purchased a custom acoustical shell from Wenger; in 2012, it ordered a newly redesigned Wenger Diva shell, which incorporates a number of improvements from the first model launched in 1995. The tower frame, for example, is a one-piece extrusion, enabling a higher maximum tower height – up to 12.2m. The ceiling truss accommodates more lights, which larger shells require. The integrated trim strip between towers provides more aesthetic flexibility.

"The Diva's design is similar to our first Wenger shell, but the technology has obviously improved over the years," Young notes. "This shell is easier to set up, take down and put away."

Ultimately, Young expects the shell to be used a dozen times annually, including for Houston Symphony concerts. ■

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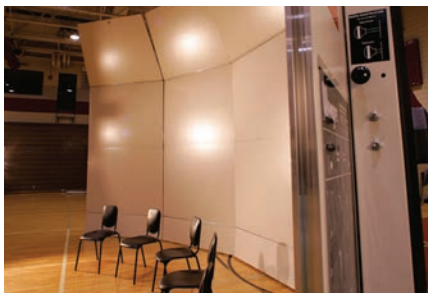

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Out with the old...

Creating a new lighting scheme for a Grade 1-listed building presented a number of difficulties for the team working on the renovation of the historic Bristol Old Vic theatre

The iconic Bristol Old Vic Theatre in southwest England's largest city was designed by local architect James Saunders back in 1766. It was the first theatre in Britain to 'do away' with the traditional rectangular auditorium shape and adopt the 'horseshoe' shape, which is now seen in venues around the world. The auditorium has remained largely unchanged for more than 200 years and is the oldest continuously working theatre in the UK.

In March 2011, a long-awaited multimillion pound redevelopment project got underway. Work on the auditorium and backstage areas was originally scheduled for completion by September 2012, while the entire redevelopment is slated to be finished in 2016.

However, as the renovation project of the old auditorium progressed, it became apparent that given the historic status of the building, an ordinary lighting solution wouldn't be sufficient. The fact that it's a Grade 1-listed Georgian auditorium particularly posed a number of challenges, as the lighting system needed to adhere to the tight constraints outlined by English Heritage while simultaneously meeting the everyday needs of a busy, working theatre.

The theatre management approached Bristol-based lighting solutions specialist GDS to consult on a suitable resolution. The Bristol Old Vic's director of production and operations, Jason Barnes, and its chief electrician, Tim Streader, had met with Matt Lloyd, one of the founders of GDS, back in early 2011 when the company's ArcSystem was in the development stages.

The GDS ArcSystem is a completely dimmable wireless lighting system, offering dimming from 0 to 100%. It uses GDS's wireless ArcMesh protocol for control, enabling it to be retrofitted without needing to rewire the venue. Barnes and Streader were so impressed by the system's flexibility and ability to dim seamlessly that they asked GDS back to work with them on their complex renovation.

Customised solution

The GDS team, led by Paul Johnson, its architectural lighting specialist, went about preparing initial designs for the auditorium. Working closely with Bristol Old Vic, Hoare Lea M&E Consultants, Galliford Try Contractors and Andrzej Blonski Architects, the team produced a series of designs that took into consideration all the major factors. Light levels and aesthetics were key aspects and GDS had to design a scheme that worked within the existing fabric of the building and complied with the rigorous planning restrictions. A succession of drawings, plans and 3D DIALux models were submitted to ensure that all parties' requirements were met.

The historical importance of the theatre meant that the house light fittings within the auditorium

Photo courtesy of Philip Ville

Photographs courtesy of Philip Ville

The bespoke dimmable lighting installations complement the auditorium's historic architecture (left)**; custom LED recessed step lights illuminate the main auditorium steps** (right)

could not be recessed and only small holes in the ceiling area were permitted. GDS was in the process of developing an MR16 version of the ArcSystem fittings, which was thought to be the perfect solution. However, the product was only at prototype stage so production of the fitting had to be brought forward in order to fulfil the requirements of this challenging installation.

Working with Stage Electrics, GDS provided more than 150 bespoke ArcSystem Décor MR16 fittings with various beam angles for the lower ground, first floor, upper circle and second floor circle areas. The fittings were colour matched perfectly to the beautiful white auditorium. The 8W wirelessly controlled fittings were ceiling mounted and their bespoke design ensured no intrusion into the historic lath and plaster ceilings.

Historic considerations

To accompany the auditorium lighting, GDS created bespoke step lights and built brass gallery front fittings designed by Andrezj Blonski, all of which incorporate a unique dimmable control and run below 10W. Nineteen brass fittings for the upper circle and gallery fronts were specially produced, including 10 UPS versions, which provide lighting in the event of an emergency. The engineering team worked to a precise design specification to ensure they were in keeping with the style of the restoration. The LED wall fittings were brass-plated with glass light shades and designed to integrate with the Grade 1-listed theatre. In addition, GDS built more than 100 custom LED recessed step lights for illumination of the main auditorium steps. The LED fittings provided the theatre with a low-energy solution that perfectly matched the colour temperature of the rest of the auditorium lighting.

The Bristol Old Vic project is GDS's most complex to date. The team had to overcome the challenges of wirelessly controlling fittings situated in many different locations, which were separated by thick walls, doors and across corridors. A single ArcSystem TX-1 transmitter is fitted in the roof space and communicates with fittings three floors below through concrete walls, floors and into the basement.

"The ArcSystem fits incredibly well," confirms Bristol Old Vic's Jason Barnes. "Listed building projects take time and thought, and can cost considerably more, but this system suited our needs perfectly. Once the lights were switched on, the building suddenly came back to life. They really show the auditorium at its best."

Consistently praised for its innovative design, flexibility and environmental sustainability, ArcSystem has won numerous industry awards. Here, it met the challenges of creating a new house-light scheme in an historic auditorium, and has proven to be a practical, low-energy, cost-effective solution for Bristol Old Vic. ■

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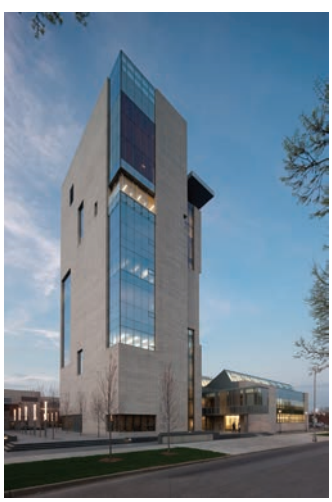
Finely tuned

The University of Chicago's Reva and David Logan Center for the Arts fuses architecture with detailed acoustic design to support and inspire artistic creativity

The 184,000ft² building will house playwrights, painters, musicians, filmmakers, dancers and sculptors (right)**; the 170ft vertical tower rises above the surrounding campus landscape** (below)



Photograph by Tom Rossiter, courtesy of University of Chicago

The Reva and David Logan Center for the Arts is situated south of the Midway Plaisance at The University of Chicago, and is a cultural beacon, drawing together students, artists, faculty and community to celebrate the creative and performing arts. The Logan Center provides a home for film, theatre, dance, music and the visual arts. Cinema and media studies students screening a film are found next to artists in their studios. Theatre students work in the costume shop adjacent to musicians honing their artistry in practice rooms. Informal spaces abound in corridors and stairs, encouraging students and faculty across disciplines to mix and forge new paradigms of creating, experiencing and studying art. The building successfully balances architectural and acoustical expressions, reflecting the intense collaboration between the architect and the acoustician – Kirkegaard Associates (KA).

Creative space

Comprised of an 11-storey tower and a two-storey podium structure, the 184,000ft² building is designed by the renowned Tod Williams Billie Tsien Architects (TWBTA) to be highly functional and a profound sculpture. It serves as an open medium to be filled with colour, movement and sound. The podium structure contains the 474-seat performance hall, designed primarily for music but adjustable to support dance, theatre, lecture and film, too. Theater East is a small end-stage theatre and is the workhorse for the theatre programme. Under the saw-tooth roof that defines the podium is the white-box exhibition gallery, painting and sculpting studios, and a massive day-lit shop intended as a collaborative space for theatre and visual arts. Theater West is a flexible black-box space with a seating gallery and full complement of technical infrastructure that can create the unimaginable. The building is fitted with advanced audio and video technologies for teaching, learning and exploring.

The podium features the performance hall, which is the premier venue of the Logan Center and is partially set below grade to capture as much acoustical volume as possible while still being congruent with the overall podium massing. The strength of this hall is in its clarity and presence of sound. While TWBTA wanted the hall to be visually calm, KA wanted it to be busy with sound-diffusive elements. The wood-clad walls surrounding the audience provide visual and acoustical warmth. Although the upper walls appear to be smooth and monolithic, they are in fact sculpted to diffuse sound. A custom-woven fabric that is acoustically transparent and visually opaque conceals the texture on the walls to achieve an elegant appearance. The fabric also conceals the surround-sound loudspeakers for film from Full Aperture Systems.

The fabric ceiling, stretched over the hall, provides supportive overhead reflections and couples with the attic volume to enhance the low-frequency reverberation. Schuler Shook, the theatre consultant on the project, designed the adjustable acoustical banner system, which enables the hall to change its reverberation time. Integrated into the lower upstage wall of the hall

Photo by Tom Rossiter, courtesy of University of Chicago

Photograph courtesy of Jason Smith, courtesy of University of Chicago

The 474-seat performance hall at Logan Center is a spectacular addition for music, film, dance and theatrical performances, as well as lectures and conferences

are a series of movable recital screens that can be brought forward on the platform to create a supportive acoustical environment for chamber music. The audience seating area is steeply raked, affording excellent sightlines for every seat in the house.

Energy and inspiration

The tower has a café as its plinth. A 129-seat screening room capable of handling eight formats (in surround sound, including 16mm, 25mm, digital, and 3D in surround sound) is located above the café, followed by alternating arts classrooms and theatre studios as visitors ascend the tower. Music practice and ensemble rooms are mixed in on many floors. The performance penthouse and the outdoor deck crown the tower. The double-height penthouse is a wooden vessel that is punctuated by large windows at the north-east corner, with great views of the campus and Lake Michigan and a viewing window from the mezzanine. The room functions as a classroom for lecturers and wind ensemble rehearsals by day. In the evening, the penthouse becomes a dynamic space for music performance, lectures and special events.

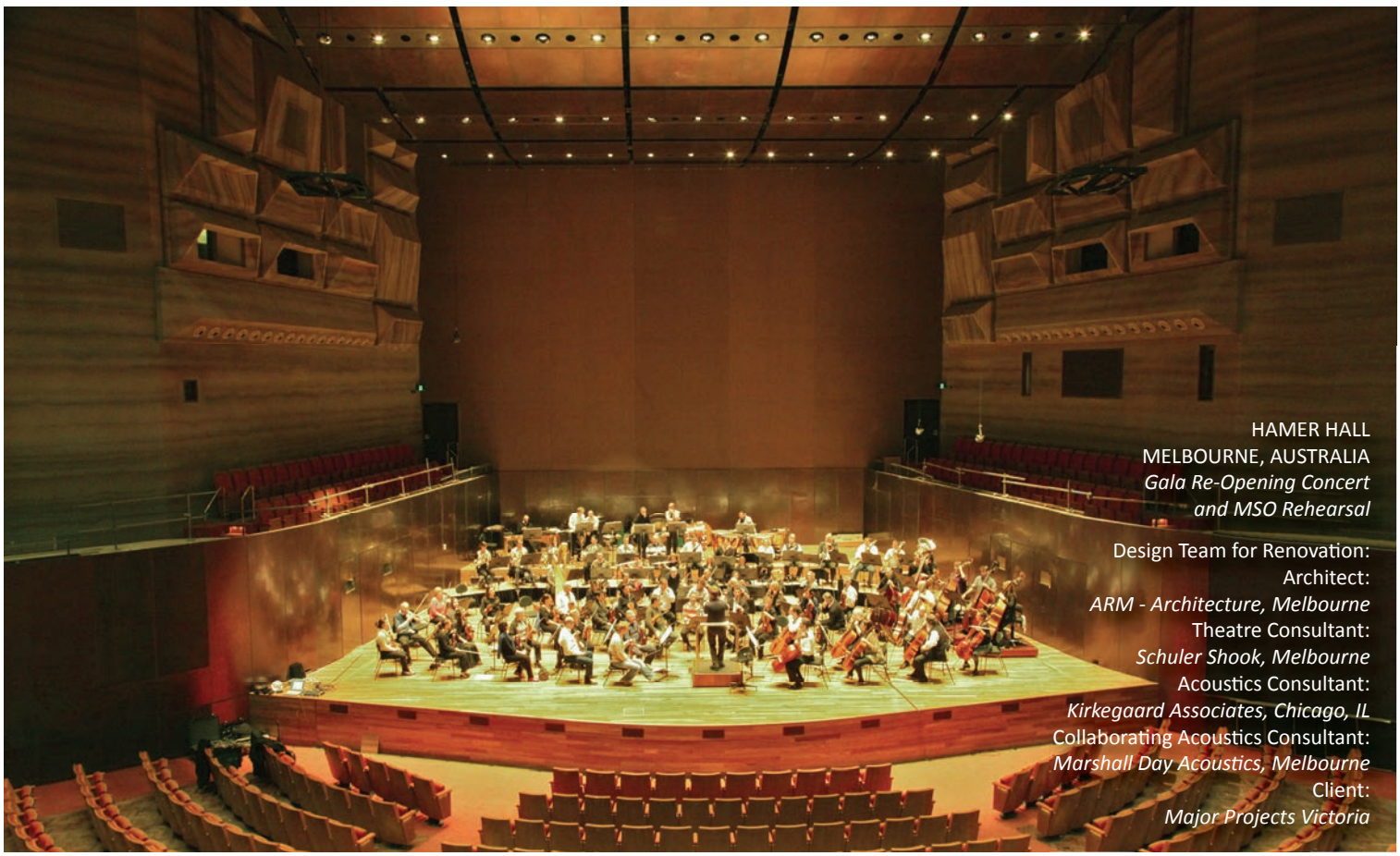
Sound isolation between the sound-sensitive spaces that are stacked on top of each other is a major design challenge. Art classrooms are generally less sensitive to intruding noise from more sensitive theatre and music neighbours. As such, they function as buffer spaces and are strategically deployed between the sound-critical screening room and theatre studios. All these spaces share a common superstructure with many flanking paths, so box-in-box construction at the sound-critical spaces was used to mitigate the paths. The inner box is an acoustical vessel that is resiliently supported from the outer box, which consists of the superstructure and exterior cladding. This high level of sound isolation allows for simultaneous use of these adjacent spaces, even when one room is noisy while the other room is quiet.

The foyer at each level in the tower is an important gathering space where students with varying interests converge and share ideas. A controlled amount of sound is purposefully allowed to escape and energise the foyer. It is also an important horizontal acoustical buffer, with its walls covered with handcrafted felt that controls sound travelling up and down the tower and functions as signage for wayfinding. Similarly, there is intentional noise bleed from practice room to practice room so that even when students are focused on individual practice, they feel connected to their peers – not sealed in a vault.

Complete integration

Convergence of the arts and critical thinking is at the core of The University of Chicago. This is how the Logan Center was conceived and constructed, and the resulting building celebrates the making of multidisciplinary connections. Every space, partition and surface was carefully considered and intended to be explored and discovered over time. So it makes perfect sense to find a post-doctoral researcher from the Biological Sciences Division playing the piano on stage, completely immersed in the sights and sounds of the performance hall. ■

www.kirkegaard.com



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Theatre Consultant:
Schuler Shook, Melbourne
Acoustics Consultant:
Kirkegaard Associates, Chicago, IL
Collaborating Acoustics Consultant:
Marshall Day Acoustics, Melbourne
Client:
Major Projects Victoria

Acoustic signature

The new home of the Stavanger Symphony Orchestra has been attuned for maximum volume while retaining a sense of intimacy

A new 1,500-seat concert hall in Stavanger, Norway, opened its doors to the public on 15 September 2012. Final commissioning and testing, including test concerts with a partial and full audience, confirmed the high quality and potential of the space. Part of a new complex, the concert hall is located directly on the shore of Stavanger harbour and fjord and also features a 900-seat multi-purpose hall (for theatre, opera, banquet and amplified concerts, including a configuration for up to 1,600 standing audience), a large foyer and restaurant, as well as rehearsal and practice rooms. The hall will be the new home of the Stavanger Symphony Orchestra.

Intimacy and acoustic volume

One of the main design goals for the concert hall was to create a highly intimate space combined with ample reverberation and a large acoustic volume, a design goal that's a direct response to the characteristic use by the Stavanger Symphony Orchestra (SSO) and other users. The SSO is a variable geometry orchestra. Under the direction of chief conductor Steven Sloane and international guest conductors, the orchestra performs the romantic and contemporary repertoire, focusing on major symphonic works such as Mahler and Bruckner symphonies or the tone poems by Richard Strauss, which can now be performed under appropriate acoustic conditions.

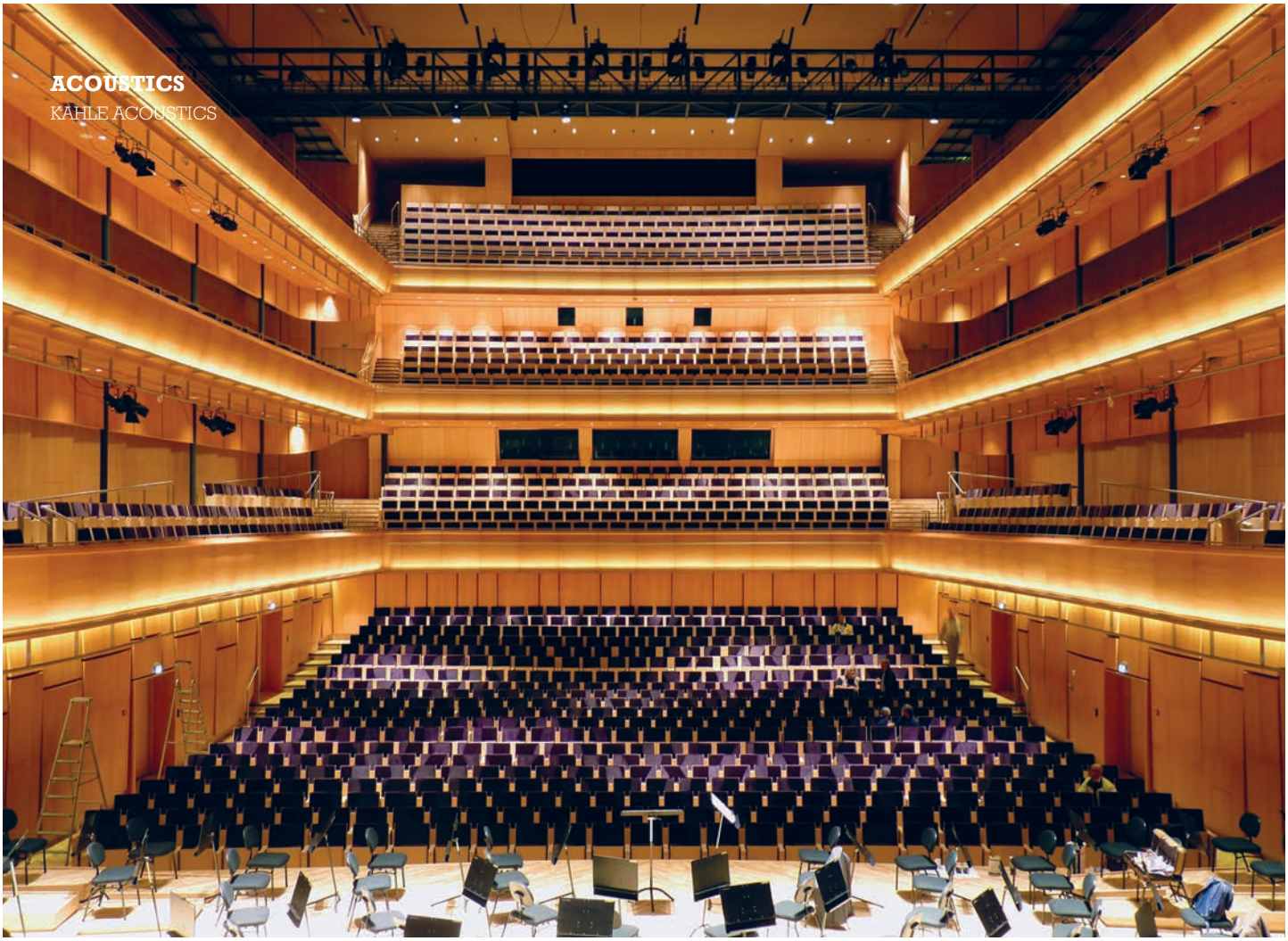
Furthermore, a subset of the orchestra performs under the direction of violinist Fabio Biondi, artistic director for the Baroque and Classical repertoire, using period instruments. In addition, a large annual chamber music festival is part of the programming of the hall. The possibility of a smaller seat count setting was also an important additional goal in the development of the design of the room.

The creation of an intimate room with an important acoustic volume was achieved by a combination of several design features, including a movable ceiling permitting volume change, reduced dimensions for the main floor parterre and 'floating balconies' hung from the side walls.

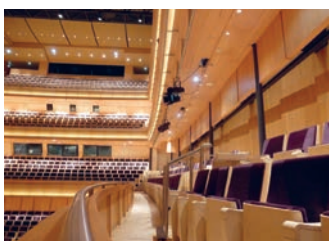
Variable volume

Divided into seven separate elements, the entire ceiling is movable in height, from the lowest setting with an average ceiling height of 17m above the stage to the highest setting with an average height of close to 22m above the stage. This corresponds to a variation in

Photo Kahle Acoustics



The view from the choir balcony shows the intimacy of the space (above)**; the floating side balconies with integrated acoustic reflectors enhance resonance volume and early reflections** (below)



acoustic volume from a minimum of approximately 17,000m³ (about 11m³/person) to a maximum of about 22,000m³ or close to 15m³ per audience member.

Reduced dimensions

To enhance the intimacy of the room and the proximity of audience members, the size of the parterre is smaller than that of other concert halls of similar size. It opens up at the first balcony level, creating the bigger acoustic volume required for the larger orchestral forces and the Romantic repertoire. The width of the main floor parterre is limited to less than 19m; the maximum width of the hall in the upper levels is close to 26m, and the distance from the stage edge to the first row of balcony seating is less than 20m. There are 20 rows of seating in the main floor parterre, six rows in the first balcony (and up to three rows for the side balconies), four rows in the second balcony and once again six rows in the third (and top) balcony level. The upper balconies are stepping back, limiting balcony overhangs to a maximum of two to three rows of seats. Using only the main floor parterre and the first rows of seating on the first balcony, an intimate chamber music hall for about 800 audience members has been created.

Floating balconies

The upper side balconies (second and third balconies) have been shifted inwards and are hung off the side walls, creating a gap of approximately 1.5m between the side balconies and the side walls. Acoustic reflectors (vertical 'downstands') are placed under the balcony soffits, maintaining the efficient 'cue-ball reflections' back to the main floor parterre from the undersides of the side balconies. The additional acoustic volume behind the side balconies creates an interesting architectural space as well as an acoustic resonance volume. Furthermore, scale model tests have confirmed that the lateral volumes improve projection of sound from the stage to the seats in the upper balconies, increasing the homogeneity of acoustics of the hall.

Architectural finishes

The architectural shape is a 'broken shoe-box' with curved surfaces and floating balconies inscribed inside the conceptual box. The use

of different wood finishes creates a vibrant feel with an overarching uniformity. The floors are made of ash, while the balcony fronts, balcony undersides and wall finishes are maple in two different stains. All wood finishes are oiled in order to maintain the natural aspect of the wood and to keep the wood pores open for a warm acoustic response.

The acoustic reflectors above the stage are three-dimensional bubbles made from 20mm-thick Corian. The translucent white of the material creates abstract clouds above the musicians and first rows of audience seating.

Acoustic optimisation

The floating side balconies with integrated acoustic reflectors allow the acoustic signature – the definition and clarity of sound sources – of a small, intimate room to be maintained, along with the acoustic volume required for the large symphonic repertoire, plus an ample reverberation. Many other reflection surfaces were optimised in close collaboration between the architects Ratio Arkitekter and the acousticians. The angle of the curved balcony fronts is different for every level, sometimes even different between the areas around the stage (for increased on-stage communication) and around the audience area (for directed reflections towards specific audience zones). All wood finishes around the stage and the main floor parterre are curved for improved diffusion. The wood finishes of the rear walls (often vertically inclined) provide early reflections for audience members on the rear and side balconies, and an increased room response back to the musicians on stage.

The design brief required a maximum reverberation time of at least 2.1 seconds, corresponding to the taste of Scandinavian musicians and audiences for a long reverberation time and ample room response. This brief was met, and the acoustic result indicates that combining long reverberation time with great clarity and interesting architecture is possible through good collaboration between architect and acoustician when optimising the early reflection design. ■

www.kahle.be

Crystal clear

A sophisticated real-time digital infrastructure ensured that the 2012 Eurovision Song Contest was broadcast successfully from within the Baku Crystal Hall to millions around the world

The Baku Crystal Hall was a prestigious project from the very outset. The short period between the time erection began and the first show – which broadcast live to more than 100 million spectators – made the project a complex and challenging task.

The Eurovision Song Contest was the Crystal Hall's inaugural event. To establish a signal distribution infrastructure for the live show and the broadcast, the German production company Brainpool TV (on behalf of Ictimai TV) used an extensive signal distribution backbone. The system was installed and managed by Riedel Communications and consisted of a MediorNet fibre backbone network, an Artist Digital Matrix Intercom System, professional radio and wireless video links, as well as a digital audio network based on Riedel's RockNet solution.

The timeframe for construction of the Baku Crystal Hall was only seven months, which meant that from spring 2012 onwards the arena was being built at the same time as the event infrastructure installed in early March. This made setup a complex task, particularly with regards to coordination between departments.

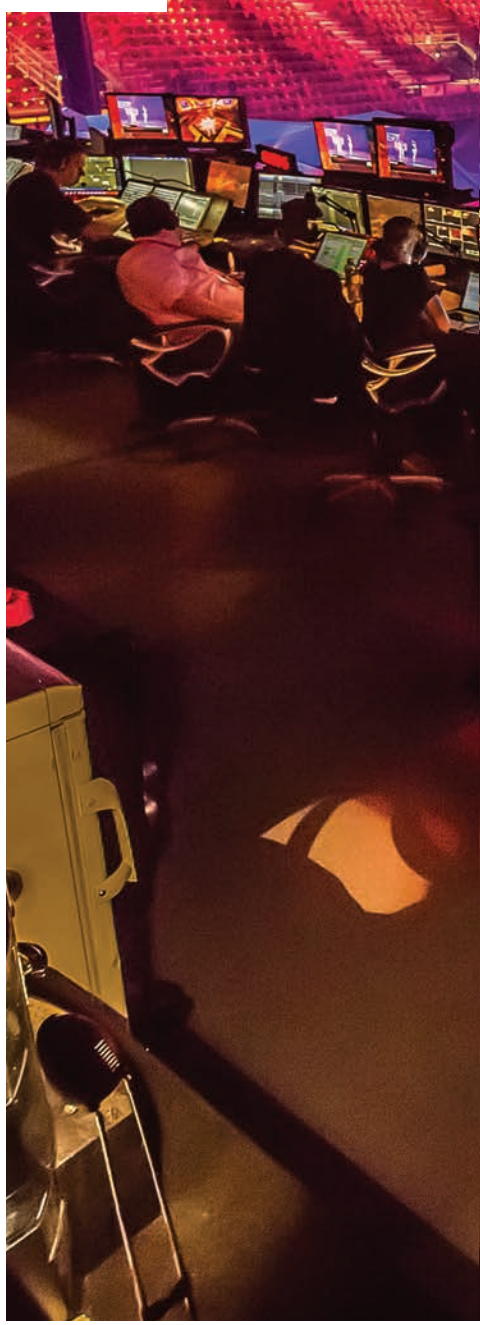
Worldwide broadcast

Riedel Communications was responsible for a large part of the event's signal infrastructure, which transformed the arena into a large-scale broadcast studio. The company has provided signal transport backbones to the Eurovision Song Contest events since 2006, including HD video, live audio and the communication and commentary of the event. The company has also provided communications and signal distribution infrastructures to other large-scale events such as the Olympic Games and FIFA World Cups, as well as notable venues such as Madison Square Garden, the opera house in Zurich and the Royal Swedish Opera.

Riedel's MediorNet, at the heart of the installation, is a fibre-based media network that allows for transporting video, audio and data in real-time over a fibre network infrastructure. The network is not a simple point-to-point system – it supports any topology and combines signal transport, routeing, processing and conversion in broadcast quality in a single system. At the Eurovision Song Contest, 40 HD and SD video signals were distributed via MediorNet within the arena – among them, the broadcast feed to the TV compound outside the hall and the signals for the onsite video walls and monitors. The system's ability to transport different signal types over a single infrastructure considerably reduced the effort required for event preparation. It also provided flexibility in terms of potential routeing changes or changes to the setup itself on short notice, which was very beneficial given the tight construction timeline.

Digital connection

In terms of the communications infrastructure, Riedel installed a system combining Artist intercom with digital trunked radios (TETRA) and professional analogue radios. Artist is a digital matrix intercom system that offers freely scalable systems of up to 1,024 x 1,024 non-blocking ports. As it is based on a redundant fibre ring, it is well protected against problems



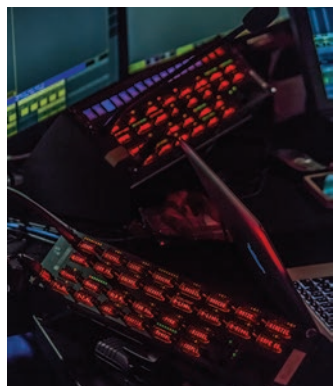
Photographs courtesy of Ralph Larmann

such as the loss of a link between two nodes, making it a reliable communications infrastructure. The connection to the individual control panels is realised via a single AES link, offering digital audio quality, which can also be used for broadcast applications. If needed, the Artist system can be easily extended with digital Partyline systems. Thirteen Artist 128 and Artist 64 mainframes were used, as well as 82 Artist control panels, including panels from the Artist 1100, 1000 and 2000 series. Nearly 900 Artist ports were available via the intercom matrix.

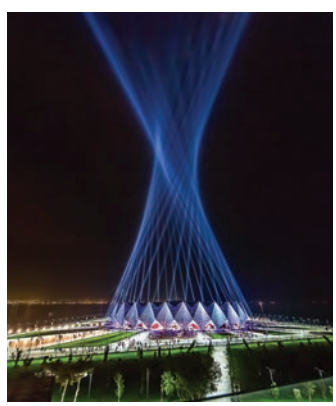
The 25 commentator booths were equipped with Artist CCP-1116 commentary control panels, which allow two speakers to independently use the same commentator unit. An integrated, freely assignable intercom control unit further expands the flexibility of the system. The connection to the matrix and transport of audio signals was achieved via a simple AES3/EBU link over a CAT5 cable.

To provide a direct connection between the commentators and their respective studios in their home countries, the organiser of the event used Riedel Connect Trio interfaces. These provide the regional ISDN codecs for individual countries so that all the commentators could easily communicate with their studios via a simple ISDN connection.

The communications infrastructure on site was expanded with more than 600 analogue and digital trunked (TETRA) professional mobile radios. These 350 radios and the 10 analogue professional radio groups were integrated into the Artist intercom matrix system using Riedel RiFace interfaces, which allowed for direct communication between an intercom control panel and individual digital radios or dedicated digital and analogue radio groups.



The Riedel MediorNet and Artist were at the heart of the network (top left)**; operators used Riedel Partyline beltpacks and headsets** (top right)**; Riedel Artist control panels provided communications with broadcast quality audio** (above)**; the Baku Crystal Hall, Azerbaijan** (below)



Integrated system

To distribute live audio signals at the event, the rental provider Cape Cross used a comprehensive Riedel RockNet digital audio network. RockNet is a real-time, low-latency audio distribution network tailored to installed sound applications, offering up to 160 channels and 24bit/96kHz audio on a single Cat 5 cable. Interface cards for digital mixing consoles from manufacturers such as Studer, Yamaha or Soundcraft offer remote control of all pre-amps of the network through the mixing consoles. At the Eurovision Song Contest, this was realised with four digital Yamaha mixing consoles.

The access control systems and accreditation services were handled by Riedel subsidiary DECA Card Engineering, which provided the turnstiles and scanners for the visitors and crews, and included specially designed RFID technology for use just at Baku Crystal Hall.

Furthermore, five wireless video camera systems consisting of Grass Valley LDK 8000 equipment, including wireless transceivers, were supplied and serviced by Riedel.

The Eurovision Song Contest was an extraordinary event to inaugurate Azerbaijan's stunning new venue and a good test run for what is possible in terms of signal distribution on site. This installation in particular clearly demonstrates how integrated technologies can minimise the complexity of a system without sacrificing reliability. ■

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Size matters

A complete renovation of the stage machinery at the historic Bolshoi Theatre in Moscow has improved staging capabilities and increased venue flexibility

The Bolshoi Theatre is one of the largest theatres in the world and one of Russia's cultural icons. Housed within its walls you will find the Bolshoi Ballet and Bolshoi Opera, which are among the oldest and most renowned ballet and opera companies in the performing arts sphere.

The theatre has recently undergone an extensive seven-year renovation, and the famous main building of the theatre was reopened on 28 October 2011 by former Russian president Dmitri Medvedev. In 2004, Bosch Rexroth had been commissioned as general contractor for the complete reconstruction of the stage technology at the legendary venue.

The renovation of the historic theatre was overdue, in a critical condition due to its weak foundation on sandy ground. Although the building had undergone many renovations in its time, this weak foundation and subsequent sinking of the main walls posed a fundamental problem for the preservation of the theatre. After the building was closed in 2005, engineers discovered cracks more than 5cm wide in the supporting walls behind plaster facing, the result of settlement. As the excavation works began in 2007, the building sank further and was in danger of collapse. The initial date for reopening in 2008 could therefore not be realised. Massive foundation works with more than 6,500 piled foundations were necessary to secure the walls from further sinking.

The interior of the auditorium and the halls were in a bad condition, too, with the antique plastering of the balconies veined with numerous cracks and damage. Not only that, the magnificent paintings on the ceiling had been heavily damaged by water.

The stage technology was antiquated, unsafe and didn't comply with European standards: old and insecure stage elevators were driven by means of rope winches from the maritime sector and weren't up to current safety standards; machine movements were controlled by simple electric patch panels while safety sensors and electronic safety control were non-existent.

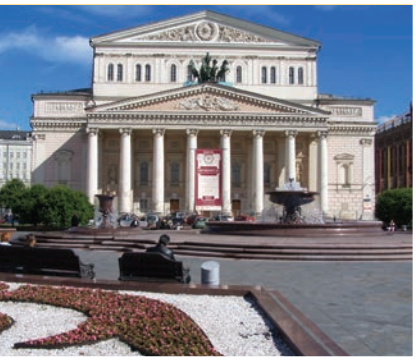
Logistics

Additional storage and performance space was needed in the stage area, but the UNESCO-listed theatre was forbidden to change its ground shape. It was therefore decided that the underground facilities should be enlarged by four additional underground levels, down to almost 21m below stage level. As a result, the usable space for theatre work was doubled from 40,000 to 80,000m^2.

The main stage now consists of seven large stage elevators, each 22m wide, 10m high and 3m deep, with a lower and additional upper platform that can be variably raked up to 4% for ballet and up to 16% for other performances. Each elevator is driven by a large hydraulic cylinder that can drive almost 100 tonnes in variable speeds up to 0.7m/sec over 16m travel height. The upper deck also contains 17 square, electrically driven flap doors, which can be used for performances in smaller scenery, with one or two singular lifts. On both sides of the stage elevators, the side stages can be customised to build a plane stage.

In order to move scenery, seven individual battery-powered stage wagons, each the same area as the stage elevators, can be moved upstage and downstage. Equalisation platforms allow clearing of these, if needed. Additionally, a revolving stage wagon (22 x 21m) may be brought out from storage underneath the rear

The Bolshoi Theatre is one of Russia's cultural icons (below); **sophisticated upper and understage technology driven by electric and hydraulic power units** (right)

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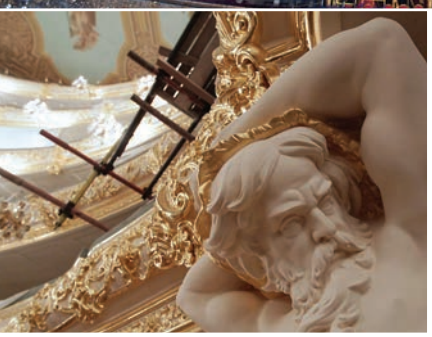
Rexroth



Throughout the renovation, the building's historical appearance has been preserved

stage. For ballet performances, a 22 x 21m wagon with mounted raked dance floor can be used.

The orchestra pit was completely redesigned to allow for variations in size and acoustic behaviour. Divided in five single platforms that can be moved variably, one of these can be used as a transport platform for instruments. It is hydraulically driven and travels over 16m, providing access to the orchestral storage areas. In the upper position of the platforms, the stage area is enlarged to reach the first seating rows. Also, the railing to the auditorium pit can by completely lowered so it is flush with the floor, which enables additional seating rows that are mounted on wagons to be moved onto the lowered platforms (the proscenium stage area can be raked up to 4%).

Underneath the stage floor of the first three orchestra lifts, a huge wooden drum, the so-called 'cassa acustica', causes reverb sound to improve the acoustics of the orchestra. This has also been completely redesigned.

Setting the stage

The overstage machinery includes numerous hoists to lift cloths and scenery. Five line sets in the proscenium area, 79 line sets over the main stage, six cyclorama sets, and additional 12- and 21-line sets in the upstage area, each allowing for 1,000kg life load and variable speeds of up to 1.8m/sec, enable flexibility and many set changes. In addition, 100 point hoists in the main stage area with flexible rope positions – each with the same allowance as the batten hoists – complete the richly equipped stage tower.

Lighting equipment can be suspended from different positions on the main stage sides, the four galleries, the false proscenium and the overstage area. The moveable portal towers and double-decked proscenium bridge are supplemented by five additional moveable lighting bridges, each carrying three or five lighting trusses. The side stages contain five telescopic lighting ladders and five extra bar hoists on each side; seven additional bar hoists are located upstage on the main stage. Two huge, static lighting bridges can be lifted by the cloth storage lifts and locked between the side walls of the upstage area.

Storage solutions and safety controls

The theatre now has sophisticated storage systems for its cloths and scenery; lighting equipment can be accessed from two lifts on both side stages. Cloths spanning up to 24m can be shelved in two hydraulic cloth elevators behind the main stage elevators. Scenery can be delivered in customised containers from the Bolshoi scenery storage building outside the city centre to the rear stage area. There, a special container-handling system sitting on a huge transportation lift unloads the carrier and brings the container to one of three extensive scenery storages. If needed, fully assembled scenery up to 12m high can be brought on stage from the underground montage hall. Another transportation lift upstage of the main stage allows for a container to be carried to unload it.

For fire safety, there is a hydraulic proscenium safety curtain and fire doors on all scenery storages, as well as fire doors between the main and rear stage. In order to exhaust smoke, a 146m^2 area of the roof over the main stage can be hydraulically lifted.

More than 200 drives for scenic usage are controlled by a Rexroth SYB2000 stage control, which has an SIL3 safety level. Users can choose one of 11 moveable touchpad control desks (one of which is wireless) to operate all possible actions and control features for all drives. Also, 200 drives are controlled by separate Rexroth SPS safety controls and local control cabinets.

And finally, between the main stage and the rear stage, a steel truss construction supports 36 historic bells that can be played by keyboard or alternatively by pulled ropes. Additionally, one of the stage right smaller galleries contains a full flute organ. ■

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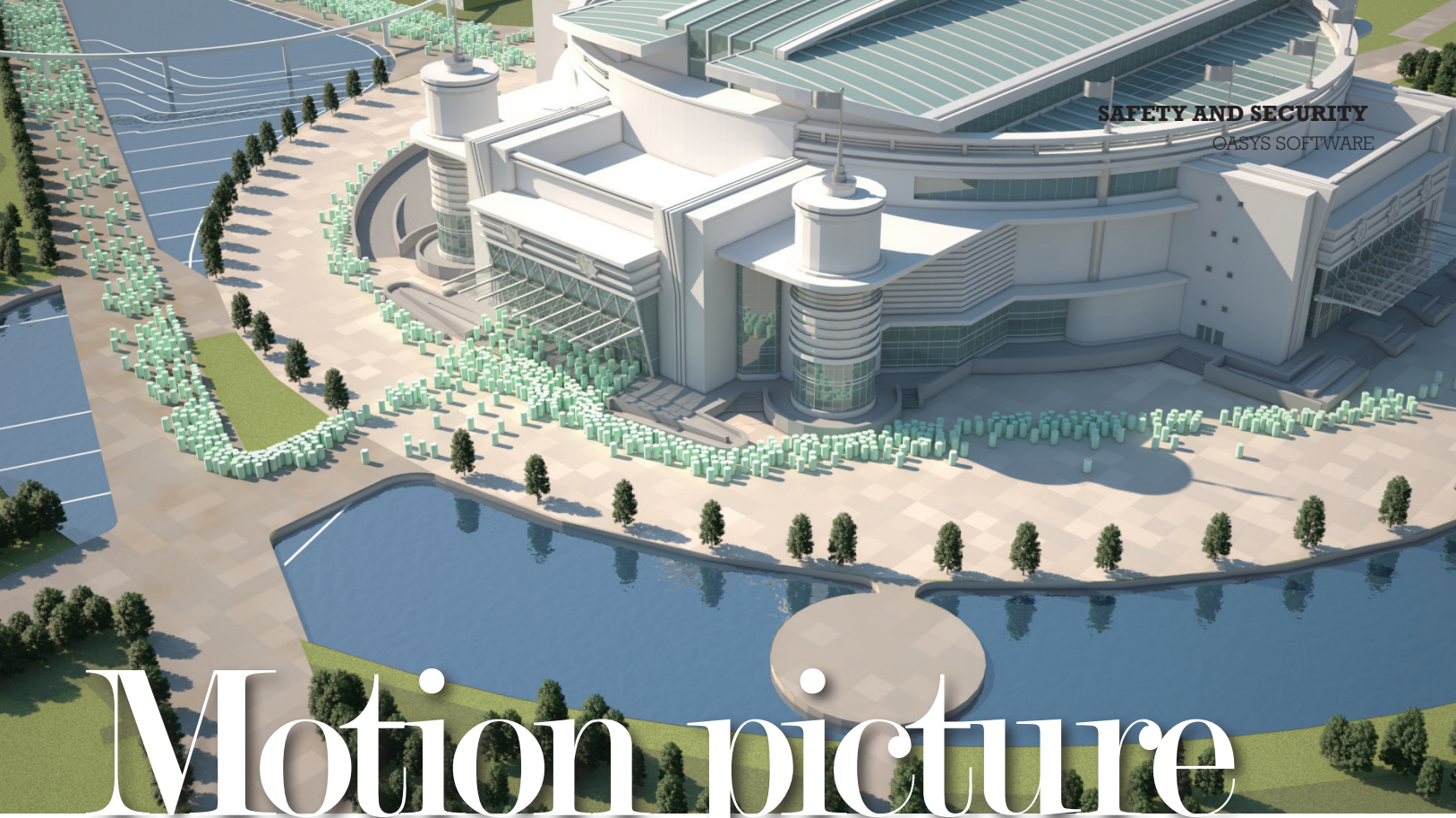


Motion picture

The only tool able to predict the movement of tens of thousands of individuals in complex 3D environments, MassMotion takes crowd simulation and modelling into the next generation

Born eight years ago out of the transport practice of planning and engineering company Arup, MassMotion is a new pedestrian analysis and crowd simulation tool that was unveiled in 2011 by the firm's Oasys Software subsidiary.

According to Erin Morrow, product director at Oasys – who wrote the earliest version of MassMotion himself – the software helps designers and architects understand how crowds will flow through large-scale facilities such as auditoria. "It started out as a pretty crude set of tools," Morrow admits, although it has since developed into something far more sophisticated. "MassMotion is what's called an 'autonomous agent solution', meaning every person that you are simulating is represented by a single agent who makes their own decisions about where they're trying to get to and how they interact with – and avoid – the other people and obstacles in their environment," reveals the Canadian transport planning consultant.

What this means in the context of a performing arts venue is that you could simulate the impact that extra security checkpoints, ticket collection booths, or the integration of new food and beverage areas, for instance, would have on the flow of patrons – or potential bottlenecks – in and around the venue, whether that be a theatre, opera house, concert hall or arena. "Over the years we've been able to apply this toolset to several performance venue projects, including the 4,000-capacity Joint at the Hard Rock Hotel in Las Vegas and at the other end of the cultural spectrum Beethoven Halle in Bonn, Germany [design only]. We also simulated pedestrian circulation around Air Canada Centre (ACC) in Toronto," Morrow says.

The ACC is Canada's premier sports and entertainment venue and home to the Toronto Maple Leafs Hockey Club, Toronto Raptors Basketball Club and the Toronto Rock Lacrosse Team. Over the past 13 years or so since it opened in February 1999, the multi-purpose arena has received more than 25 industry awards and has welcomed more than 28.5 million spectators at close to 2,200 events including Leafs, Raptors and Rock games, as well as concerts and live events.

Detailed analyses

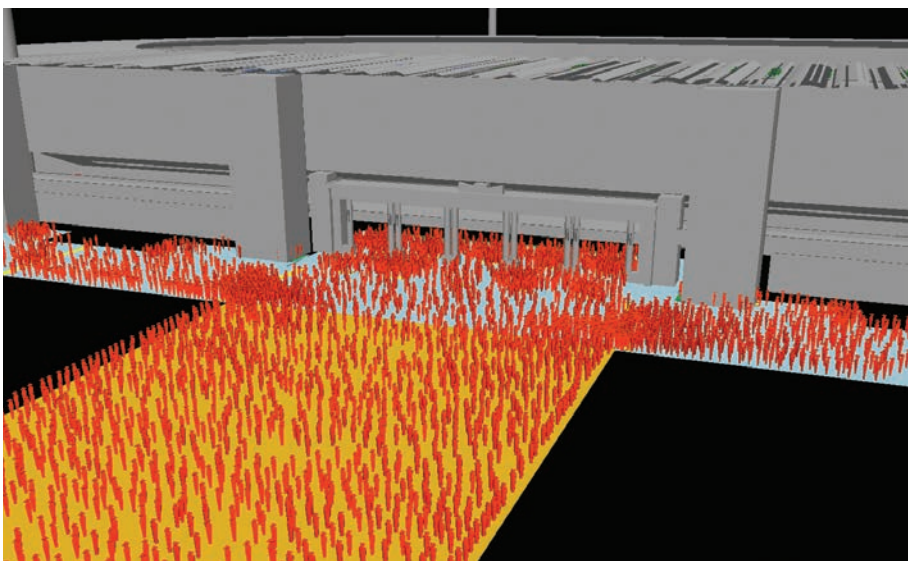
"Arup is a big company and if there's software out there to perform the types of analyses you need to design large buildings such as these, we've used it," the Oasys man continues. "We have a very sound idea about what it takes to have a good and appropriate tool in this area, and I think we've taken the best of our consulting knowledge and put it into the software."

MassMotion has the ability to programme individual personalities with unique agendas from start to finish in their journey through an environment (left and below)

So what does Morrow believe MassMotion can do that other software packages cannot? "It certainly scales better than others – many of which aren't 3D so things end up being represented in a series of 2D environments," he responds. "The improved visualisation that you get from our 3D game-quality graphics makes MassMotion a great communications tool, easily understood even by non-technical decision makers involved in large-scale planning.

"One of the great things about 3D is that you benefit from a richer sense of the interactions people have with their environment – as well as how aware they are of their environment. For instance, we've done some work looking at tracking, analysing where people's eyes fall on wall surfaces, and so on. We can effectively project people's cone of vision out through the 3D space, so this could be useful for placement of signage, location of concessions for optimal revenue generation, placement of video screens, emergency routes, etc. We have these virtual sensors that capture the eyeball time of the crowd passing by, so we can generate a heat map in which red denotes large numbers of people looking for long periods of time and blue means nobody is looking."

The wayfinding component is another innovative aspect of MassMotion, as Morrow explains further. "The automatic route trace component in our package has always been very robust – if you have a continuous 3D environment, it's conceptually a much more appropriate way of looking at the continuous routes of people, from the local mass-transit station, via food and beverage areas, all the way to the patron's seat and back out of the venue. You simply tell the agents where to start and finish plus any tasks they need to do along the way; they work out for themselves how to get there."



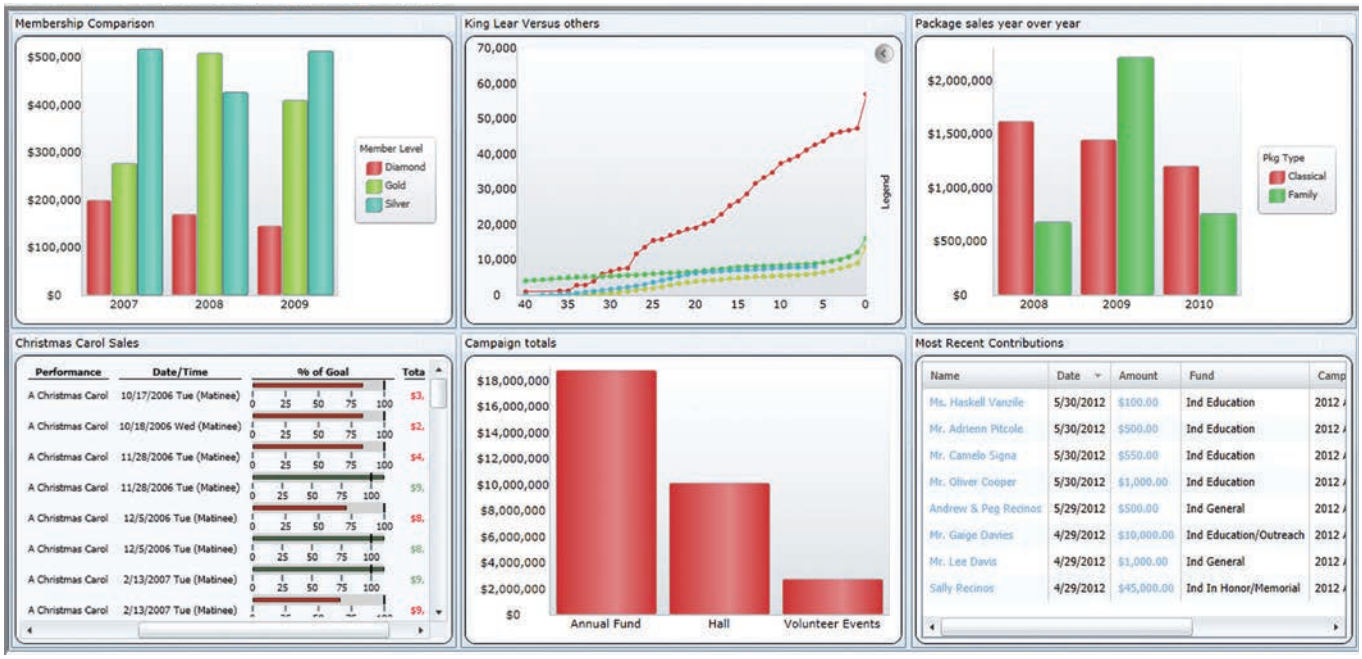
And of course MassMotion is highly adept at simulating evacuation scenarios – providing invaluable information in doing so, not just through every stage of design and construction, but also on an ongoing operational basis. "Because MassMotion is 3D, it's actually able to model the raked seating you get in some venues, which a lot of other programmes would struggle with, so you're able to assess various stages of evacuation, from the seating area to the vomitories, from the vomitories to the concourse and vertical circulation to full evacuation.

"Site access is another potentially valuable application, i.e. simulating the movement of pedestrians in and around roads in the neighbourhood, parking areas, onto entrances, foyers and so on. From an operational perspective, it would also be useful to understand the impact of staffing levels at entrances and food and beverage areas. Have you provided enough space for these facilities, for the security and for the sort of queuing you would expect within a very busy building? MassMotion allows you to optimise strategies for these and many other areas."

Visualise your dreams

Ultimately, the use of MassMotion could help designers get closer to their goals by enabling them to optimise their solutions. "But it also comes down to risk mitigation as well," Morrow points out. "On any number of actions, you need to ensure safety, yet you also want to make sure that the hundreds of millions of dollars you're about to spend on the facility are well spent, that it's going to be functional, good for the patrons, and that it's going to generate the revenue you would expect." ■

www.oasys-software.com



Full house

Venues are effectively utilising customer data for personalised marketing and communications

Data visualisation on the Tessitura strategic dashboard (above)**; opening night at Opera Australia** (opposite)

In our digital age, entertainment is in abundance via a growing number of electronic devices that provide consumers with a constant stream of information and distraction. How do arts and cultural organisations get their message through the data haze? Jack Rubin, president of Tessitura Network, keeps a close eye on emerging technology trends in order to find creative and meaningful ways to reach potential customers.

"Breaking through the data haze to smartly pique a potential customer's interest and stimulate interaction has graduated from the mass to the personal," Rubin says. "Consumers switching entertainment and interest preferences are the penalty for poor execution, and the result will be unsold tickets and empty seats."

Organisations can employ various tactics to successfully increase attendance, improve revenue per customer and gain loyal new fans. Mining behaviour, for instance, to predict preferences and acting upon that knowledge in micro-targeted ways. Offers could be tailored to fit specific audience segments. Strategically tracking results and adjusting on the fly can maximise marketing expenditures, while open and accessible databases enable organisations to slice and dice data then communicate in a one-to-one, personalised manner on a mass scale.

Detailed picture

Opera Australia recently piloted an incredibly successful opera production on the Sydney Harbour waterfront, and more than half of the audience at *La Traviata* – about 20,000 people – were new to the genre. The organisation knew this because Tessitura Software provided it with a detailed picture of its customers: the types of shows they like; their ticket-buying patterns; how they prefer to receive information; and any complaints or compliments they have ever made to the organisation. This navigation of data provides a wealth of information for Opera Australia and helps it communicate with its customers in a targeted manner.

"Past behaviour is the best indicator of what someone might do next," says Opera Australia's Liz Nield. "That tells us what we need to know about a customer more than anything else."

If organisations analyse information about customer behaviour and preferences, they can adjust their tactics accordingly. This increases the chances of grabbing a customer's attention and building a relationship.

"Our Tessitura system can tell you anything you want to know," adds Georgia Rivers of the Australian Chamber Orchestra. This goes beyond simple transactional data. "For us it's more behavioural stuff. What they booked for, how they booked, when they booked, and what choices they made in terms of which reserve they sat in or what type of concert they attended. Also, how they heard about the event."

Tessitura Software also enables the tracking of offers, ticket sales and results by using an advanced data-mining tool called T-Stats. The Segerstrom Center for the Arts in Costa Mesa, California, for example, uses T-Stats data to measure customer segments and react quickly.

And beyond data mining, the visualisation of data enables staff to easily see results and identify potential opportunities. ■

www.tessituranetwork.com

Photo courtesy of Shai Gil

Natural balance

The spotlight is on sustainable design at the Burlington Performing Arts Centre just outside Toronto, Canada

While the building exterior showcases a fusion of brick, steel and glass (above)**, the foyer uses sawn white oak to add warmth to the interior** (below)**; the wood-panelled theatre has been configured for acoustic and amplified performances** (right)

The Burlington Performing Arts Centre is one of the very first theatres in Canada to have an aggressive sustainable directive. The 720-seat main stage theatre and 260-seat studio theatre have been designed to contribute important energy-conserving initiatives, both front and back of house, while also adding a shot of vitality to the downtown district by maximising access and flexible programme space.

"We furthered the design response for this multi-purpose theatre to include versatility in the lobbies as well, where receptions and city events can take advantage of the generous triple-height volume, providing, in essence, another venue at the Burlington Performing Arts Centre," explains Gary McCluskie, principal with Diamond Schmitt Architects – the Toronto-based design firm behind Toronto's Four Seasons Centre for the Performing Arts and Montreal's Maison Symphonique. McCluskie adds that the lobby opens onto a public plaza, so events can move outdoors in warmer weather. "This way, the entire building (inside and outside) is activated as performance space, which lends a dynamic presence to the downtown neighbourhood."

Photo courtesy of Shai Gil

Eco building

The sustainable narrative is interwoven throughout the project, from innovative on-site remediation initiatives to treat contaminated soil to ongoing third-party energy performance tracking. The theatre is expected to achieve a 77% reduction in the provincial energy use intensity average and is targeting LEED Gold certification. Additional energy-saving measures include thermal and lighting controls and monitoring, use of natural daylight, lighting fixture selection, and a high-performance building envelope.

The extensive use of FSC-certified wood in the main auditorium imparts a high level of quality craftsmanship while creating a warm and tactile setting for performance enjoyment. The proscenium and box seats are framed by millwork, faceted wood reflectors define the ceiling, and the balcony is a dramatically cantilevered millwork enclosure that appears to float above the room. In balance with the modern expression of brick, steel and glass on the exterior, the millwork gives warmth and human scale to the centre. Solid quarter-sawn white oak is used for the entrance canopy soffits, handrails, balustrades and door edgings in the lobby and mezzanine.

A wood underlay was deemed to provide the best 'feel' for the three stage floors constructed in the building. Innovations developed by the designers in the finishes here include computer

numerical control (CNC) cut and drilled masonite panels, and a paint specification for primer and finish that provides durability, ease of cleaning and maintains indoor air quality.

Working with acoustic consultants JaffeHolden, the designers configured the theatre for a range of acoustic and amplified performances. In all, 24 form-liner Reckli panels on both sides of the auditorium have different angles and depths to reflect sound in a variety of directions. When it has to be dampened for spoken presentations, the walls are covered with acoustic drapes.

Overall, the centre engages with the community as cultural institutions should, connecting with the street life that surrounds it through expansive windows, a large lobby, public square, landscaping and lighting, and a scale that fits within the context of the urban fabric. ■

www.dsai.ca

Photo courtesy of Shai Gil

Creative inspiration

Two performing arts venues have been purposefully designed to optimise the creative space, support performers and enhance the audience experience

Performers excel when they are supported by a specialised environment that is specifically designed to engage audiences and enhance acoustics. Anne Minors Performance Consultants (AMPC) works with all levels of amateur and professional artists to create facilities that meet the needs of performers to enable them to achieve their full potential.

The new Garsington Opera pavilion uses timber, fabric and steel to combine transparency and lightness with a sense of intimacy (below)**; the Great Hall at Bishopsgate Institute has been upgraded with restoration of original volume, acoustic treatment and lighting** (right)

Opera immersion

Garsington Opera is a professional company that runs an annual summer festival consisting of three or four operas – often less well-known compositions by popular composers. After the 2010 season, the company had to move from its home in the gardens of Garsington Manor; the seating and scaffolding structure at the venue had been improved and expanded over the previous 15 years but the venue was no longer available.

Moving to a new site and investing in a new bespoke pavilion gave the company the opportunity to strategically place the orchestra pit in a position that would effectively balance the sounds of the singers and orchestra.

AMPC was contracted during the design stage of the project to determine how the new theatre would look from the point of view of the audience, using sightlines to demonstrate how this would affect the relationship between the audience and the performers. Together with Iain Mackintosh and acoustician Sound Space Design, AMPC and architect Robin Snell Associates refined the critical aspects of the pavilion design to enhance the audience-stage relationship and optimise sound.

In its first two seasons the design, sightlines and acoustics of the new venue have been well received, and the building and client were recently awarded three RIBA prizes.

Historical preservation

Bishopsgate Institute, meanwhile, is a cultural icon in the heart of London, and its Great Hall is fundamental to the choral tradition within the city. In 2011, in collaboration with Sheppard Architects and Adrian James Acoustics, AMPC refurbished the venue to restore it to its original volume with a contemporary feel and expand its potential use to include dance performances, recitals and examinations. In addition to flexible seating layouts, AMPC proposed a production lighting scheme that enables any part of the Great Hall to become the stage. In addition, for recitals, the company devised an acoustic canopy over the stage area, with technical installations designed to be as discreet as possible to preserve the historic mouldings and panelling within the hall itself. ■

www.ampcstudio.com

Photo courtesy of David Sundberg/Esto

Design intervention

Three dynamic performance spaces integrated into a city high-rise building make the ideal new home for a New York theatre company

For two years, the Signature Theatre Company alongside the City of New York, Gehry Partners and Auerbach Pollock Friedlander, scoured Manhattan for a space that would support the company's vision for a new multi-space venue. What they were looking for turned out to be just a stone's throw away – a high-rise building spanning one city block, with a 70,000ft^2 cultural amenity. MiMA, a 63-story high-rise hotel and residential tower, was designed by Arquitectonica for developer Related Companies. The new Pershing Square Signature Center is on the second and third floors.

As the design of the building was nearly complete, Auerbach and Gehry Partners had to fit the space around already planned structural columns, stairs and mechanical chases. The Auerbach team worked closely with structural engineers to get the infrastructure into the concrete slabs. A similar amount of effort was also put into pre-construction coordination for the major electrical and mechanical systems.

"The overall building project schedule was a challenge," remembers project manager Don Guyton. "Our work for Signature had started years before but once this building was chosen, the design of the high-rise was near completion and a hole in the ground had already been dug.

"Much effort and cooperation was needed to coordinate the theatrical, mechanical, electrical and structural systems with the architecture. 3D building information modelling (BIM) was used to precisely locate every piece of equipment in the theatres and to discover potential conflicts before fabrication. This upfront, intensive approach eliminated any surprises on site."

Collaboration for success

Founded in 1991 by artistic director James Houghton, Signature Theatre Company was the first to devote an entire season to the work of a single playwright. In 2004, it was chosen to be part of the proposed World Trade Center Performing Arts Center. But in 2008, after an initial schematic design phase, the project was reduced in scope and Signature Theatre was released from its involvement.

"Our relationship with Auerbach evolved greatly from the initial site at the World Trade Center in 2004 to the realisation of this new centre in 2012," says Houghton. "Their experience, open collaboration and dedication to fulfilling our objectives served the project in every way. The result is dynamic and effective performance spaces."

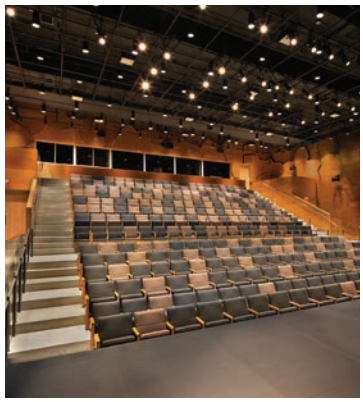
The new Signature Center has three venues – the End Stage with 299 seats, the Romulus Linney Courtyard Theatre, and the Alice Griffin Jewel Box Theatre, both with 199 seats. The theatres were developed in close collaboration with Signature's playwrights, production designers and technical staff. The performance spaces are situated around a lobby with a café and bookstore. The project also includes a 99-seat performance/rehearsal space and a second rehearsal studio, as well as administrative offices.

The exterior of the Pershing Square Signature Center (above)**; the Romulus Linney Courtyard Theatre** (opposite, top)**; the new End Stage Theatre** (opposite, left)**; the 199-seat Alice Griffin Jewel Box Theatre** (opposite, right)

Auerbach also designed the sound reinforcement and playback systems within each performance space, as well as the facility-wide video and production communication systems within the centre. This included digital signage displays, which are located throughout the lobbies and building exterior entry.

"Our biggest challenge was developing a programme for an already designed building," explains Steve Friedlander, principal in charge for Auerbach. "The success of the project is a result of a team effort from the owners, designers and builders. Every decision was collaborative. The Gehry Partners team was really responsive to the functional criteria that Auerbach developed to meet Signature's programme and we successfully incorporated the architects' concepts within the theatre spaces." ■

www.auerbachconsultants.com



Photographs courtesy of David Sundberg/Esto

War and peace

A Hong Kong-based design studio has found a solution to the age-old problem that has long plagued cinema-goers

We've all experienced it. Not only in the cinema, but also in theatres, concert halls, lecture halls, and even on aircraft: the fight for the middle armrest; a frustration that has probably been around since auditoria first existed.

Yet for decades there has been no real solution to this problem. One may argue that adding an extra-wide armrest between seats is an obvious way to solve the issue, but for most venues, economic realities make this option unfeasible. Now, Hong Kong-based Paperclip Design claims to have found the perfect answer to this dilemma: a double-decked armrest.

"The vertical dimension is used all around us to multiply space in situations where real estate is limited – think double-decker buses, bunk beds or duplex houses," explains James Lee, director of Paperclip Design. "There is no reason why the same principle cannot be applied on a smaller scale. It's not rocket science."

Simple as it may sound, the double-deck armrest concept – which the company has dubbed the 'Paperclip Armrest' – has already won a number of high-profile international design awards, including the coveted Red Dot Award, the Good Design Award from Chicago Athenaeum, the A' Design Award from Italy, and the Crystal Cabin Award from Hamburg.

The Paperclip Armrest is a concept that can take many forms

How stuff works

So how does the Paperclip Armrest work? "It's simple," says Lee. "The key to the design is the large gap between the upper level of the armrest and the backrest of the seat. It is this gap that allows the arms to access the lower deck. Without this gap, the upper deck would block access to the lower deck."

Adding a second level to the armrest effectively doubles the usable space for the arms without taking up extra floor space, enabling adjacent occupants to use the same armrest simultaneously.

A question that often comes to mind is whether the concept requires neighbours to be of very different heights for it to function effectively.

"It doesn't," Lee confirms. "Our arms are very adaptable – they pivot freely around the shoulder joints and swinging the arms forward happens to raise elbows at the same time. This swinging action enables anyone to easily adapt to varying armrest heights. In fact, it is this swinging motion that makes the concept work so well – a person's arms tend to angle forward when using the higher level, which naturally avoids the arms of the person using the lower level.

"On a side note, a taller person does not necessarily have to use the higher deck. Tests with our prototypes have shown that

an occupant's preference does not correlate with their height."

Business opportunities

The Paperclip Armrest does not have one specific shape – it is a design concept that can take many different forms as long as the basic criteria are satisfied. The concept has already been granted utility patents in the UK and USA, and the company is confident that applications in other countries will soon be approved.

But while the concept is applicable to many types of high-density seating arrangements, such as on trains, boats and aircraft, the company's eyes are firmly focused on auditorium seating.

"We have chosen to focus initially on the auditorium because this market has the widest reach, is the most open to innovations, and has the least regulatory bureaucracies to put through," explains Jack Sun, business development manager of Paperclip Design.

Marketing effort for commercialising the concept has just begun, and the company is looking at partnering up with seat manufacturers. "Our concept can help seat companies differentiate themselves from the rest of the market with a very unique proposition. We are offering them a very good business case, which we believe is the future of auditorium seating," Sun says.

What's in a name?

For those with a curious mind, the name 'Paperclip Armrest' has nothing to do with the way this design concept looks.

"A paperclip is a simple yet effective tool that is widely used around the world," explains designer James Lee. "That is exactly what we hope our concept can achieve here."

In particular, Sun foresees great potential for the concept for use in cinemas. "People want to have a good time and relax when watching a movie," he says. "The last thing they want is to get into a fight with a seat mate."

Nobel Peace Prize

"My secret ambition is to win the Nobel Peace Prize," replies Lee, jokingly, when asked about his ultimate goal for the Paperclip Armrest. That is pretty far-fetched but perhaps he could get close if the Oslo City Hall, the venue of the ceremony, was to install the armrest. Time will tell whether the concept can eventually become as widespread as its namesake – the paperclip. Nevertheless, the Paperclip Armrest is certainly an invention that has the potential to bring a little harmony to our everyday lives, and make the auditorium experience that little bit more enjoyable. ■

www.paperclipdesign.hk

The Paperclip Armrest concept seeks to eliminate conflict in everyday life (above left)**; arms can adapt easily to either deck by rotating around the shoulder joint** (above centre)**; two people can share a single armrest in harmony** (above right)

Break the mould

In a time of constant technological progress, when man is often replaced by machine, 'real art' crafted by human hands is highly valued. Despite the fact that they may look similar, a craftsman's trained eye can see minor differences and individual character in each of his crafts. Some may think that taking a traditional 'hands-on' approach would rule out modern amenities and luxury, but this simply is not true. These things are possible; they just take a little more time.

Megan Seating has been involved with a number of unusual projects over the years involving venues that have required bespoke seating solutions. With a traditional mode of production and an individual approach to the project, these venues have been provided with individual seating solutions that incorporate modern expectations and increased comfort, while maintaining a sense of 'human soul'.

A traditional approach to craftsmanship has created bespoke seating solutions for venues that want modern quality with a human touch

Individual taste

The company's most 'traditional' project took place at the Palac Kultury Zaglebia (the Palace of Culture) in Dabrowa Gornicza, Poland. The building is a fine example of socialist realism architecture and was originally constructed in the late 1950s. Although still playing host to a variety of performances, exhibitions and workshops, over the years the original splendour of the building had faded, so recently, the management of the facility decided to restore the venue to its former glory. As part of the project, Megan Seating made custom seats for the main hall and the theatre. Designed to suit the 'old' style of the building, while catering to modern expectations of comfort, the seats meet the highest safety and acoustics standards.

An equally intricate but slightly more 'modern' project took place at the Boleslawiec Theatre, also in Poland. Here, to emphasise the uniqueness and beauty of the historic building, the audience hall was in need of seats that looked elegant and classic. A seat model was drawn based on old drawings and was built from scratch in the workshop. Adjusted and shaped to the finest detail, the seat fulfilled the expectations of the theatre's management. Simultaneously delicate, elegant and comfortable, the seating has become a showcase of the theatre, and the inspiration for many other theatres in Europe.

In Saudi Arabia, meanwhile, cultural influences and respect came into play for a hospital auditorium project. The client required that the seating be created to combine the highest quality, traditional materials with advanced technology translation systems hidden in the chairs. Megan Seating designed a custom chair that was hand sewn, with each seam intricately assembled to satisfy the highest, royal taste.

Despite a modern design, the Eye Film Museum in the Netherlands has a unique atmosphere. The layout and colour scheme of its auditorium (inspired by old, black and white movies) create the ambiance of ambition and quality. Here, the challenge for the seating designers was to preserve the idea of an ascetic chair but to make it comfortable. As the model was custom-made, upholstery and colours varied and the whole production took place manually.

Delicately handmade seats with built-in translation systems in Saudi Arabia (above)**; the custom seating at the Eye Film Museum** (below)

As it can be difficult to ensure retention of the acoustics of a venue when new seating is installed (due to the different materials used), Megan Seating carries out tests that enable the exact acoustics to be replicated after modernisation. This made it possible for the Filharmonia Pomorska (Pomeranian Philharmonic) in Bydgoszcz, Poland, world-renowned for its acoustics, to install custom seating without any change in acoustic quality.

When commercialisation and mass production is rife, it's still possible to have a creative, individual approach to a project. From the Dabrowa Gornicza to the Eye Film Museum, projects requiring the most traditional to the most modern seating have been pursued with the same inherent passion. Individual seating designs makes each of these halls unique and special – a fact that makes their owners very proud. ■

www.meganseating.com

Traditional seating with a modern twist at the Palac Kultury Zaglebia

Circle of influence

The integration of 21st century technology into an 18th century heritage site enables social enlightenment to be shared with a global audience

The Royal Society for the Encouragement of Arts, Manufactures and Commerce (known as the RSA) – formed in 1754 and the UK's third-oldest Royal Society – has awarded the title of 'Royal Designers for Industry' since 1936. Esteemed members of the Society have included Charles Dickens, Benjamin Franklin and Stephen Hawking, while Royal Designers include global design leaders such as Sir Jonathan Ive and Sir Terence Conran.

The RSA is an enlightenment organisation committed to finding innovative and practical solutions to today's social challenges. To fulfil the society's mission within the 21st century, a project was commissioned to refurbish the facilities of London's RSA House, the centre of the RSA's activities.

The challenge of refurbishing the society's historical home has been to provide an architectural solution that satisfies the sensitivities of English Heritage while implanting fully integrated, flexible, multimedia facilities that allow the RSA to continue at the forefront of intellectual thought.

Key drivers for the architecture and the systems have been to restore the Great Room to its original open-plan layout, revealing hidden historical features and enabling the most flexible use of the space. Technically, this approach placed heavy restrictions on the design and positioning of AV equipment, specifically prohibiting the mounting of any AV hardware or cabling on any walls or ceilings. A cantilevered stage box was therefore installed that contains a retractable projection screen and loudspeakers alongside key audiovisual elements.

James Barry's mural 'The Progress of Human Knowledge' looks down on the integrated technology installed in the Great Room

In addition, the Great Room and the Benjamin Franklin Room beneath have been provided with an intelligent under-floor cable infrastructure terminating in floor plates that house custom-built media columns and production-standard trusses. The media columns provide power, LED colour, sound, robotic HD video cameras and data connectivity, all of which enables a completely flexible configuration for events including HD film screenings, lectures, banquets, fashion shows and art exhibitions. The system connectivity allows for the configuration of multiple rooms, and interaction using touch- and gesture-based displays and mobile devices has also been incorporated.

Global reach

An integral part of the project has been the unification of media across the organisation.

Custom-built media column

The RSA has realised the power of providing access to media content, both in the house and around the globe. To this end, Vanguardia has designed and programmed a media consumption platform, Mediaview, which provides user interaction with multiple feeds such as social networks, blogs, online video, publications and internal streams. A user experience-based design process of the touch- and gesture-control interfaces is key to providing users with relevant and up-to-date content. HD LCD multi-touch displays and gesture-sensing interactive wall surfaces have also been installed.

Importantly, the facilities also provide full live HD streaming of events in the house direct to the web, enabling the RSA to spread its message of enlightenment worldwide, as it continues to move forward in the 21st century. ■

www.vanguardiaconsulting.co.uk

JAAP OOSTVEEN

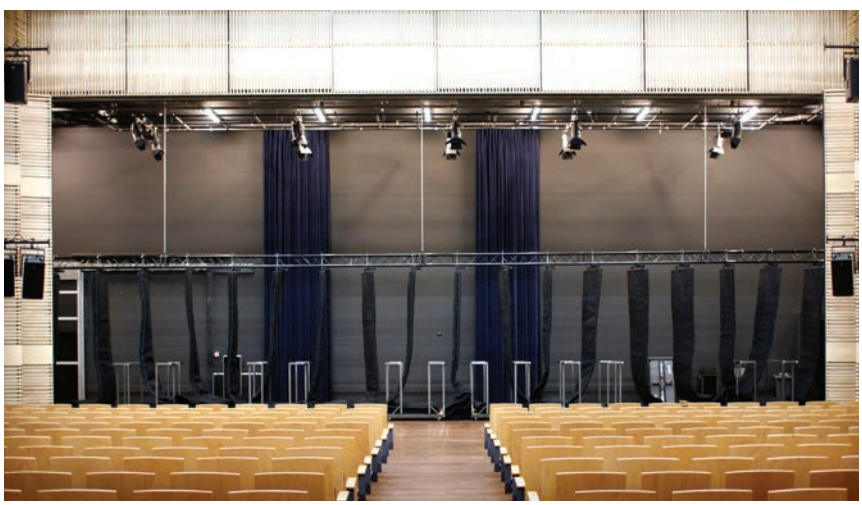
Good vibrations

The acoustics at Amsterdam's Muziekgebouw aan 't IJ have been perfected using a sound-absorbing baffle solution

Backstage TexLnt baffle and mobile, bridge-flown baffle at the Muziekgebouw aan 't IJ

Hailed as Amsterdam's '21st century concert hall', the Muziekgebouw aan 't IJ opened its doors to the public in spring 2005, offering a contemporary programme of varied eras, styles, cultures and art forms. With a 750-seat (1,500 standing) capacity, the venue's unique 'box-in-a-box' architecture and moving ceilings were designed for optimal acoustic qualities and flexibility.

Issues with the acoustics in the main concert hall, however, became apparent soon after opening. "The reverberation time was too long," reveals Jaap Oostveen, a theatre consultant and technical producer at the Muziekgebouw aan 't IJ. "This was especially the case with amplified instruments on the stage, where high volume monitoring was required. Additionally, we also wanted to make the venue more suitable for lectures and conferences.

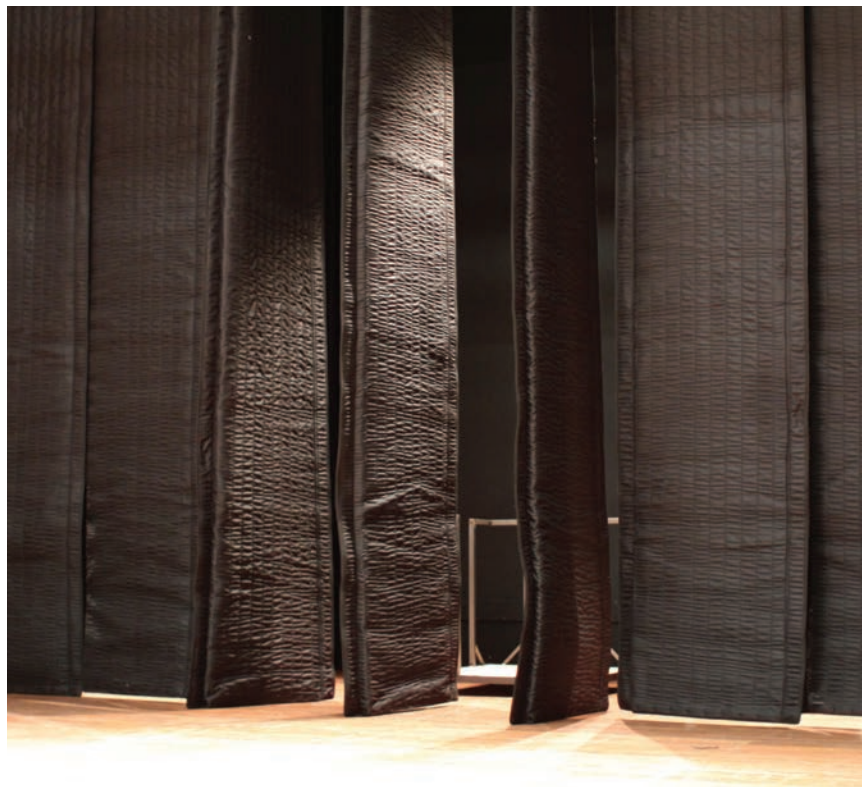


"We knew that to solve the reverberation issue we needed curtains, but although most velour or synthetic wool products provide good results in the high and top-high frequencies, results in the lower frequencies are rather disappointing."

Two years ago, the Muziekgebouw management agreed on a working budget to improve the main hall's variation in acoustic characteristics. Oostveen conducted some research and calculations, and discovered that by placing the D&B subspeakers in a cardioid configuration, the influence of reflections in the hall would be limited. "I also discovered a product called TexLnt, which had yielded impressive results from its first tests at the North Sea Jazz festival and the Amsterdam Paradiso venue," Oostveen adds. "It had been shown to substantially reduce the low-frequency reverberation time without the need for expensive and complicated construction.

"To reduce reverberation with amplified music in a concert hall, a 'silent' stage is crucial," Oostveen continues. "The TexLnt backdrop absorbs the sound of the monitors and back-line, allowing the FOH engineer to work with the direct sound of the PA system. The material had been proven to drastically reduce the reverberation time and improve speech intelligibility as it absorbs almost 100% of sound. A traditional curtain would absorb about 40%."

As a result of his research, Oostveen decided to install a 140m² main backstage TexLnt baffle and a 115m² mobile, bridge-flown baffle at the Muziekgebouw. "The theatre also added two extra 18m² acoustic 'wings' on each side of the stage, close to the sound source to absorb the first reflection," he explains.



Sound investment

"The baffles have greatly improved speech intelligibility in the hall," reveals Oostveen. "And sound source identification with amplified music is remarkably better."

With up to nine events a week, flexibility is essential for the Muziekgebouw's technical crew. As the TexLnt elements can be placed, adjusted or removed using mounting strips, changeovers to different acoustic parameters can be completed in under 45 minutes.

Also, as the acoustic baffles are made from sheep's wool, they are naturally flame-retardant. "Safety is a priority for us and fire prevention is an important part of that," Oostveen stresses.

Since the installation of the TexLnt in 2011, the feedback from audiences, artists and engineers has been unanimously positive. ■

www.jaapoostveen.nl

Photograph courtesy of Christian Gahl

In perfect harmony

Traditional Chinese design meets contemporary German architecture at the new Qingdao Grand Theatre

In the East China city of Qingdao, between the Lao mountain area and the Yellow Sea, stands the new Qingdao Grand Theatre. Designed by gmp Architects von Gerkan, Marg and Partner (gmp), the building includes an opera house that accommodates an audience of up to 1,600, a 1,200-capacity concert hall and a multi-purpose hall with 400 seats.

The theatre's halls and facilities make it ideal for a broad variety of events, such as classical concerts, operas, musical and ballet performances, acrobatics and many other events. World-famous orchestras – including the Berlin Symphony Orchestra and the Moscow State Orchestra – gave guest performances in Qingdao shortly after the inauguration, consolidating the theatre's international standard.

Photograph courtesy of Christian Gahl

The theatre is designed to be suitable for hosting a variety of performance events

Architecture and acoustics

The venue's acoustic design was developed and refined by Müller-BBM in close collaboration with gmp. The key concept was to divide the two main functions of the theatre into separate complexes, which are connected by a light roof construction. The shape of the opera hall is a mix of the ancient horseshoe-style and modern Chinese theatre design. With an inclined stalls area, seating boxes and two balconies, the hall meets modern expectations in terms of sightlines and even sound distribution.

The reverberation time was adjusted to around 1.9 seconds to create a richness of sound for the orchestra, although the definition for a singer's position is rather high. The loudspeakers are positioned behind movable flaps inside the ceiling and are mainly used for speeches and announcements. These flaps are closed during performances to allow for natural acoustic transmission. The concert hall was planned as a perfectly proportioned classical shoebox with a narrowed stalls area surrounded by balconies. The volume of approximately 13,500m^3 inside the hall enables a reverberation time of 2-2.2 seconds for classical symphony performances. The materials and surface design were purposefully selected to harmoniously combine architectural and acoustical design.

Photograph courtesy of Christian Gahl

After the decision was taken to use the hall exclusively as a guest performance venue, the planned orchestra rehearsal room was redesigned into a multipurpose hall for different kinds of performances. With the aid of an architectural acoustic enhancement system – which as of yet hasn't been installed – even chamber music performances can be performed in this small hall.

As a result of the 1:1 sample mock-ups on the building site, which are rather unusual in China, the acoustically sophisticated coverings of the walls, balustrades and ceilings are of excellent quality. To ensure this high standard, the German architectural and acoustic designers guided the local planning partners during the whole planning and building process, until the project had been successfully completed. ■

www.muellerbbm.com

Sound of Sydney

As part of a bold revitalisation project, The Concourse concert hall and theatre provide ideal acoustics in an intimate space

(Above) **the 1,000-seat concert hall in Chatswood**

The opening of The Concourse in September 2011 marked the end of a five-year journey for the Willoughby City Council. This A$160 million cultural precinct is fully owned by the council, and required considerable vision and determination to bring to fruition.

The Concourse is located in the main retail centre of Chatswood on the north shore of Sydney, Australia, which is approximately 10km north of the Sydney central business district and a vibrant community of around 15,000 people. The precinct also caters for the wider needs of Sydney's northern suburbs – a catchment area of more than 500,000.

The vision to revitalise the centre of Chatswood and develop a new civic and cultural heart for the north shore of Sydney was bold and ambitious. The precinct features a major public open space, a 5,000m^2 library, 1,000-seat concert hall, 500-seat theatre, a civic pavilion catering for up to 800, performance and exhibition spaces, restaurants, shops and basement parking.

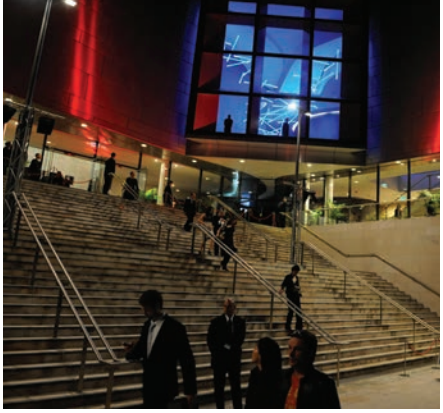
Australian architects fjmt were commissioned to develop the masterplan, community consultation process and architectural designs for the entire project. This was completed in consultation with acousticians Marshall Day Acoustics and the theatre designers Marshall Day Entertech (formerly Entertech), which advised on venue layouts and operational requirements, while specifying the cabling infrastructure and all production-related systems and equipment.

Jands Staging supplied and installed the dimmers, lighting bars, power flying systems, orchestra lift, acoustic banners and stage management systems for the entire building, with all audio systems supplied and installed by the Technical Audio Group (TAG).

The concert hall

The 1,000-seat concert hall is a traditional rectangular shoebox shape. Audience seating is in gently raked stalls and balconies around three sides of the auditorium. Choir seats behind the stage complete the sense of intimacy. The lower walls are beautiful maple wood panelling shaped to provide excellent acoustics throughout the auditorium. The interior appearance is of a timber boat floating below a black sky.

The concert hall is home to the Willoughby Symphony and contains the relocated 1926 Willoughby Wurlitzer organ. The concert platform accommodates 80 musicians.



The acoustics can be varied by the deployment of motorised acoustic banners, enabling the venue to cater for symphonic works, chamber ensembles, jazz, world and pop music.

The production facilities are comprehensive, including five technical bridges, four flown lighting bars, flown speaker systems, a flown roll-drop projection screen, numerous relocatable chain motors, technical cabling infrastructure and loose equipment. All of this enables the hall to also be used for large meetings and product launches.

The theatre

With a seating capacity of 500 over two levels, The Concourse Theatre is designed to meet a wide range of needs and provides a venue for drama, dance and spoken performances. It has been designed to meet the requirements of professional touring theatre companies, cultural workshops and amateur musical societies, with recent performances including the English National Ballet. It will also cater for corporate events, seminars, product launches and presentations.

(Clockwise from top left) **Opening night at The Concourse in September 2011; the foyer; the 500-seat theatre; and an exterior view**

Two full lighting bridges, forestage rigging facilities, and a full fly tower with 42 motorised batten sets are featured. A Serapid-driven motorised orchestra pit lift platform can be used as a stage extension, for creation of extra seating positions, or as an orchestra pit for performances with live music. Level loading dock access, dressing rooms for 48 performers, and numerous practical support spaces are also integrated. ■

www.marshallday.com

Photograph courtesy of David Herman

Loud and clear

A versatile music and arts centre in England's northeast provides a fine example of how perfectly amplified sound can be achieved with enhanced acoustic quality

When the vibrato in a singer's voice or the exact tone from a bass guitar needs to reach the ears of hundreds of spectators in a large entertainment venue, effective sound amplification is a prerequisite. Poor quality sound delivery can completely alter an audience's experience of an event. And with large, multi-purpose venues on the rise, ensuring optimum acoustic quality for a variety of performance types is a vital consideration for the modern theatre sound designer.

To meet the needs of today's acoustically challenging productions, the Netherlands-based Duran Audio has developed a 'total transparency' loudspeaker concept – in essence, loudspeakers that 'don't sound'. The philosophy that drove this development is the belief that a loudspeaker should accurately amplify a performance without 'colouring' the sound so in order to achieve this, the loudspeaker needs to be 'transparent'.

Emersion and definition

On a landmark waterfront location in northeast England, The Sage Gateshead is a popular multi-purpose performance and events venue, designed by Lord Foster to provide inspirational performance spaces with all-round acoustic excellence. The venue boasts a busy calendar of concerts and shows – from acoustic musicians, to opera, to rock concerts to musical theatre – and is also host to a variety of other events, such as conferences, ceremonies and workshops. Each event that takes place at venue has specific sound requirements, and with a capacity for up to 1,700 people, The Sage's main hall was in need of a solution that would enable sound to be effectively amplified, while importantly retaining optimum acoustic quality.

After a consultation with Duran Audio, The Sage decided to install a combination of AXYS loudspeakers and AXYS control software within the large, multi-purpose hall. The main flown system at the venue consists of a series of AXYS Target loudspeakers. The system comprises a traditional left/right configuration but unlike conventional line arrays, which are 'mechanically aimed', the Target units are 'electronically aimed' using Duran Audio's DDS (digital directivity synthesis) technology. This enables sound to be aimed where it is required – towards the audience and away from reflective surfaces. The concept is simple. Excite the audience and not the room – and the result will be clear, intelligible and transparent sound reinforcement.

The ability to direct the sound wherever you want it also has some very practical benefits. Depending upon the type of event taking place, the coverage area may need to change. With a conventional system, this could mean re-rigging loudspeakers and/or spending time uploading settings to loudspeaker processors. However, the AXYS onboard DSP and amplification and the eight presets stored within the loudspeakers enable the aiming and equalisation of the Target arrays to be adjusted at the touch of a button.

In addition to the Target arrays, a number of other AXYS solutions have also been deployed at The Sage to enhance its acoustic capabilities.

Photograph courtesy of Ian Grundy

For example, a series of AXYS Flex U12's have been deployed as 'front fill' and 'balcony fill' loudspeakers. These contain a single 6.5in loudspeaker and a 1in dome tweeter, and prove to be extremely powerful and accurate, despite their relatively small size. In addition, the venue has installed AXYS Scope loudspeakers (three-way loudspeakers with a 1in, 2in and 12in driver) in the main hall stalls. These loudspeakers immerse the front areas of the stalls while keeping the image down – something that can be an issue when flown arrays are used in this type of a hall.

Deeper sounds are accommodated by AXYS Beam Shaping subwoofers. These arrays make use of the AXYS DDS technologies, which make it possible to vary the directivity of a bass array. Traditionally, subwoofers are often seen as being omni-directional, but the use of directional subwoofers in a reverberant room can have remarkable results. They add more definition and punch to the low end and banish the undefined bass sound that is usually associated with a poor direct-to-reverberant ratio at low frequencies. The Sage has installed three B-215 (twin 15in subwoofers) each side in a hyper-cardioid configuration.

For unamplified events at the venue, the sound system can be completely hidden from sight. However, there is still often a requirement to have a speech system in place to introduce the performance, the conductor, the soloists, etc. For this purpose, The Sage has installed AXYS Intellivox loudspeakers to provide a clear and intelligible speech-reinforcement system, units that are recessed to the left and right of the stage to provide 'invisible' reinforcement.

Transparent sound

Over the past few years, AXYS loudspeakers have successfully been used on a temporary basis at a number of Broadway and West End Theatre productions. Some recent success stories include the productions of *On a Clear Day* at the St James Theatre in New York and *MisterMan* at the National Theatre in London. "The rig sounded fantastic," reveals Greg Clarke, the *MisterMan* sound designer, who says he had not come across AXYS loudspeakers before. On the other side of the Atlantic, the proscenium system for *On a Clear Day,* which was designed by Peter Hylenski, exclusively used AXYS products. They were chosen as a result of their ability to create transparent sound reproduction right across the wide dynamic range required for the show. "*On a Clear Day* has a precision and coherence that I have rarely – if ever – heard in multisource system," enthuses Keith Caggino, associate sound designer.

In addition to the abovementioned installations, AXYS loudspeakers have recently been used in many other high-profile fixed installations, including The Smith Centre in Las Vegas, USA, the Sherman Cymru & Royal Welsh College of Music and Drama in Cardiff, Wales, UK, and the Conservatório de Música de Coimbra in Portugal. ■

www.duran-audio.com

Hall One at The Sage Gateshead, UK (above left)**;** ***On a Clear Day*** **on stage at the St James Theater in New York** (above centre)**; the Sherman Cymru theatre in Cardiff** (above right)

Logistics puzzle

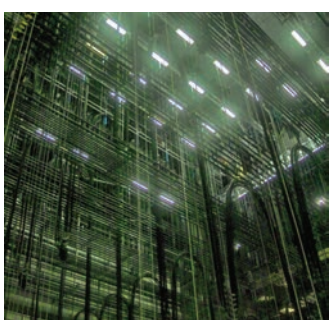
The major refurbishment of a San Francisco opera house required extensive planning and coordination to fit around the venue's busy event calendar

The War Memorial Opera House is owned and managed by the city council and is home to the San Francisco Opera Association, San Francisco Ballet and many community groups. The building opened in 1932 and in order to become fully automated required an extensive backstage upgrade.

Such a refurbishment is always a big undertaking in any venue but with a hugely busy programme, multiple users and a schedule phased over several years, this project required particular focus on planning and logistics.

The brief required that the refit of the system shouldn't disrupt any performances or rehearsals taking place at the venue, and Stage Technologies met this challenge by sequencing the installation in four phases over several years, fitting it in between the opera and ballet seasons. In the end, no performances were affected by the work being carried out, during installation and system commissioning, with control infrastructure designed at the outset to allow for easy integration of subsequent phases of work.

(Below and opposite right) **Winch installations at the War Memorial Opera House**



Phase one consisted of a structural engineering review of the existing system and building infrastructure, a feasibility study to consider and plan the full automation of the house.

Phase two focused on the house curtain and existing lighting bridges. Stage Technologies installed seven Big Tow winches to motorise the curtain as well as 14 demountable point hoists, drives and control. The BigTow Winch range provides scenery-moving capability for use in theatres and other entertainment applications. They are multipurpose, brushless servomotor winches designed for use in both fixed theatre installations and touring productions for power flying, counterweight assist, performer flying and moving scenery across the stage.

Phase three saw the installation of 17 winches to move the cyclorama and sweep battens onto the automated system, plus a full cleanup of the grid that allowed more comprehensive coverage of the stage by the existing point hoists.

In phase four, Stage Technologies installed 63 counterweight assist winches, a permanent rack for the existing Phase One point hoists and the installation of an additional 10 point hoists for a total of 24 on the rack. The counterweight assist winches can be quickly decoupled from the arbor, which allows the battens to be moved manually as required. Every rigged element in the opera house is now automated.

The installation included 14 BT290 winches, seven BigTow390 winches, 63 BigTow290 winches, two Nomad control consoles, and one Solo handheld console.

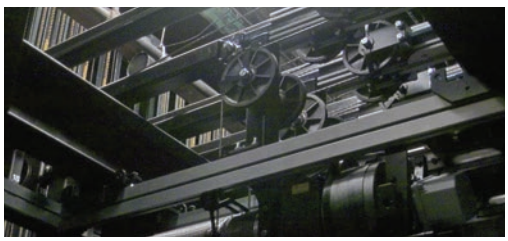
Fitting in with the schedule

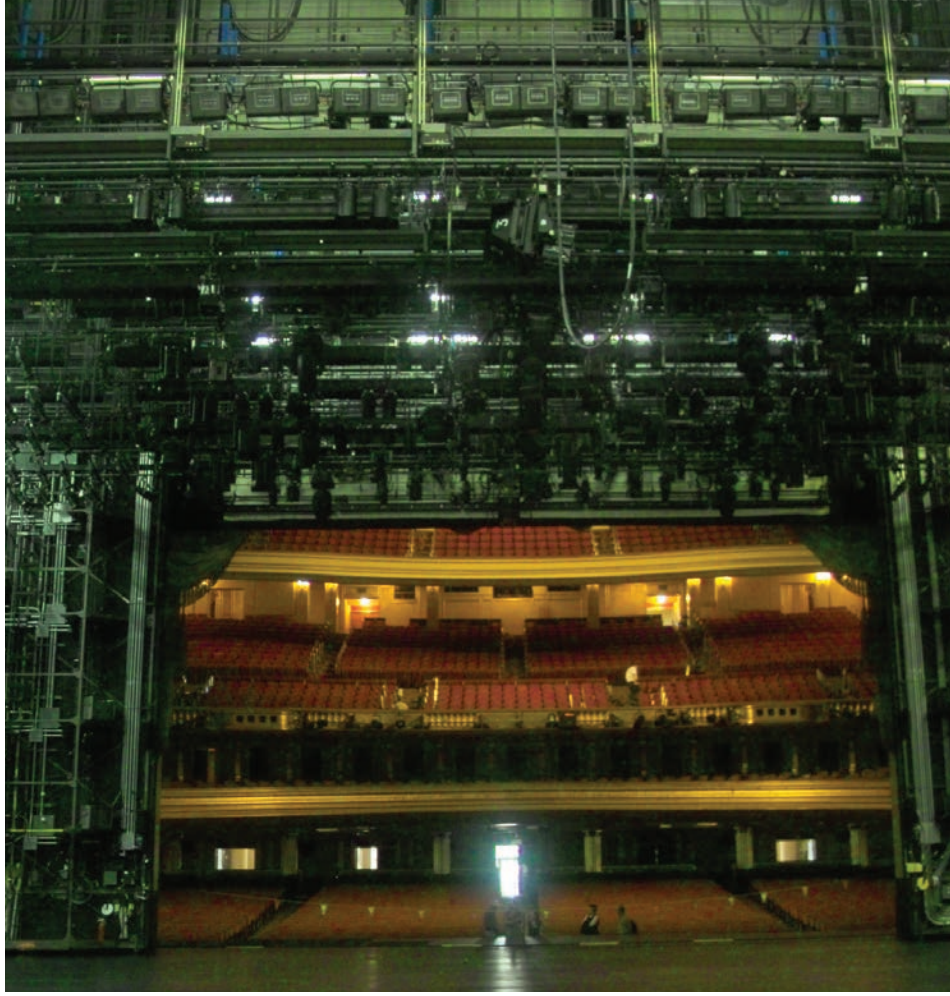
"With little unoccupied time in our opera house, the calendar forced the project team to create and coordinate an agile and at times ever-changing installation," comments Greg Weber, director of production for the San Francisco Opera. The team worked very efficiently – coordinating night shifts, adroitly working on dark days, and with continuous ingenuity of time-use, bringing the project in on time and empowering us to premiere the system for one of the highest-profile projects in our company's history – *The Ring Cycle*. We were able to engage the automated fly rail system immediately upon installation

for use on one of our largest projects in the past two decades."

"Given that we were working around a busy schedule of performances and rehearsals, our plan was ambitious but achievable," adds project manager Stephan Wood. "We kept the communication lines open with our counterparts at the venue, remained flexible when timelines changed and challenged ourselves to find solutions to any issues that arose." ■

www.stagetech.com





On cue

Several theatres have installed Daktronics automated rigging systems to enhance their staging of a variety of performances

Around the world, there are a number of newly constructed and renovated theatres using automated rigging systems to cue visual effects and scenery for performances such as concerts, ballet, opera and theatre.

Global appeal

After nearly four decades of planning, the Cyprus National Theatre (THOK) in Nicosia will soon open its doors to the public. Located just off Homer Avenue, the theatre's architecture and aesthetics make it a treasure in Cyprus's capital city, with an award-winning, organically shaped auditorium that promises audiences excellent sightlines from any of the 550 seats.

The theatre is the most technically advanced in Cyprus, with a complete automated rigging system to execute demanding and complex performances. Its 26 Vortek hoists are managed by a Daktronics Pro Series controller.

For the recent productions of *Carmen* and *My Fair Lady* at the Teatro Pérez Galdos in Las Palmas de Gran Canaria, the exquisitely refurbished theatre utilised Daktronics' Pro Series controller for cueing and grouping the variable-speed 24 Vortek heavy-duty hoists, 13 custom hoists (up to 2,000kg each) and eight point hoists.

Originally built in 1880, the auditorium was renovated in 2007 and restored to its original state. In addition, the stage tower and all technical areas were completely redesigned and enlarged. The original design called for a manual counterweight system and a few fixed-speed motorised sets, but the technical director, Roman Grau, opted for a fully automated Vortek system. As a result of the system's flexible configurations, the automated rigging was installed without any modification to the existing steel structure.

In Montevideo, Uruguay, the historic 1857 Solis Theatre has also been renovated and subsequently labelled one of the most beautiful theatres in the world. Daktronics provided the rigging technology, this time incorporating 47 Vortek hoists. The easy-to-operate, flexible

(Below left) **The restored Teatro Pérez Galdos in Las Palmas de Gran Canaria; the historical artwork of the Teatro Pérez Galdos was preserved** (below right)**; setting up for a performance at the Solis Theatre** (opposite) **in Montevideo, Uruguay**

control system works effectively for a fast-paced schedule of concerts and plays.

The new drama theatre at Singapore's School of the Arts (SOTA), meanwhile, has recently installed Daktronics versatile rigging solutions. The school required a sophisticated, multi-purpose system for accommodating performances of all levels, and adopted 44 overstage hoists and two lateral-stage line-sets on each side.

And when the Dee and Charles Wyly Theatre at the Dallas Center for the Performing Arts in the USA wanted to install vertically stacked floors, it called upon Daktronics to custom engineer four large hoists, each capable of moving loads up to 27,215kg both horizontally and vertically. ■

www.daktronics.com

Sparks fly

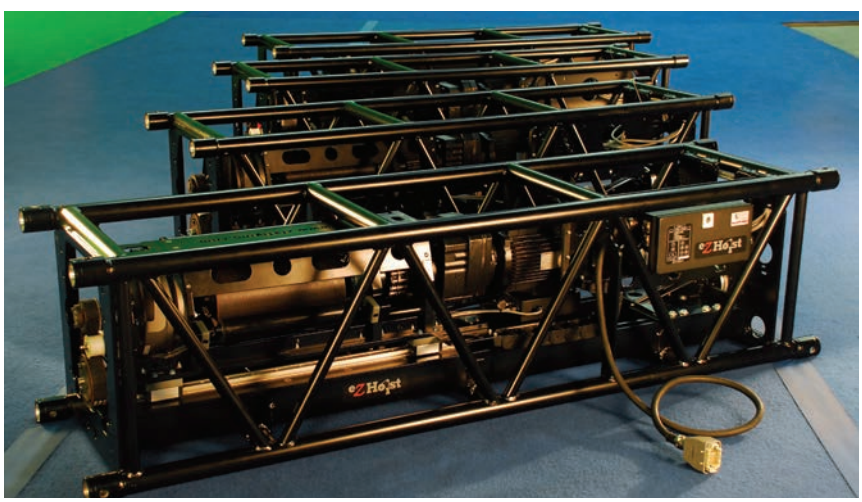
Flight becomes a reality for Eurovision performers using an intricate rigging system at the Baku Crystal Hall

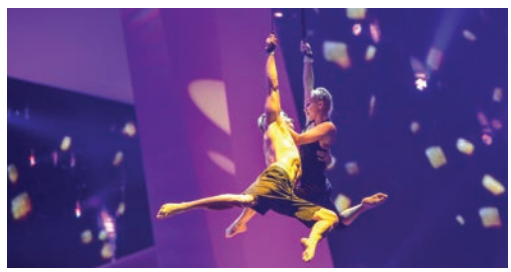
The opening ceremony at Baku Crystal Hall saw Eurovision artists suspended above the stage (right)**; single-wire hoists were used to realise complex flying effects** (opposite)**; eZ-Hoists were used to enable the performers to 'fly'** (below)

The Eurovision Song Contest has been an annual highlight on Europe's entertainment calendar for 54 years. The 2012 edition was characteristically spectacular and took place at the newly constructed Crystal Hall in Baku, Azerbaijan. The facility is a brand-new, multi-purpose indoor arena with capacity for 23,000 spectators, and in May international attendees filled every one of those seats during the three live Eurovision shows.

The elaborate opening ceremony was a close collaboration between Italian and Azeri artists. Simmetrico Milano managed the concept, the creative and artistic direction, and the production. The opening act required complex rigging and choreography to enable the performers to 'fly'. But to achieve a realistic flying effect, the organisers asked ZFX Europe to provide its equipment and expertise.

It was not simply a case of programming automated hoists based on story boards;





specialised flying directors were required to flesh-out the artistic director's vision and turn it into reality, which also needed to be done in a relatively short amount of time. Flying directors must create a strong bond between the performers and operators. Like dance partners, they must be able to anticipate the other's movements and – if a misstep occurs – adjust the choreography accordingly. The hoist only moves the performer; it is the interplay between the operator and the performer (their chemistry) that creates a realistic flying effect.

Practice makes perfect

During the preproduction stage it became apparent that more rehearsal time would be needed than was available in the Crystal Hall, so a second, identical set of equipment was set up in the rehearsal arena. This enabled the performers and operators to have adequate time to perfect the choreography while building the strong bond they would need to bring the performance to life.

A total of eight eZ-Hoists (specific-purpose performer flying hoists) were used to create the flying effect. ZFX also provided the flying directors and operators who made that movement match the artistic director's vision.

Six of the eZ-Hoists were configured as single-wire hoists and two of them as

double-wire. With the experience and creativity of the flying directors, the single-wire hoists were used to realise several complex flying effects by combining what are essentially simple pendulums, while the double-wire hoists were used to create somersault effects. As the needs of the production evolved, the flying harnesses could be quickly adapted to the specific requirements of the client.

ZFX manufactures the harnesses, as well as the eZ-Hoist, the rigging and even the black wire rope (flywire) at its research and development facility in Louisville, Kentucky. In total, 5,000kg of equipment was airfreighted in four large crates from the USA to Azerbaijan to create the effects for the show. The crew was in Baku for one month, including setup, rehearsal, show and tear down. ■

www.zfxflying.com

Artfully functional

A beautifully designed and specially fabricated curtain has been tailored to serve multiple purposes

The recently completed addition to Chazen Museum of Art at the University of Wisconsin-Madison features an expansive new lobby that doubles as an event space. Its two-storey, all-glass front wall is outfitted, floor to ceiling, with an immense, net-like curtain that was designed by Petra Blaisse and her firm Inside Outside, and fabricated and installed by Gerriets. In addition to being attractive, the 65ft-wide x 22ft-high curtain fulfils a range of functions: an inviting point of entry for the public; a filter for sun and noise echoing off the room's glass, stone, metal and wood surfaces; and, as the lobby faces a busy campus mall, preventing a 'fishbowl' effect for evening events.

The voile is sheer when bathed in sunlight during the day, and at night – when the curtain is directly lit from the interior – a band of grey silk at the base of the curtain is opaque

Photograph courtesy of Chazen Museum of Art. Image by Eric Tadsen

Architect Rodolfo Machado, principal at Machado + Silvetti Associates, designed the Chazen addition. Seeking a curtain to define the lobby in a contemporary and site-specific way, he thought of Rem Koolhaas' iconic concert hall, Casa da Musica in Porto, Portugal, where Machado had been intrigued by vast hand-knotted curtains created by Blaisse to screen huge expanses of glass. He therefore proposed commissioning a piece by Blaisse. Early sketches by the renowned artist were enough to convince museum leadership the project would be a work of art, with accession funds secured to pay for it.

Inspired choice

Drawing inspiration from fractal geometry as well as Japanese art and origami, Blaisse and her team created a design composed of a complex crisscross pattern of grey wool felt sewn onto translucent voile, which itself would be double-printed with a gradation of deep blue and a repetition of the Escheresque felt lattice. At the base of the curtain, the voile would be overlaid with a thin and delicate panel of grey silk for opacity. Above that, a band of silver laser scrim would form a transparent 'window' at eye level. For occasions when the glass was to be fully exposed, the curtain would withdraw, coiling

around a specially designed tube light and forming a glowing, sculptural column.

Fabrication would require quality materials and specialised technology, including laser machinery to precision-cut the felt into the intricate fractal pattern, and digital printing equipment to double-print the voile layer. Expert sewing skills would also be essential as much of the work of constructing and integrating the different elements would have to be done by hand and with painstaking attention to detail.

Inside Outside turned to Gerriets, which supplied materials, fabrication and installation for the curtains and track systems at the Casa da Musica as well as numerous other Inside Outside projects, including Milstein Hall (Cornell University), the Mercedes-Benz Museum (Stuttgart), the Prada Epicentre (Los Angeles), and the Illinois Institute of Technology (Chicago).

Photograph courtesy of Nick Pagliante

Fabricated at Gerriets' headquarters in Germany, the drape was then shipped to Chazen, where a tightly scheduled installation was completed by technicians from Gerriets International (US subsidiary of Gerriets, serving North America).

By integrating all aspects of manufacture, logistics and installation, the company ensured that Chazen's exquisite curtain was fully and flawlessly operational for its starring role in the October 2011 gala re-opening. The curtain fulfils all its practical functions, but also performs as a beautiful and dynamic work of art, creating an ever-changing interplay of light and shadow by interacting with the sunlight, interior lighting and the building's architecture – just as the artist, architect and museum decision makers envisioned it would. ■

www.gerriets.com

Green screen

How can theatres improve their environmental performance while remaining at the forefront of innovation?

One of the main challenges to the theatre and performing arts industry is sustainability. Over the past 10 years, our struggle to save the planet has resulted in a variety of industry-specific initiatives and standards that are measurably making a difference. As the Broadway Green Alliance in New York gains steam, the Ecovenue theatre-specific environmental project run by The Theatres Trust is publishing the results of its three-year-long programme aiming to improve the environmental performance of 48 London theatres and raise awareness of how to make theatres 'greener'. At the same time, a growing number of venues, designers and companies are taking advantage of the resources offered by London-based Julie's Bicycle. In this landscape, stage drapery supplier ShowTex has started down the path to sustainability.

Sustainable innovation

From its foundation 30 years ago, ShowTex has developed fabric, motion systems and tracks in-house at its original headquarters in Belgium. Recently, the company started an ecology workgroup, adopted sustainable operations practices, invested in a greener infrastructure, created a recycling programme for fabric waste from the workshops, and launched the first range of eco-friendly stage drapes in the industry. "We always had an environmentally friendly culture, but now we're putting long-term systems into place at all of our offices and incorporating sustainability at every stage of product development," explains Jessica Ballenger, part of the ecology work group at ShowTex.

The Oeko-Tex 100 certified Ultrablack velvet range is one example of how innovation in one area led to a greener product in the long-term.

"Stage fabrics are always perceived by audiences in their relationship with light," details Dominique Verpoten, a member of ShowTex's R&D team. "More intense stage lighting influences this interaction, especially with regards to black backdrops and stage masking drapes. Curtains that should disappear on stage end up looking more grey than black, which can minimise the black box effect. To meet this challenge, ShowTex set out to develop three weights of flame-retardant Ultrablack velvets, which resulted in the Shakespeare, Molière, and Goethe fabrics. They looked blacker to the naked eye when compared under light to other black fabrics, but we wanted to test just how much blacker they were."

The Lab for Light Technology in Ghent, Belgium, tested samples of many typical stage

fabrics along with the new velvets for light transmission and absorption. Research was carried out in an environment that replicated a theatre setup as realistically as possible. Engineers used the bidirectional scatter distribution function (BSDF) method. Light transmission and light reflection were measured in 5nm increments within the visible spectrum, ranging from 380 (blue) to 780 (red) nanometres. Attention was given to situations in which light transmission and reflection are critical, as in the case of frontal light and follow spotlights. Engineers measured light transmission at an angle of 0° and reflection at an angle of 45°.

Reflection tests proved the Ultrablack velvets absorbed more than 99% of incoming light across the whole visible spectrum, comparatively twice as much as commonly used cotton velvet and five times as much as Wool Serge.

Along with Ultrablack, the three ShowTex velvets come in a standard range of colours and have since been installed in renowned theatres such as the Bolshoi, Kilden Performing Arts Centre, the UK's Mayflower Theatre, and the DeLaMar Theater in Amsterdam.

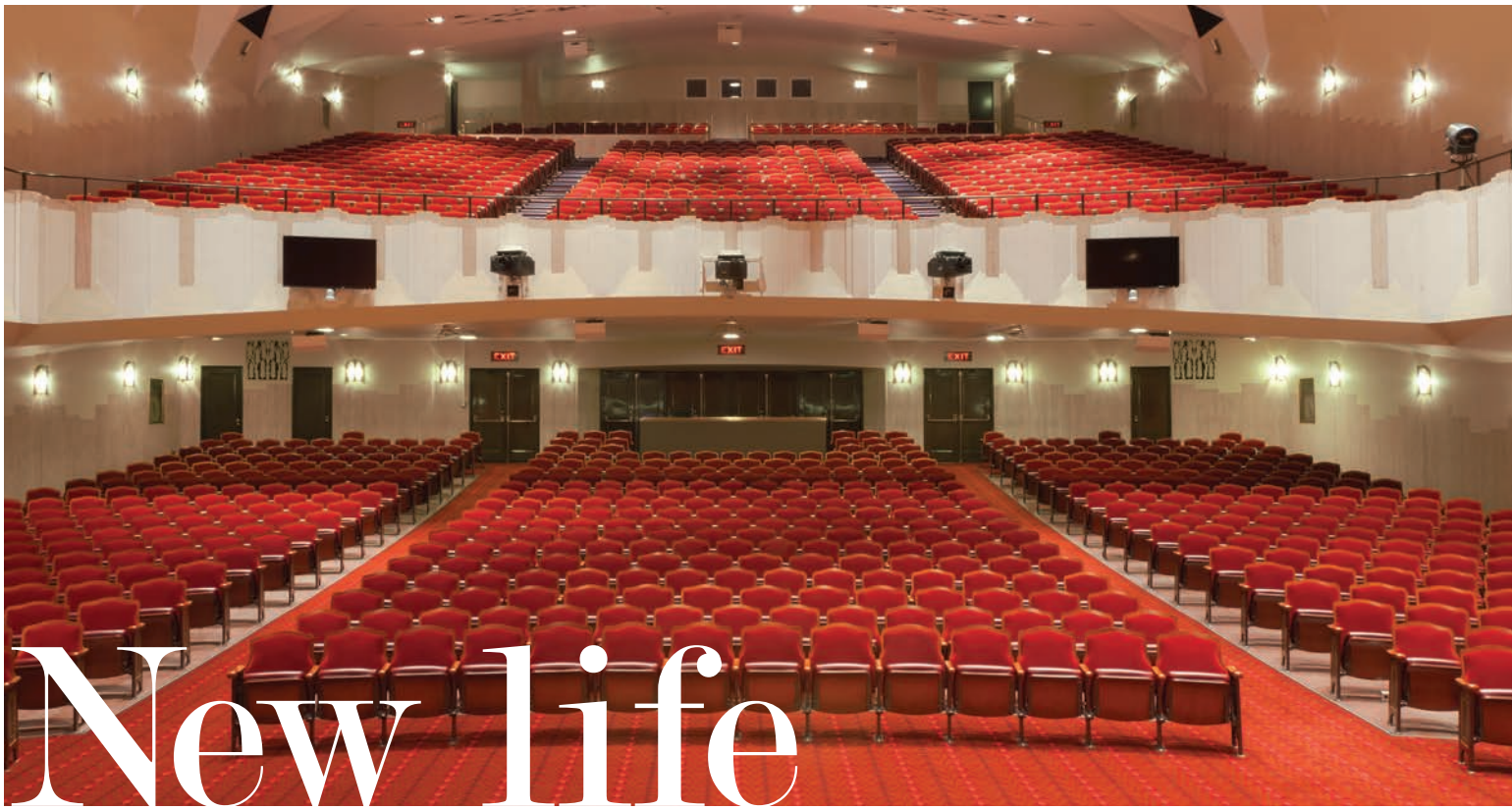
"Once we achieved the minimum light reflection, we looked for ways to reduce the amount of harmful chemicals in the production, dyeing, and flame-retardant treatment process," continues Verpoten. "To test these levels, we first researched the available standards for decorative flame-retardant fabrics and concluded that the Oeko-Tex 100 certification would be our target to meet."

According to the testing facility, the Oeko-Tex Standard 100 is a globally uniform testing and certification system for textile raw materials, intermediate products and end products at all stages of production to limit the use of harmful substances. The tests for harmful substances comprise substances that are prohibited or regulated by law, chemicals that are known to be harmful to health, and parameters that are included as a precautionary measure to safeguard health.

"All stage fabrics are treated with chemicals," admits Jessica Ballenger. "At this point, there's no way around that, but by limiting harmful substances at the production level, the carbon footprint of the fabric can be lowered during the entire lifespan of the theatre curtain. We hope that by being the first in the industry to be awarded the Oeko-Tex 100 standard we can set an example for others to follow and lower the overall use of harmful chemicals in all stage fabrics." ■

www.showtex.com

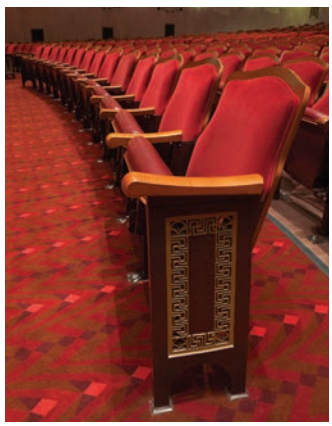
ShowTex velvet in-situ in a theatre environment (left)**; the special material absorbs more than 99% of incoming light** (centre)**; making the curtains for the Bolshoi Theatre** (right)



New life

Hidden behind the art deco façade of the Salvation Army's New York HQ lies the Centennial Memorial Temple, one of the Salvation Army's most historic and iconic spaces. It was commissioned in 1928 by Evangeline Booth in honour of her father William Booth, founder of the Salvation Army, to commemorate the 100th anniversary of his birth and the 50th anniversary of the Army in America. The Temple – designed by noted architect Ralph Walker of Voorhees, Gmellin and Walker – is a superb example of the Ziggurat Modern style. At the time, the radical modern design was advanced to improve the public's perception of the Army by presenting the organisation in a more progressive light. At its opening in 1930, the auditorium seated 1,600 for congregational gatherings and musical concerts.

One of New York City's most prominent art deco theatres has been renovated and repurposed to suit a wide variety of performance needs and enhanced production flexibility



Renewed and reborn

Fast forward to 2011, the Centennial Memorial Temple, which had been virtually untouched for 80 years, reopened with the annual Welcoming of Cadets in a new space that has been fully restored and outfitted with state-of-the-art technology. The modernisation accommodates contemporary theatrical productions, both acoustic and amplified musical concerts, and a variety of multimedia-oriented events. The restoration began in 2006 when Kostow Greenwood Architects was asked to repurpose the space to meet the demands of the 21st century. The project scope was executed in three consecutive phases and included: the complete replacement of all mechanical and electrical systems; restoration of the historic façade and monumental entry stair; installation of a new rooftop cooling plant; and the project centrepiece – the complete restoration and modernisation of the historic theatre.

For the refurbishment of the house itself, all of the original travertine walls, ornamental plaster ceilings, proscenium and band shell were carefully restored while the original house lighting was retrofitted with LED lamps to reduce power consumption and facilitate ease of maintenance. The seating capacity was reduced to 1,375 to allow for wider seats and new ADA-compliant viewing positions. In order to improve audience sightlines, the seating was staggered and the new seats were designed to evoke the original design while re-using the original cast end standards. Inspired by the ornate decorative plaster ceiling, Kostow Greenwood designed a custom carpet that brightens the overall space with its subtle pattern and bold colour.

Today, the Centennial Memorial Temple boasts a fully integrated audio and video production system complete with an on-site control room and editing suite, a new digitally controlled theatrical lighting system with a motorised truss, and a new wireless audio translation system that can simultaneously transmit in up to six languages. To preserve the historic interior, all cabling was concealed within the walls and floors through an intricate distribution system to create a technologically enhanced and flexible performance space.

Positioned for the future, this important New York City landmark is now ready to perform in the digital age while maintaining its roots in the history of the Salvation Army, providing a sustainable platform for extending its useful life for generations to come. ■

www.kostowgreenwood.com

Q&A

Dogged, determined and delightful, the enormously talented and award-winning lighting designer Paule Constable discusses her breaks in the industry and why she loves her job

How did you get into lighting design?

At school I studied mathematics, physics, English and history of art – really the perfect mix for lighting design. I then studied English at Goldsmiths but that was quite dull so I switched to a double honours with drama. I'm very logistical and linear but elliptical in my thinking, too. My flatmate when I was at Goldsmiths was a drama student who got a job as a followspot operator at the Hackney Empire. She fell madly in love and went off to Spain without telling them but then she got a call to start work: I was broke and went along and pretended to be her. Luckily for me, the person there who showed me the ropes was a woman, too, and took me under her wing. That was 1987.

And it's been onwards and upwards ever since?

I got some very early lucky breaks, such as working with Theatre de Complicité. Maybe being female has been a part of my success; the people I've worked with have been genuinely interested in the different voice I have. Also, being a mum, and having to juggle a lot of things, knowing there are two people at home who need me puts things in a very healthy perspective.

What are you working on right now?

I'm off to Glyndbourne, which I think will be the 12th season in a row. I split my time between theatre and opera. I'm working at the National Theatre on *This House*; I've just opened *The Curious Incident of the Dog in the Night-time*; and I've got a Cameron Mackintosh musical on the cards. I also still babysit *War Horse*, *Les Misérables* and *Phantom of the Opera* globally.

Ah yes, the Tony Award for *War Horse*…?

Awards are far from the be-all and end-all for me but in terms of the amount of work we put into *War Horse*, the way the Tonys are judged, that whole 24 hours was unforgettable. I left for London at 7am on a Sunday, won the award in the evening, then had to go straight to rehearsals the next morning for Damon Alburn's *Dr Dee*. I remember cycling past Wormwood Scrubs Prison in the rain, thinking to myself, 'I won a Tony 12 hours ago!' What I do is either mundane or glamorous – there are lots of extremes.

Any other highlights…?

I distinctly remember working on *Faust* at Covent Garden and being in a room with Bryn Terfel, Simon Keenlyside, Angela Gheorghiu, Roberto Alagna and Sophie Koch – perhaps five of the top 20 opera singers in the world – just 2m away from me in their jeans rehearsing. People would have paid thousands to see that, and that's my job. It's just such a privilege.

You live and breathe 'live', then?

There's a very direct relationship between light and the way that an audience behaves, and it's the kind of 'liveness' of that – the subtlety (and not) of that relationship – that I find very central to my work. I love the resonance space between a performer and an audience member and I love the fact that it can all go *so* wrong. I love the element of risk and chance, it never being fixed, and the fact that everything I've done in my entire career has gone. I think that's absolutely insane and rather brilliant.

And finally, which are your favourite venues?

The National and Glyndbourne. But I think the Epidaurus in Greece (*Phèdre* with Helen Mirren) was crazy and fantastic. I've never worked at Palais Garnier, so that's unfinished business. ■

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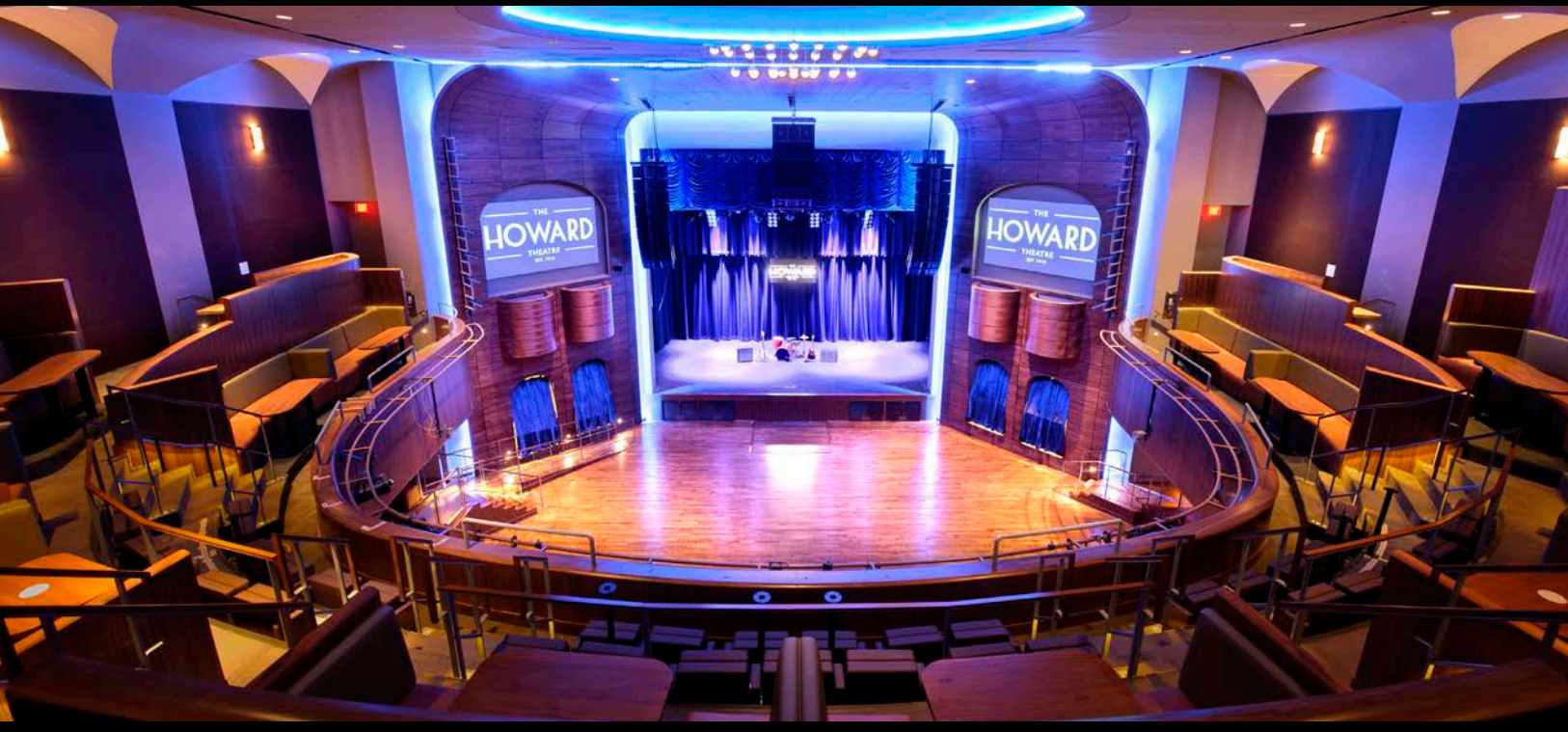

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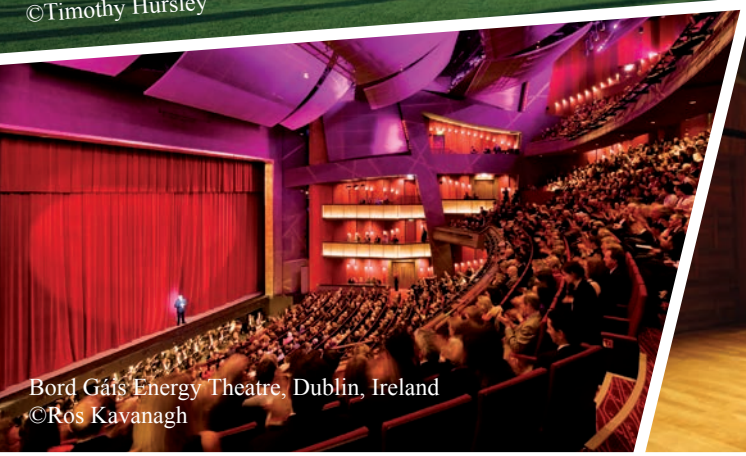
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