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foreword

When Kevin Spacey was appointed artistic director of London's Old Vic theater in 2003, the announcement was met with derision and bemusement. Only three years prior, the building was put up for sale and touted as a future theme pub or bingo hall, before being saved by a charitable trust. The Oscar-winning actor's suitability for the post was scoffed at ("Critics asked me to pack my bags and get the hell out of town," Spacey told UK newspaper *The Daily Telegraph* in 2013). The general feeling was that, beyond providing star-power to a forgotten, decaying building and creating short-term media buzz in the process, what did a Hollywood actor know about arts venue programming, operation and revenue generation?

Fast-forward 11 years and The Old Vic is in much better shape than when Spacey inherited it. Set to vacate his post in 2015 (in turn, passing on the reins to director and Old Vic artistic associate Matthew Warchus), Spacey's final hurrah involves ensuring the long-term future of the venue itself. Aiming to raise £20m (US$33.8m) "as an endowment fund to make the theater fit for the 21st century", Spacey wants to provide an annual income to cover the building's upkeep. "We can use the £20m to give us £1m [US$1.6m] to help refurbish the theater – like more ladies' loos and more bar room."

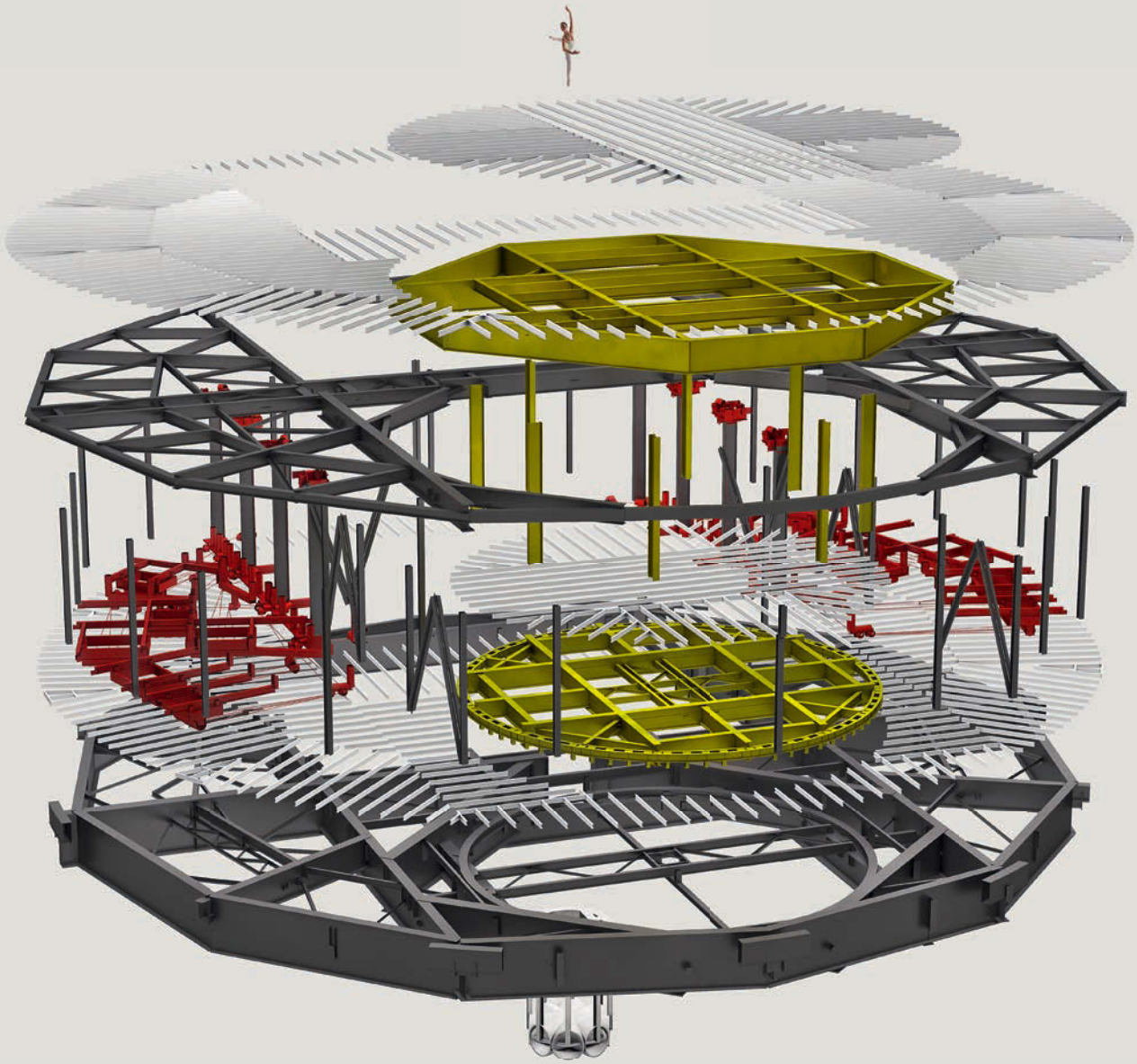
How close Spacey is to achieving this aim remains uncertain; however, the timing of his departure and nature of his swan song ties in nicely with an issue that is highlighted within these very pages: arts funding. Or lack thereof. Earlier this year, Arts Council England (ACE), which funds hundreds of theater, art, dance and other cultural venues and producers, from a National Lottery and government war chest, announced that 670 organizations – from giants of high-culture to grassroots shoestring setups – will receive annual funding from 2015, down from the current 703. One of the biggest victims of the shake-up is the English National Opera (ENO), which had its funding cut by 29% due to struggling to reach box office targets and achieve long-term stability, according to ACE. In response, the ENO is moving to a new business model – which you can read about from p26 – that recognizes the challenging funding climate and reduces the cost to the public purse.

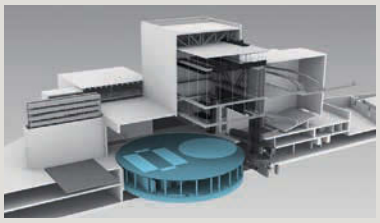
In further climes, myriad alternative financing models, from crowdsourcing and commercial ventures to co-productions and facility expansions, are being developed by arts venue operators to combat the drying up of traditional subsidy sources. By no means are such methods guaranteed to bring long-lasting success to the venues that employ them – however, the state of the arts certainly feels all the more optimistic for the creation of them.

John Thornton, Editor

contents

—IT ALL REVOLVES AROUND YOUR PERFORMANCE.—





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

Photo: Helene Binet


Iwan Baan


Iwan Baan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Auditoria loves...

...the Heydar Aliyev Center – Azerbaijan's striking cultural hub in the capital city of Baku, designed by Zaha Hadid Architects

With a futuristic design aesthetic that favors continuous flowing curves that spill, turn and rise instead of monumental sharp angles, the eye-catching Heydar Aliyev Center could only be the work of lauded Iraqi-British architect, Zaha Hadid.

Named after the country's Soviet-era leader and latter-day president, and located on the main road between the city and its international airport, the 260ft-tall building houses a 1,000-seat auditorium and conference center, gallery, library and museum. These facilities, along with a cavernous foyer, sprawling public plaza and underground parking lot, spread across a near-14-acre parcel of land previously occupied by an abandoned Soviet-era factory.

The building's large-scale column-free spaces are achieved thanks to a free-form roof structure design that combines concrete with a space frame system. Trusses span between supports within the perimeter envelope and concrete sheer walls. The complex geometry of the exterior's distinctive shell called for the use of glass fiber reinforced concrete and polyester cladding.

Floors at the back of the Heydar Aliyev Center, stacked nine stories high, house the library, while closed volumes to the right contain the wavy, mind-bending auditorium. Paneled with strips of laminated oak to evoke the burnished glow of a cello, the auditorium's ceilings and floors feature gaps for lighting between the striations that circle the hall.

Working with associate Patrik Schumacher and project architect Saffet Kaya Bekiroglu, Hadid's creation also features an omnidirectional interior public space that merges white floors with white walls and white ceilings to form a continuous surface that would not look out of place within Stanley Kubrik's imagining of *2001: A Space Odyssey*. The exterior, meanwhile, incorporates a delta of terraced pools, fed by banks of cascading water traversed by straight paths and zigzag switchbacks, and a large food and restaurant pavilion with a slanting roof and wall. A subway extending to the foot of the esplanade is also in the works. ■

LAS VEGAS ARENA

BY EMMA POMFRET

in the hole

With a consumer-focused mix of headline sports, entertainment and club facilities, Las Vegas Arena hopes to attract more than just slot jockeys and high rollers to Sin City

"We wanted this building to be about Las Vegas itself. It has two design qualities that mediate between the desert and the electricity and high energy of the Strip"

Brad Clark, *senior architect*, Populous

Las Vegas: the home of high rollers, stratospheric expectations and monumental pomp. MGM and AEG's new Las Vegas Arena will, says its website, 'bring the city, and the world, a whole new place to play… The Arena is what the Coliseum was to Rome. It will redefine and reshape how the monolithic events of our time are experienced and remembered.' Low-key it isn't.

The developers of the US$375m indoor arena broke ground on May 1, 2014, with completion scheduled for spring 2016, building through a period when Las Vegas's offering to visitors continues to evolve. Designed by Populous, the arena is a purposely flexible space. Though designed to accommodate an NBA (basketball) or NHL (ice hockey) sports franchise, the real driver is entertainment – anything from world-class concerts to the Ultimate Fighting Championship (UFC), to boxing and award shows. The 16-acre development also includes an eight-acre landscaped park and a two-acre plaza with an external stage for pre- and post-arena events. This enterprise is about creating a 360° entertainment experience.

Las Vegas Arena will be the centerpiece of a complete revitalization of the area between New York-New York and Monte Carlo resorts, extending from Las Vegas Blvd to Frank Sinatra Drive

Las Vegas has plenty of existing venues – MGM's Grand Garden (14,000 capacity) and Mandalay Bay (12,000) – but none as big as the new arena's 20,000 capacity. "This will be the granddaddy of them all," says Brad Clark, lead architect on the project for Populous. Clark's 650,000ft² elliptical arena – 145ft at its highest point – bucks the Vegas trend for recreating the rest of the world on the Strip. Instead of faux Venice or Egypt, the arena melds Vegas pizazz with the Mojave Desert setting.

"We wanted this building to be about Las Vegas itself. It has two design qualities that mediate between the desert and the electricity and high energy of the Strip," explains Clark, who also states that much of the exterior is a solid, insular armature of metal panels and local stone that provide protection from the sun. The undulating sand-colored metal panels also evoke Nevada's Spring Mountains to the west.

On the shaded east/northeast side of the arena, facing the plaza and beyond to the Strip, is an 85ft-high glass atrium. "It gives great volume inside and provides a more kinetic face for the main entrance. When you are outside you see what's happening inside – the motion, color and activity." And from inside or from one of several exterior cantilevered balconies, visitors can gaze back at Vegas itself. A lightweight, perforated aluminum screen protects the balconies from wind and sun.

Spanning the main entrance, an LED event overlay – a diaphanous stainless steel mesh with embedded multicolored LED modules that sits in front of the glass curtain wall – will create a giant exterior video screen rising another 33ft above the entrance (to 118ft). It is an authentic touch of Las Vegas – and a prime sponsorship and messaging space.

Audiences will approach across a two-acre plaza around the foot of the arena. This will help the movement of huge numbers of people and provide another space and outdoor stage for pre-show events, and anything from pop-up basketball to farmers' markets. The plaza will join to the eight-acre park to extend the Strip.

Impeccable timing

Set back from the Strip, the site seems an unusual choice behind the MGM resorts Monte Carlo and New York-New York, with Frank Sinatra Drive to its west. But it's a clever one: the new arena will be visible from freeway I-15, and existing on-site infrastructure, parking and utilities (from a stalled CityCenter condominium development) saved the project US$100m before quoted construction costs.

MGM Resorts International, the arena's operator, had been seeking a new arena site since 2005. Then the economic downturn began to bite. "Everybody put the brakes on arena projects," says Mark Prows, head of arena operations at MGM Resorts. Now, however, MGM and sales agent AEG's timing looks impeccable. While other recently proposed arenas in Las Vegas have been scuppered by

KEYS TO THE VVIP

"You can have a VVIP experience in Las Vegas like no other," says Mark Prows of MGM Resorts. And MGM and AEG's new Las Vegas Arena is no exception. It offers 50 luxury suites including eight bunker suites, each welcoming 16 guests. Bunker suites are at playing-floor level, under the seating. "Like a living room you go to for maximum privacy and amenity," explains Populous's Brad Clark. Bunker suites have associated courtside seating (specially upholstered) reached through the suite.

Arrival is just as important to the experience as watching the show, so each suite has a canopied limo drop-off area. "They are probably throttled up a little higher on this project than we would typically do in another city," adds Clark. After premium customers are dropped off at the curb, "they enter through a beautiful hallway," continues Prows, "and have their own personalized experience taking them straight to the suite. VVIP customers do not go through public areas." Rob Stephens, of Icon Venue Group, concludes: "There is an expectation in Vegas for a great VIP experience and we want to make sure we exceed those expectations."

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LAS VEGAS ARENA

calling for part-public finance, MGM and AEG's model is privately funded and geared for renewed sponsorship as the global recession lifts.

"About two-thirds of the arena is paid for by naming rights and sponsorship, and spin-off revenue," says Prows. "We are selling naming rights, founding partnerships in the building, and the suites and premium products to corporations, many of whom already bring conventions to Vegas." Future share of rental and ticket revenue will be around one-third of gross revenue.

For Rob Stephens, senior vice president at Icon Venue Group, the Arena's project manager, a key challenge is making sure the building has sufficient revenue potential. "These buildings are driven by sponsorship opportunities in many ways. We have to drive revenue and get innovative ideas within a reasonable budget."

After several years of declining visitor numbers and gaming revenue, Las Vegas is shedding shades of the 2007/2008 global financial crisis with vigor. Visitor numbers, food and beverage, retail spend and show attendance are all up, and convention attendance is stable. Gaming is still fluctuating a little. "The arena, park and plaza are not adding one single gaming machine," points out Prows. "Years ago that would have been unheard of."

The new face of Vegas

People's reasons for visiting Las Vegas are changing. As Macau and Asian gaming has boomed, so Vegas has invested in a more compelling mix for visitors. "What Vegas is all about has changed dramatically," says Prows. "Entertainment, retail, and food and beverage have ratcheted up over the years, so today, if you come to Vegas, you might not gamble at all. You might come to enjoy great restaurants and to shop. Or to see a show and shop."

The people who visit Las Vegas are also changing. Today, a new Vegas faithful comes from Generation X and Y customers, flocking to dance music events – more than 300,000 attended the Vegas Electric Daisy Carnival in June 2014. "There's enough of a shift that we're focused on how to reach those customers and give them what they need," says Prows. "Generations X and Y consume items differently. They spend money in a different way and demand different types of entertainment. They want a more sustainable, fluid environment, which the park and plaza will deliver."

The arena itself will deliver a huge variety of sports, entertainment and family events – 100 to 150 a year. "We're focused on events that give the arena, the brand and Vegas exposure and cachet outside the four walls of the event itself," says Prows. PPV boxing, award shows, one-off spectaculars that attract an international audience are just the ticket, as are homegrown events. "We're creating an awards show that is very particular to Las Vegas and its history. The format doesn't exist anywhere in any city."

Populous's Clark says the arena has been designed to be "intimate" with excellent sightlines from each of the bowl's six seating levels. Capacity is 20,000 for center-stage events (boxing, UFC, concerts), 17,500 for hockey and 19,000 for basketball. With moveable seating sections and curtaining, capacity can drop to half-house and even 5,000 seats. Clark adds that the design – with a horseshoe upper tier and modest mid-deck at stage end – minimizes the number of dead seats in end-stage concert mode (the arena website quotes 1,500-2,000 saved).

King of clubs

The arena will certainly be a new jewel for the city. Inside, the range of premium spaces runs

> "The arena, park and plaza are not adding one single gaming machine. Years ago that would have been unheard of"
>
> **Mark Prows,** *head of arena operations*, MGM Resorts

THE GREAT OUTDOORS

Las Vegas may be the last place on Earth one would associate with sustainability, but times are changing. The Las Vegas Arena is part of a more ambitious development – The Park. This landscaped eight acres stretches from the arena to the Strip, integrating the façades of the Monte Carlo and New York-New York resorts. MGM's The Park, masterplanned by Cooper, Robertson & Partners, will have water walls, mature trees, native plants, retail, dining and events, and a curving pedestrianized approach to the arena.

"The Park was conceived by our chairman as a green, sustainable initiative," explains MGM Resorts' Mark Prows. "Casinos, concrete and things that generate money aren't a responsible way to continue building in Vegas. His vision was to build a park that abutted the Strip, where you could turn in and enjoy shade and misting systems – a casual environment with a soft urban feel."

Competitors are also getting in on the outdoor act. In spring 2014, Caesars opened The Linq, a seven-acre plaza boasting the 550ft High Roller observation wheel, retail, food and entertainment. Sin City is going alfresco to satisfy customer spontaneity.

MGM and AEG officially launched their US$375m construction project behind the Monte Carlo in Las Vegas on May 1, 2014. The 20,000-seat arena will open in 2016

the gamut from club seats and hospitality spaces, loge boxes and party suites/sponsor decks to bunker suites, catering for all categories from casual fans to ultra high-premium customers. "We're incorporating design elements driven by fan experience and revenue. And we've ended up with some very special pieces in this building," says Clark. "For example, two Tower Clubs in the corners of the seating bowl face stage end. They're dramatic, angular pieces that float out above the bowl and have a bridge-like connection between them. They're going to be very cool."

These Tower Clubs provide a distinct revenue opportunity according to MGM's Prows. "The Tower Clubs are [currently] a separate business model and will be leased to a nightclub operator. Potentially they will integrate with our other VVIP and sponsor areas as we provide cross-related opportunities. For instance, if you buy an Event Level Lounge it may well allow for premium access to the Tower Club area."

Credits

Groundbreaking: May 1, 2014

Opening: Spring 2016

Owner: Las Vegas Arena Company, owned by AEG and MGM Resorts International

Operator: MGM Resorts International

Sales agent: AEG

Project manager: Icon Venue Group

Architect: Populous

Construction manager: Hunt-Penta Joint Venture

Functions: Multipurpose entertainment venue available to host NBA and NHL teams, concerts, boxing, mixed martial arts, award shows

Project cost: US$375m

Site size: Approximately 16 acres

Arena size: 650,000ft²

Number of events: 100-150 annually

Seating capacities: Boxing/UFC: 20,000; End-stage concerts: 12,000-18,000; Center-stage concerts: 19,500-20,000; Ice hockey: 17,500; Basketball: 19,000

Amenities: 50 luxury suites; more than two dozen private loge boxes; two dedicated VIP Entrances; two-acre outdoor plaza; premium balconies on all VIP and public levels; multiple locker facilities, premium dressing rooms, green room and multipurpose spaces; wide variety of food and beverage options; 75,000ft² loading dock, six truck docks and staging storage facilities

Backstage, the arena provides multiple locker facilities, premium dressing rooms, green room and multipurpose spaces for sport and entertainment. MGM and AEG are overseeing acoustics and stage technology, working with a consultant. There is a 75,000ft² loading dock and six truck docks, staging and storage for major events. All six levels are ADA accessible and the building meets US Green Building Council LEED Gold certification.

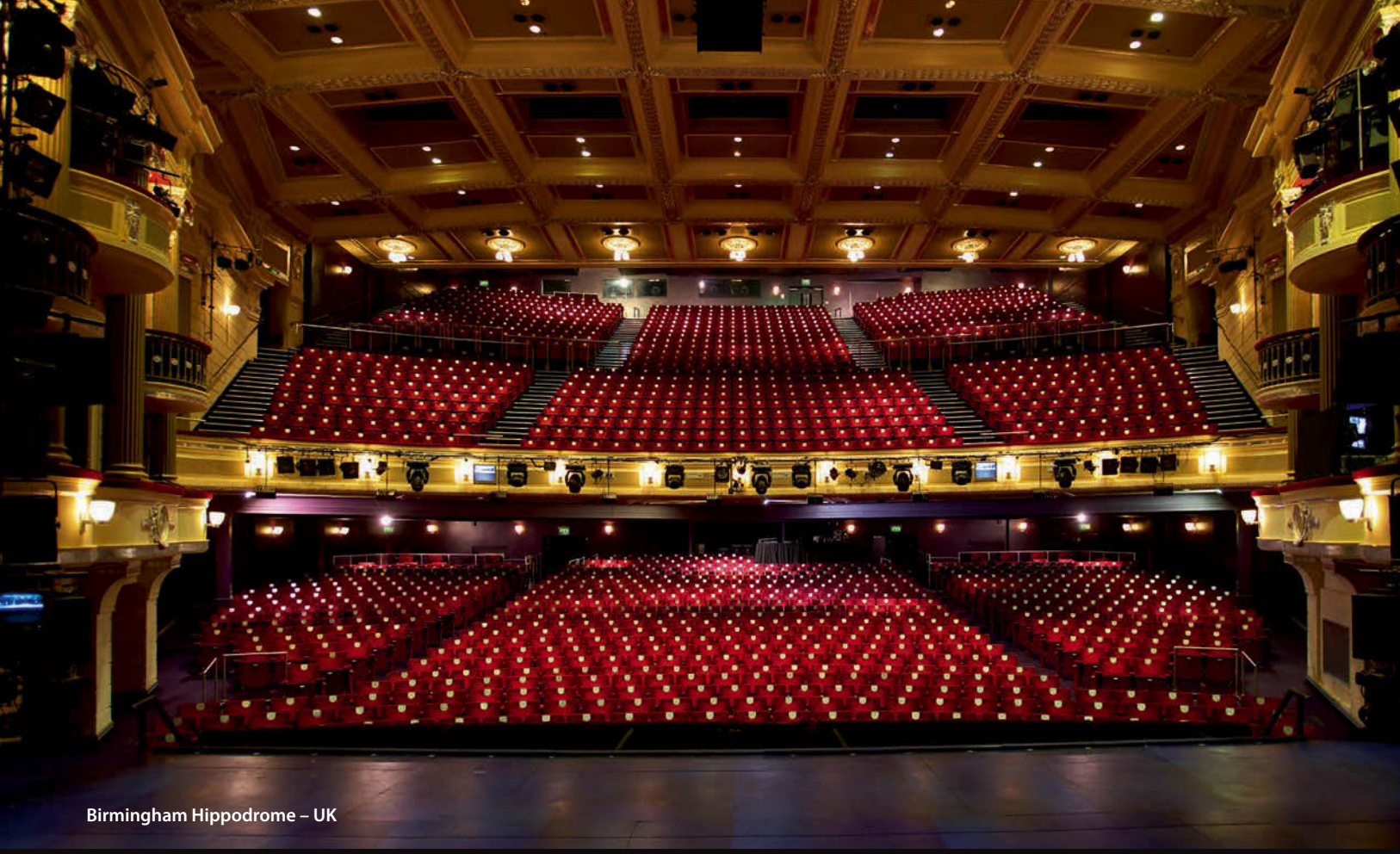
Prows is keen to stress MGM and AEG's working partnership with the Las Vegas Convention and Visitor Authority (LVCVA). "This is all part of changing our and the entertainment strategy in Las Vegas, and continuing to be a responsible leader for attracting major events to Vegas." He's also keen to dispel anxiety about arena supply outstripping event demand in Vegas. Prows will oversee programming across all three of MGM's Vegas arenas and says he frequently turns away events from the Mandalay Bay and Grand Garden because they are full.

As of summer 2014, the arena hadn't signed a sports franchise, but for Prows this would be the cherry on the top, not a must-have. He cites Kansas City and AEG's Sprint Center, which has never had an NHL or NBA team but ranks as the 26th most successful arena among 200 venues worldwide (Pollstar 2013, based on ticket sales). "There's a good chance we might have one NHL or NBA team, maybe two, but we're going to be fine financially either way because we've taken a conservative approach."

Naturally Prows won't disclose the arena's projected income. "The bottom line is this: AEG and MGM are very practical companies. We don't do pie-in-the-sky projects where we're making unreasonable representations to our partners or banks. We're very bullish on Las Vegas and we're seeing tremendous growth across all our segments," he adds. "And when we deliver this arena-park project, we believe it's going to be an unprecedented success." ■

Author

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



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STAVROS NIARCHOS FOUNDATION CULTURAL CENTER

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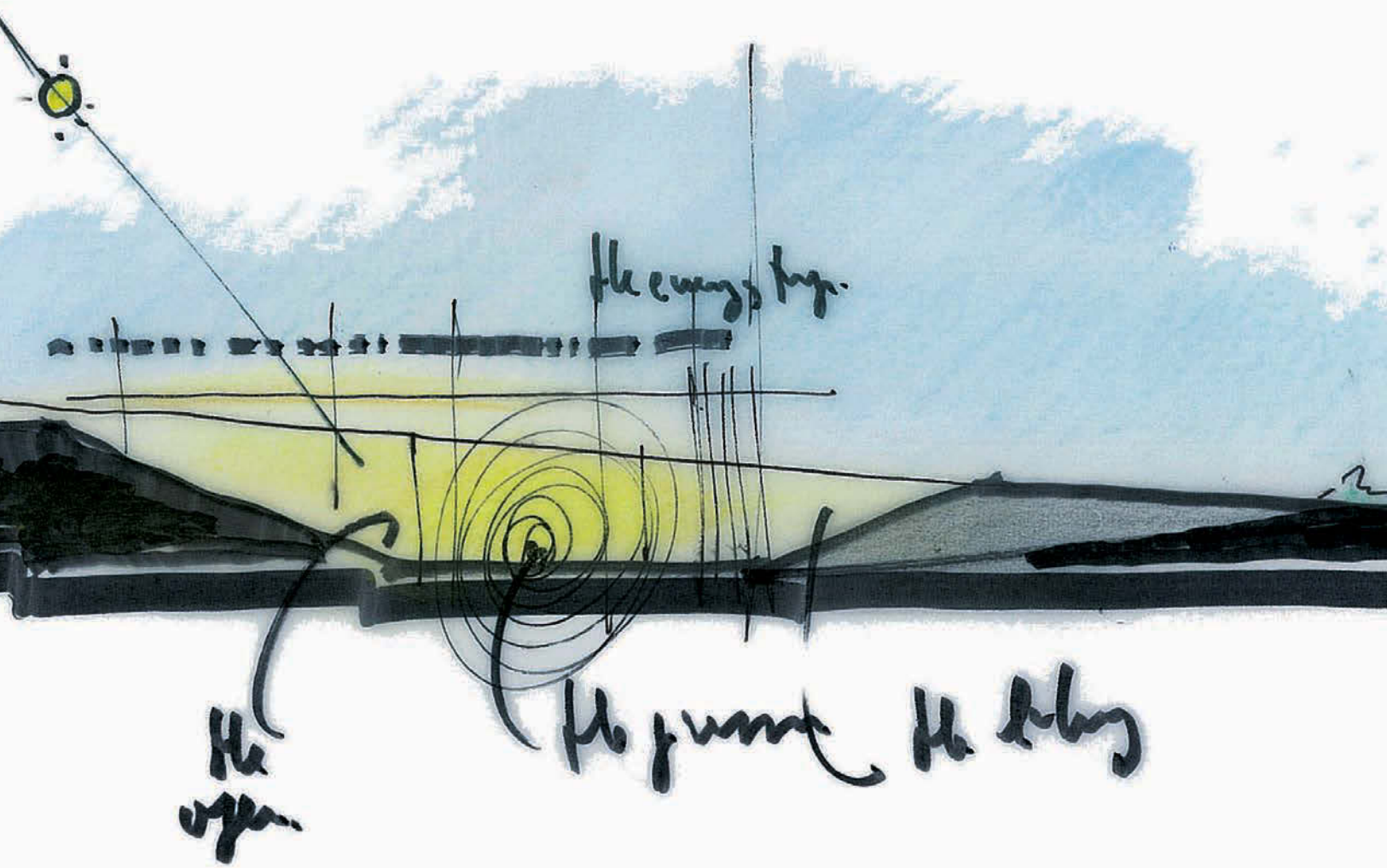
Athens rebirth



The Stavros Niarchos Foundation Cultural Center is set to revitalize an economically beleaguered Greece with a landmark cultural attraction and innovative public spaces

In recent years, Greece has been more battered by recession than any other country in Europe. Now, as this proud and culturally rich Mediterranean nation begins to recover and rebuild, one of its most important philanthropic organizations is at work building a symbol of the new, resilient, ambitious Greece. The Stavros Niarchos Foundation, founded in 1996 from the pockets of the shipbuilding magnate whose name it bears, has partnered with the national government to create a new combined home for the Greek National Opera and the National Library of Greece.

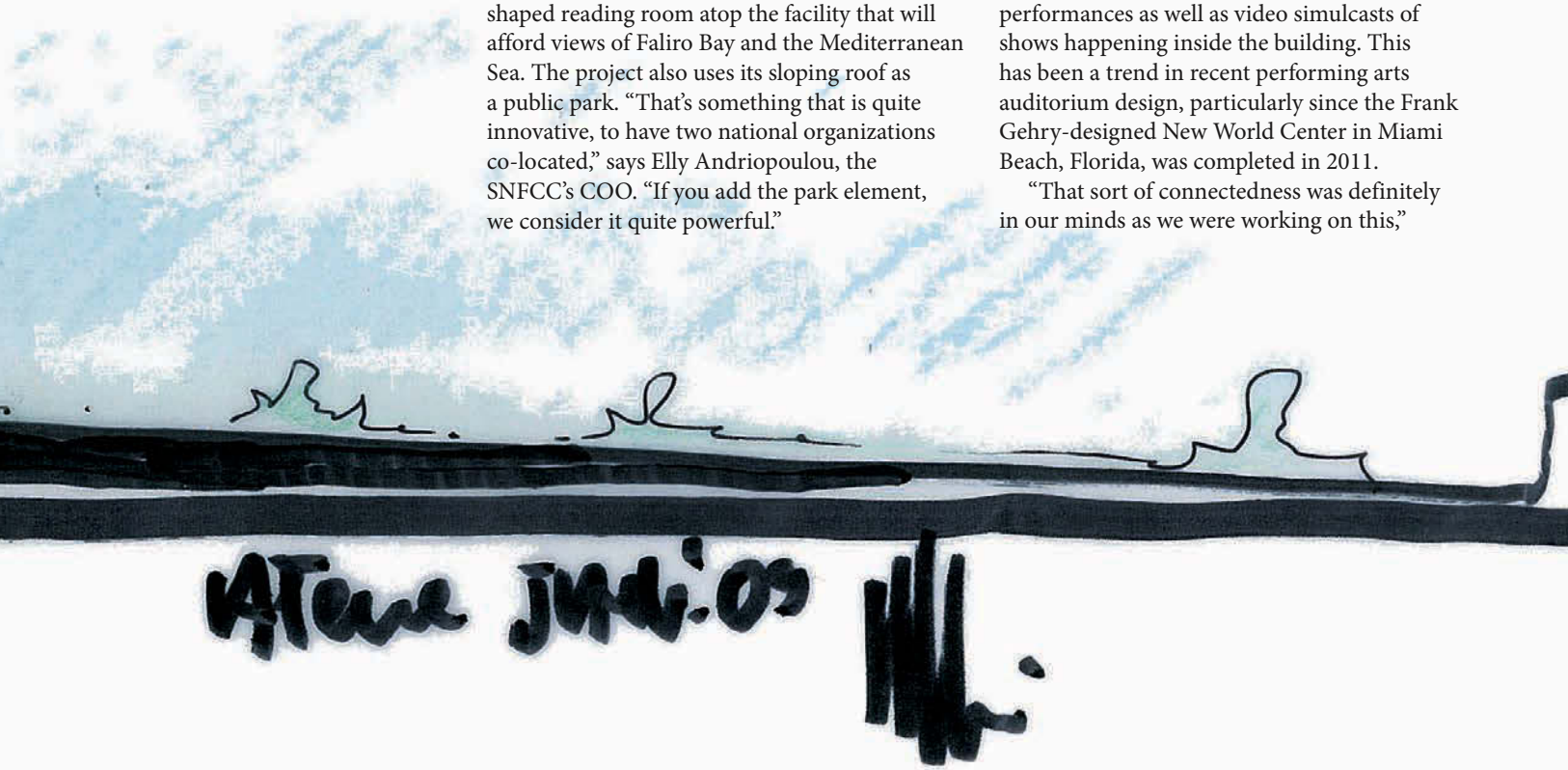
Situated in the waterside Athens suburb of Kallithea, the €566m (US$734m) Stavros Niarchos Foundation Cultural Center (SNFCC), scheduled for completion in 2016, will in addition to the library include two auditoria – one with 1,400 seats for operas and ballets, and the other with 450 seats that is dedicated to experimental performances. The National Library will enjoy not only hundreds of thousands of square feet of book storage and research space, but also a striking glass cube-shaped reading room atop the facility that will afford views of Faliro Bay and the Mediterranean Sea. The project also uses its sloping roof as a public park. "That's something that is quite innovative, to have two national organizations co-located," says Elly Andriopoulou, the SNFCC's COO. "If you add the park element, we consider it quite powerful."

Long time coming

The project had a long gestation, dating back to the foundation's original 1998 commitment to support construction of a new National Library. During that time, national and world economies have boomed, busted and boomed again. "The foundation put a lot of thought and time into doing it right, in terms of many studies," Andriopoulou says. "We had to look at the business as well as the technical side." The Greek National Opera only needed the larger auditorium, but including the additional smaller theater "allows the facility to bring lots of different groups here to experiment and to attract people of all ages", she adds. "If we didn't have this second space, that wouldn't be so easy."

Openness and accessibility were major factors in the design, which seeks to break down barriers between the performance halls and the outdoor spaces. In addition to the park atop the building, there is the Agora, a multistory, glass-faced public plaza resembling a kind of cliff or crease in the hill that serves as the entrance to the library and the two performing arts venues. The venue will also feature numerous outdoor performances as well as video simulcasts of shows happening inside the building. This has been a trend in recent performing arts auditorium design, particularly since the Frank Gehry-designed New World Center in Miami Beach, Florida, was completed in 2011.

"That sort of connectedness was definitely in our minds as we were working on this,"



The numbers

€566m (US$734m): Cost of design and construction

4: Number of years it will take to construct SNFCC

2,200,000ft²: Size of SNFCC

1,400: Number of seats in the main auditorium

85%: Percentage of SNFCC site covered by parkland

15%: Percentage of SNFCC site covered by the new National Library and National Opera buildings

328 x 328ft: Size of the photovoltaic solar energy canopy that will provide power to the SNCC

2,000,000: The total number of books that will be stored in the new National Library of Greece

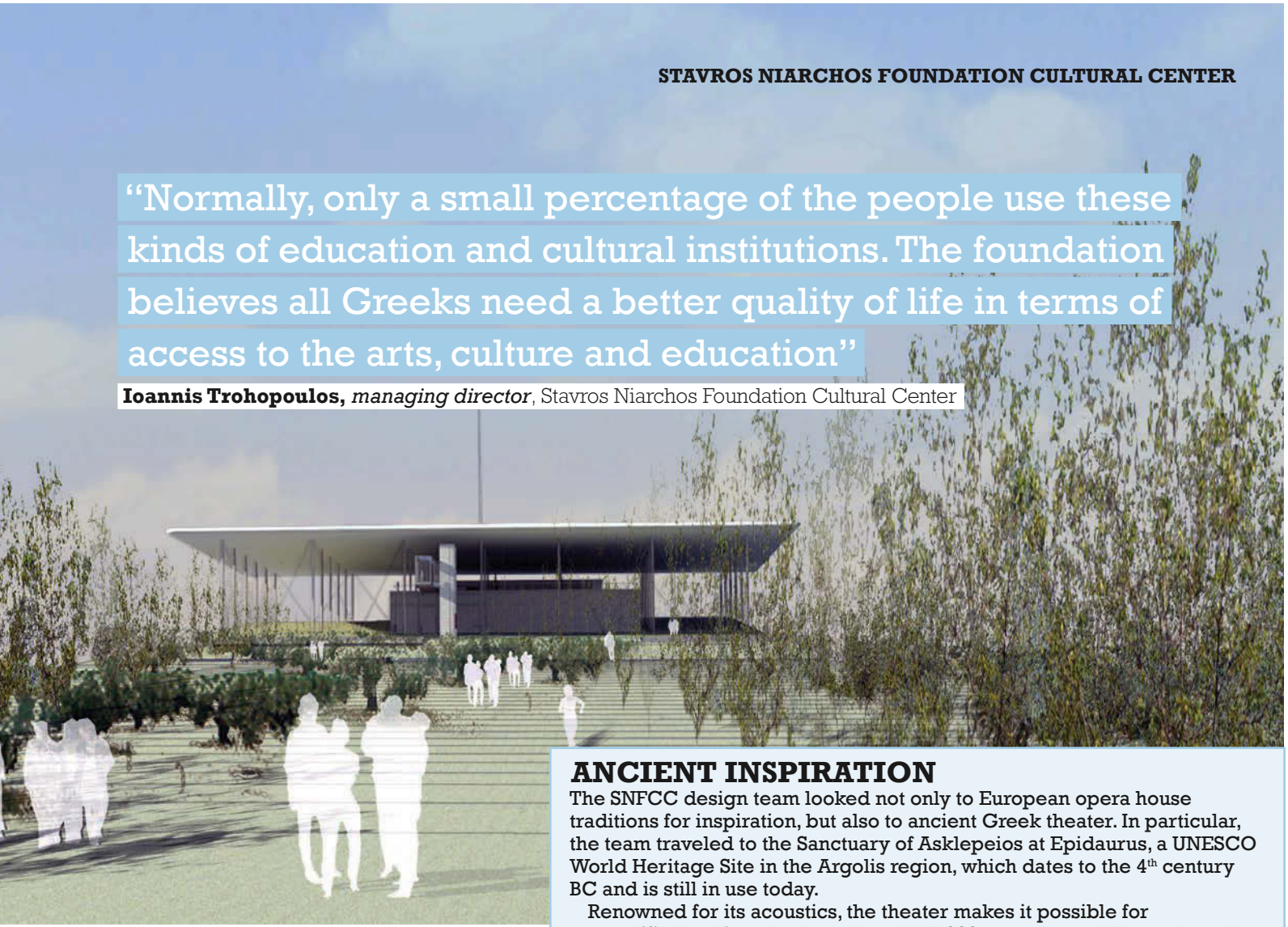
says Benton Delinger, a principal with Theater Projects Consultants, a collaborator in the opera house's design and configuration. "Symphonies are asking how we can connect to audiences further afield. And for this client, education was important. Part of the importance of this project was using technology to reach out to Greeks to show them that they have this important connection within their community."

For the SNFCC, openness becomes not just a way to attract new audiences but to symbolically express inclusion. "It's trying to show people that this is a place for everybody, for all the citizens," says Ioannis Trohopoulos, managing director of the SNFCC. "Normally, only a small percentage of the people use these kinds of education and cultural institutions. The foundation believes all Greeks need a better quality of life in terms of access to the arts, culture and education."

Room with a view

The Greek word 'kallithea' translates as 'nice view', but the 103,000-acre site, which once held a racetrack and was later used as a parking lot for the 2004 Olympic Games, had long lost its view of the water to surrounding development. That is why the NSFCC's designer, Pritzker Prize-winning Italian architect Renzo Piano, proposed creating an artificial hill on the site, burying the building program, except for the glass-cubed reading room, underground. This would create a hillside view of the water and provide room for an 180,000ft² landscaped public green space on top, leading up to the reading room.

"The first time we met Renzo Piano he said, 'Why don't we make a hill?' In this hill we contain everything," explains architect Giorgio Bianchi, who oversaw the project for the Renzo Piano Building Workshop. "From that point, he got the idea of having this movement of the earth, which shifted gradually over 40m [130ft]. When you are at this height you no longer have the street and the city. You have the island, the sea, and if you turn around you have the Acropolis and the city of Athens. Everything becomes a public space. It is a movement of the



"Normally, only a small percentage of the people use these kinds of education and cultural institutions. The foundation believes all Greeks need a better quality of life in terms of access to the arts, culture and education"

Ioannis Trohopoulos, *managing director*, Stavros Niarchos Foundation Cultural Center

ANCIENT INSPIRATION

The SNFCC design team looked not only to European opera house traditions for inspiration, but also to ancient Greek theater. In particular, the team traveled to the Sanctuary of Asklepeios at Epidaurus, a UNESCO World Heritage Site in the Argolis region, which dates to the 4th century BC and is still in use today.

Renowned for its acoustics, the theater makes it possible for unamplified audio to be heard by all 15,000 spectators. "We conducted measurements and it was clear that there is some shaping and forming of the stonework and seats that contributes to the theater's acoustic properties," says Arup's Raj Patel. "There's a particular curvature to the backs of the seats that allows sound reflections to travel along the lengths of the curve."

This goes against more recent design principles, as Patel explains. "Buildings that did it often ended up being unsuccessful because of echoes. It was a misunderstanding of the geometry of the curvature and how to use it. However, we decided to reuse some of the curvature and natural acoustic enhancements of these Greek rooms and put them to work in this building."

ground, the soil, the earth, that generates a big park. And then when you walk along the canal you find this huge glass façade, which is the way the building reveals itself outside."

Sun worshippers

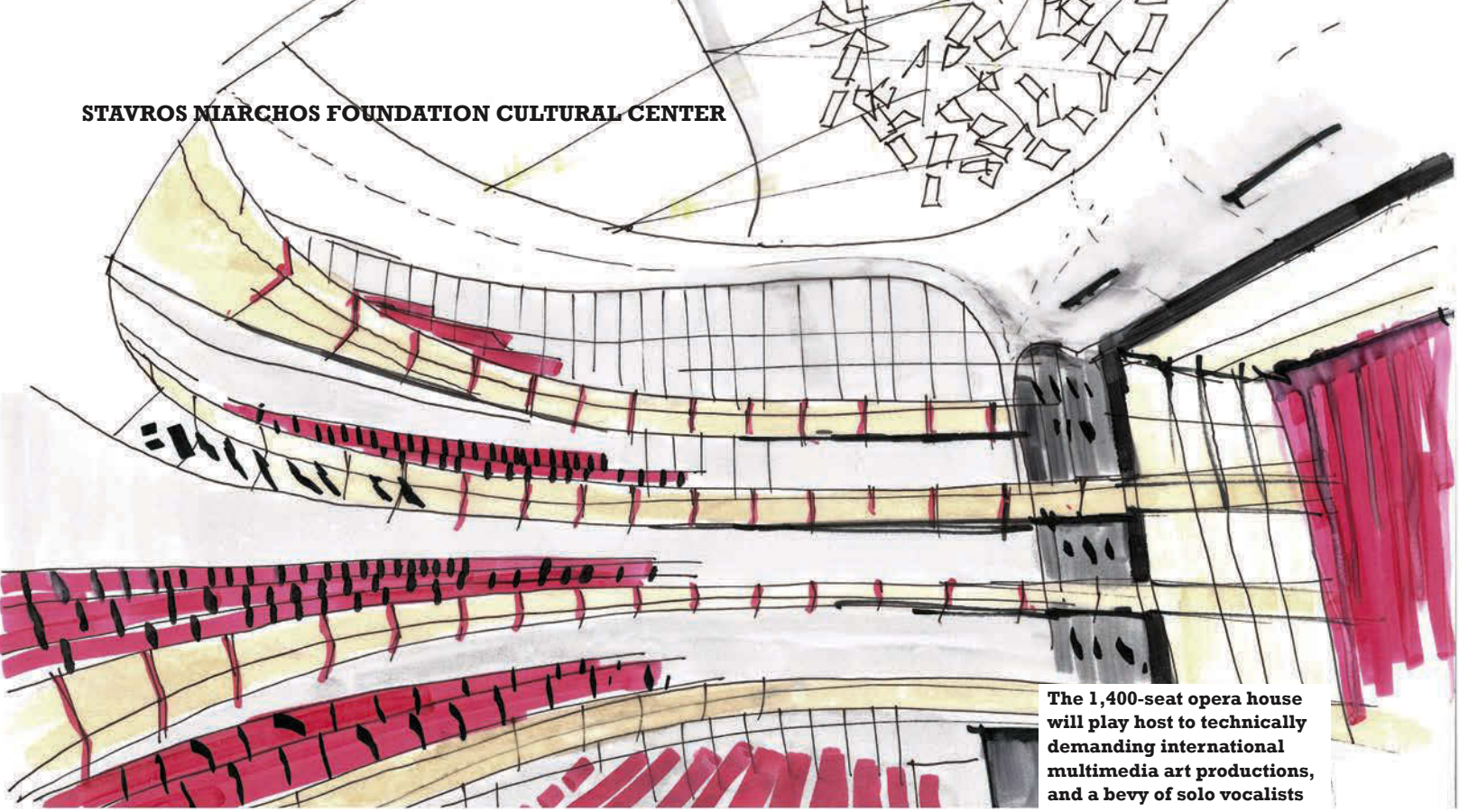
The NSFCC seeks to be a model of sustainable design, earning a top-level platinum rating from the US Green Building Council's LEED system thanks in part to a massive array of photovoltaic solar panels on the reading room's roof that will supply all the venue's electricity. "Since the beginning, we said we were in the country of the sun and of the wind. So, these elements should be used to generate energy for the building," explains Bianchi. "Nothing is wasted in this building." While the solar panels provide power, building into a hillside helps with insulation. Rainwater is also collected for irrigation and many spaces make use of natural ventilation.

The NSFCC's larger opera house, which has a traditional curving horseshoe shape with three balconies, is much larger than the Greek National Opera's existing home, in a former movie theater. "We knew we needed to do something bigger to suit modern operas," says Delinger. "The thing that's distinctive about the room, and which Renzo brought to it, is a strong sense of the operatic. There is a very strong design quality in terms of strength and the grandeur of the proscenium that I like very much. The whole place is very grand in a modern way."

Bianchi follows this up: "When you think about a theater or opera house, at least in Europe, you imagine La Scala and the Paris opera, where

Above: **As visitors approach the SNFCC site from the north, the urban landscape gives way to tree-lined side streets where patrons can rest in meditative seating areas or explore a circular labyrinth**

Opposite: **The site's visual and physical connection with water will continue in the park with a canal running along a north–south, main pedestrian axis, dubbed the Esplanade**



The 1,400-seat opera house will play host to technically demanding international multimedia art productions, and a bevy of solo vocalists

you have all this decoration, warm colors, velvet, plaster... But Renzo is more modernist than traditionalist, viewing the past through a prism of contemporary architectural language."

Style council

In order to determine the best possible acoustics, both the architects and acousticians sought a balance between northern and southern European styles as well as traditional and modern influences. "There's a big difference between an old Italian opera house like La Scala and a new building like Oslo's opera house," says Raj Patel, a principal with Arup, the project's acoustical consultant. "La Scala has lower reverberation and higher clarity. Northern European opera houses favor high reverberance, a more choral reverberance for the voice tones. We had to ask ourselves, 'Should we be designing a rich lyrical Mediterranean auditorium or something more akin to the northern tradition?'" Ultimately, Patel says, the design favors a balance of both.

For the National Library, "The first thing we said was that we should have something very open so that from outside you can understand it is a library," Bianchi explains.

"It was clear that we wanted the books to be visible. That's why we have this gigantic structure inside that is wrapped with books. From the outside you understand you are going into this world of culture and memory."

LIGHT ADVANTAGE

The SNFCC is using LED technology to create more focused, precise lighting while expanding the use of colored light in opera.

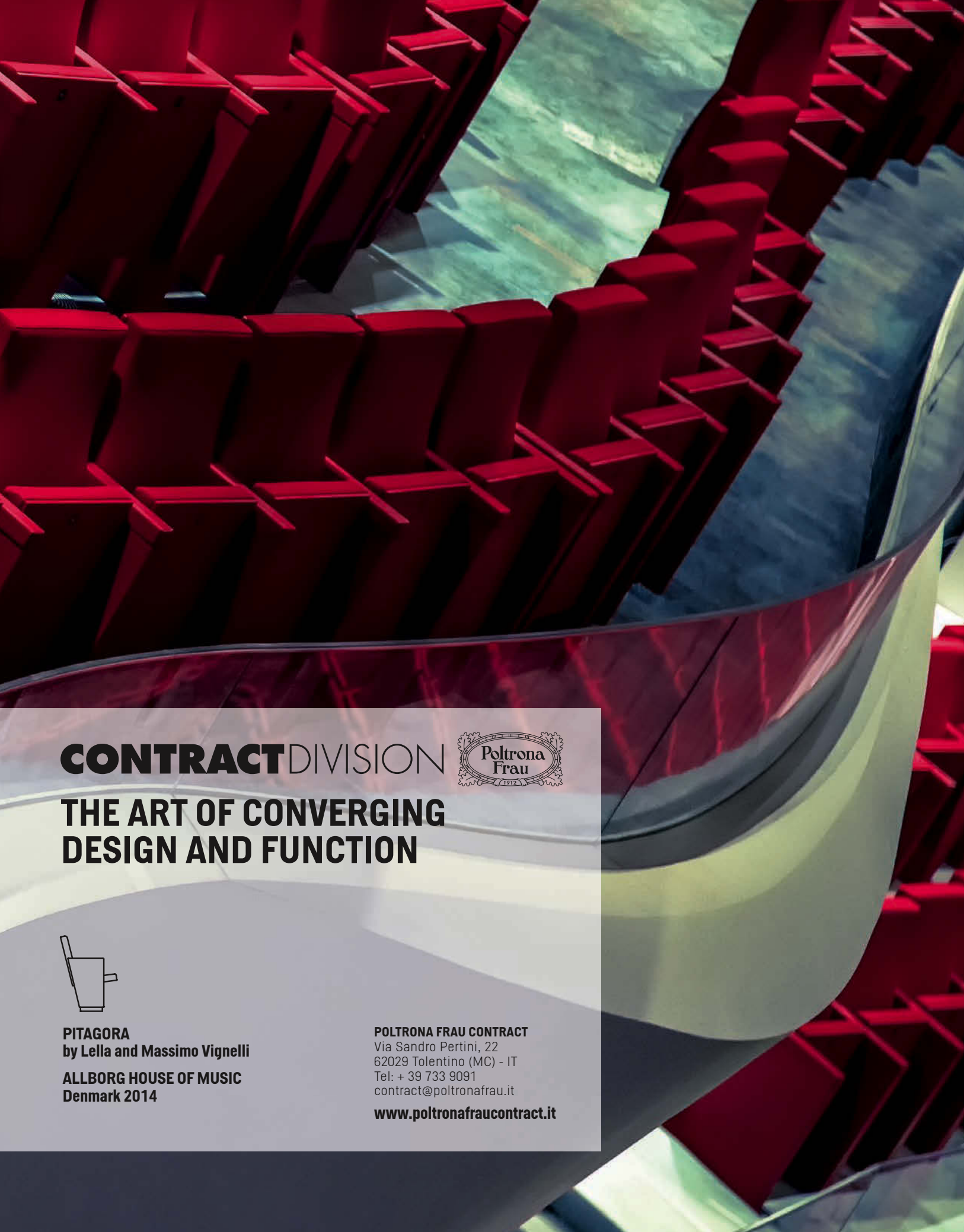
"Light is key to creating connections between performers and audience," says Brian Stacy, lighting leader of the Americas region at Arup, which provided lighting consultation in addition to acoustics. "There's a level of precision with LED that we necessarily don't get with tungsten or halogen approaches. We have walls that curve and panels that undulate. We couldn't get the curving response we need with a standard four-foot light in some locations. LED gives that flexibility."

Although books and other printed text are increasingly becoming digitized, the design sought to celebrate cultural history in the tactile nature of bound volumes. The library reading room, sitting on the hill with its auditoria and book stacks below, becomes the project's signature form, and a counterpoint to the Acropolis across Athens on another perch-like hillside spot. "When you are on top of the hill, you turn around and see the Aegean Sea. You see all the most important monuments of one of the oldest cities in the world," Bianchi adds. "When you are up there you really are in another world. You are in a dimension that didn't exist before. With all of this around you – the city, the sea, the island – it is quite magical."

With its large, multivenue scale and its arrival in tumultuous economic times, the SNFCC has an opportunity not only to transform the arts in Athens, but perhaps even to uplift the nation. "There is also a lot of expectation from the public," says Trohopoulos. "A lot of people believe that this project will be a very important positive sign. It gives the possibility for progress, for hope. We shouldn't underestimate the problems Greece faces, but these cultural centers can be a success story. And in that way, it's a positive." ■

Author

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



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DR PHILLIPS CENTER FOR THE PERFORMING ARTS

BY BRIAN LIBBY

Downtown prescription

The Dr Phillips Center for the Performing Arts in Orlando, Florida, is injecting a sorely needed cultural edge to a city better known for Mickey Mouse than Mozart or Swan Lake

Images: Craig Mullins/Dr Phillips Center for the Performing Arts

The Acoustical Theater as seen from the balcony

For all the popularity of major cities in the USA such as New York and Los Angeles, or entertainment meccas like Las Vegas and Atlantic City, the nation's most-visited tourist destination is actually Orlando, Florida, which in 2013 attracted a record 59 million visitors. But it is resorts on the outskirts of the city such as Walt Disney World and Universal Studios that are bringing in the tourists, not the city center. Until just over a decade ago, Orlando's downtown was noticeably smaller than cities of a similar size and often felt empty at evenings and weekends.

Over the past 10 years, however, the city center has seen a boom in residential and commercial construction, culminating in the 2010 opening of the 18,000-seat Amway Arena, home of the NBA's (National Basketball Association) Orlando Magic, in addition to concerts and other entertainment events. But until now, the city has lacked a major performing arts venue for classical and opera performances except for the outdated and undersized Bob Carr Performing Arts Centre, a 2,500-seat venue dating back to 1926.

Now, after more than a decade of planning, the Dr Phillips Center for the Performing Arts is poised to become a new cultural anchor for Orlando. With a budget of approximately US$514m, the 330,000ft² facility's first phase is set to open this autumn, with a second phase scheduled for completion in 2018. Named in honor of late local physician, orange magnate and philanthropist Phillip Phillips, and sitting on a site of almost nine acres, the Dr Phillips Center's primary first phase (totaling 250,000ft²) features a 2,700-seat amplified hall for Broadway theater class plays, called the Walt Disney Theater, and a 300-seat venue for smaller functions called the Alexis & Jim Pugh Theater. The second phase will feature a 1,700-seat Acoustical Theater for ballet, operas and orchestral performances. There are also extensive spaces in the back of the building for an accompanying arts school and rehearsal spaces (all part of the first phase).

The project is a public-private partnership with approximately two-thirds of the cost coming from public sources, primarily Orange County's tourist development tax, and the remaining one-third from numerous private donors, including a US$12.5m donation from the Orlando-based Walt Disney Company. "We knew the funding would come from several sources and it needed to be public-private," explains Kathy Ramsberger, president of the Dr Phillips Center. "Philanthropy follows private leadership, but it also requires the support of elected leadership. And we wanted it to be owned by government but operated by a private entity. We wanted it to be a public institution, but on the nine acres we have three companies. The ground lease and sales of the properties would go into a trust to run the arts centers."

Urban renewal

During feasibility studies prior to the official groundbreaking, the Dr Phillips Center team, headed by Ramsberger and board chair Jim Pugh, looked for arts centers around the nation that had employed successful models. They found inspiration from the New Jersey Performing Arts Center (NJPAC) in Newark, New Jersey, which has helped revitalize the city's downtown. "We noticed the success factor of NJPAC was about urban renewal. It was about inclusiveness and it was statewide," Ramsberger explains. "We fell in love with the mission as much as the building. We realized we wanted the mission to drive the architecture. We really tried to say, 'How can this piece of architecture look forward in terms of how the city of Orlando's going to grow?' But we also wanted people to realize they weren't just giving money to a building but to a purpose."

That the Dr Phillips Center is being built in two phases is a result of funding difficulties tied to the recession of 2008/2009. In 2008, after raising approximately US$425m, the venue was scheduled to break ground in 2009. "We were US$16m away from completely fundraising this project, and we had four years to raise the rest," Ramsberger remembers. "Then all of a sudden we got a delay in US$120m in funds." When the American economy crashed, tourism declined enough in the region to mean tourist tax funds

The five-level Walt Disney Theater features three tiers of raked seating and is intended for touring Broadway shows

couldn't be delivered on time. The project was delayed for more than a year, as public funding issues were attempted to be resolved and the venue's leaders debated whether to scale back their plans, ultimately deciding to maintain the entire facility but break construction into two phases, with the second breaking ground upon securing funds.

"To go back would really have changed the business and the goal of being a leading 21st century performing arts center," Ramsberger explains. "If you start changing the architecture, you change your business. Our chairman just said, 'Let's take one of the theaters off and delay it'. One of our board members said it wouldn't look good, and another said, 'Good'. The upside is we have a building that needs to be finished and it looks like it."

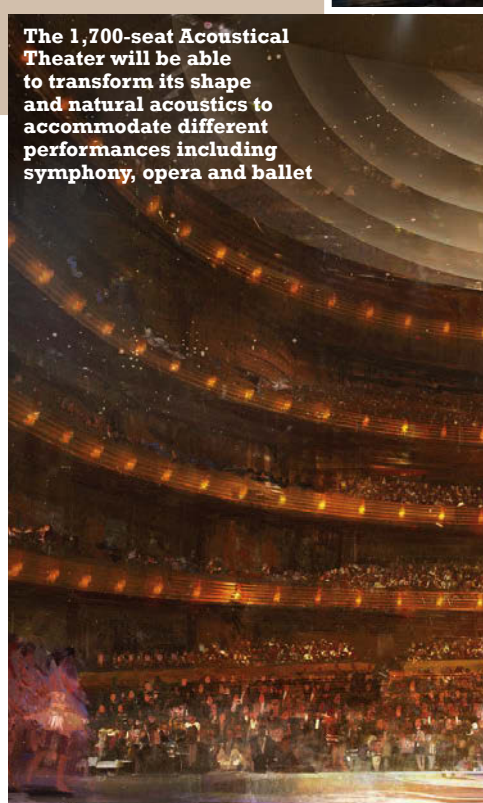
Making the right impression

The overall project occupies a two-block site, with the Dr Phillips Center occupying a full block to the east. The adjacent block, which sits between the venue and City Hall to the west, will feature a mix of hotels, offices and condominiums, but its middle third will comprise a public plaza that not only serves as a kind of extended entry and front yard for the Dr Phillips Center, but at times also an outdoor performance venue. "When you approach the building, you've arrived before you've even arrived," Ramsberger says proudly.

REVITALIZING ORLANDO

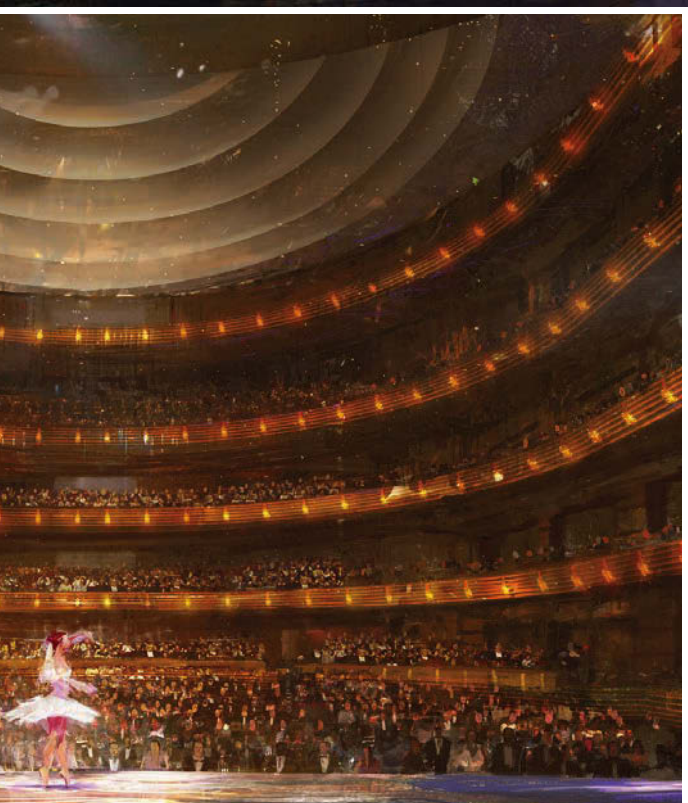
The Dr Phillips Center for the Performing Arts is part of a larger, multivenue effort to transform Orlando's downtown and make it a destination that can compete with and complement Walt Disney World and the other theme parks located southwest of the city. "We didn't used to have the amenities for those people to come downtown," says the project's CEO, Kathy Ramsberger. "But now we do. You need that mix of humanity, establishing memories and experiences with other people. You start engendering pride in your community and everything follows." She believes the Dr Phillips Center has a large role to play in that process. "If arts facilities are done well, what they really become is the family room of the region," she says. "And that's what we want for this building – for everyone to feel welcome, whether it's for a music performance or a wedding."

Designed by Barton Myers Associates, based in Santa Barbara, California, in association with Dallas-based firm HKS Architects' Orlando office, the Dr Phillips Center is intentionally open and welcoming. The building actually extends across Magnolia Avenue in front with a glass-walled bridge that ends on the east edge of the plaza across the street. The outdoor space will be used for banquets, rehearsals and small performances, and will be available to rent. The building is also distinctive for its dramatic steel-framed concrete canopy, which extends 85ft over Magnolia Avenue, thereby shading the multistory glass façade. The architects placed upper-level lobby spaces for the theaters along the façade to celebrate the theatricality of citizens coming

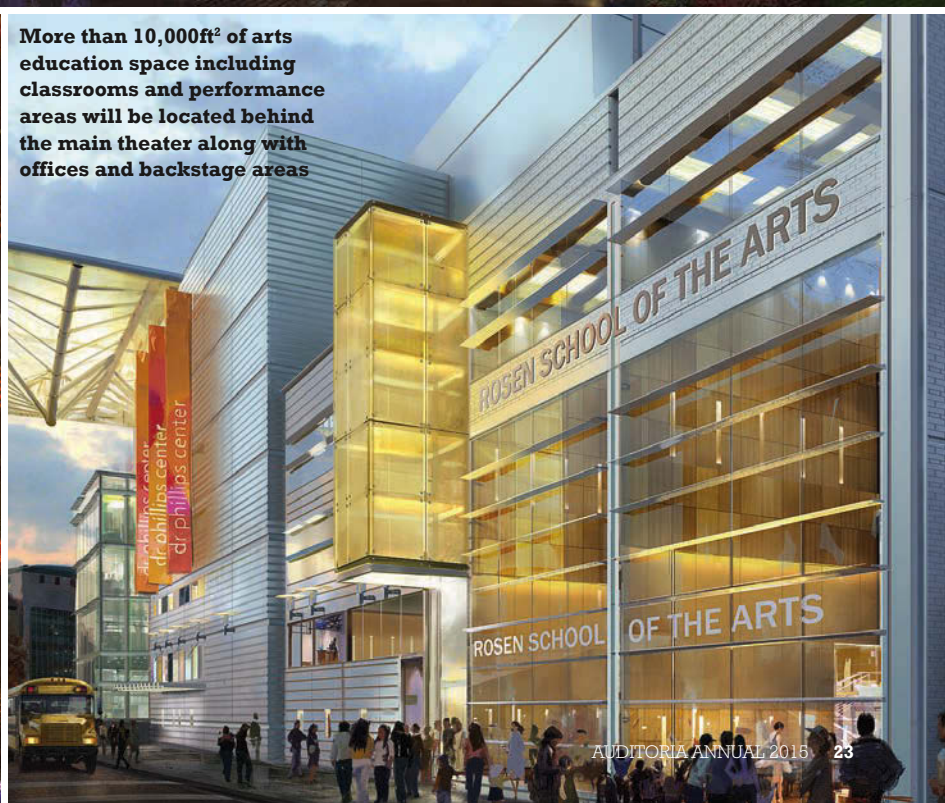


The 1,700-seat Acoustical Theater will be able to transform its shape and natural acoustics to accommodate different performances including symphony, opera and ballet

The glass-walled DeVos Family room overlooks the CNL Arts Plaza. It seats 300 and will be used for weddings, galas and community events



More than 10,000ft² of arts education space including classrooms and performance areas will be located behind the main theater along with offices and backstage areas



together, as well as to bring natural light into public areas and provide views. "It's this idea of being seen and seeing the city," says Ryan Ihly, a senior associate with Barton Myers.

After visitors move into the adjoining theaters, they pass an 85ft-high curving masonry "wave wall", as it's called, which will isolate performance spaces from lobby noise. "That's our acoustic first line of defense," says Edward Arenius, an associate principal with Arup, the project's acoustic consultant.

Re-establishing relationships

The five-level Walt Disney Theater, which begins at the complex's ground floor and features three tiers of raked seating, is intended for touring Broadway shows. "If you go stand in the Bob Carr [Performing Arts Center] and look around, and then you walk the six blocks to this building, you see a relatively similar number of seats but a much tighter volume," explains Millie Dixon, a principal with Theater Projects Consultants, the project's theatrical consultant. "You immediately feel the difference in how much more intimate and welcoming and close the audience-performer relationship is going to be. We've got a series of boxes that come down the sides. We're wrapping the audience around the chamber and bringing everybody forward. The balcony is slightly deeper. We're pulling people closer. But it gives you that sort of feeling of being in one of those grand old spaces."

Theatrical performances in the Walt Disney Theater will use amplified sound almost exclusively, but the smaller Acoustical Theater, which will host local symphony, opera, and ballet performances, had much more exacting acoustic requirements. "It's mainly plaster and solid wood surfaces – hard, dense materials," explains Arup's Andy Morgan.

Yet at the same time, the Acoustical Theater also had to be more flexible. The design includes features such as a moveable orchestra shell to provide acoustically enhanced settings for different kinds of performances, as well as a variable-level flooring system. "That space, what's special about it is the fact that it literally changes, that the whole shape will change, between a rectangular concert hall and a proscenium space like the Walt Disney Theater. And the building needed to be able to change from one form to the next within a four-hour time period, so that they could do a flat-floor afternoon banquet and set up for the symphony later in the day. The seating system on the main floor is actually a series of lifts, but they have seats on them that will flip over. You create a flat floor that way."

The 300-seat Alexis & Jim Pugh Theater, named for the chairman and his wife (who were among the project's private donors), is also designed for flexibility. "For a chamber orchestra we can make it sound like a great unamplified space, or we can bring in the curtains and really deaden it down for electronic music," Morgan explains. "It's a room with a lot of flexibility built into it, acoustically and physically."

There's no doubt that when it opens at the end of this year, the Dr Phillips Center will be a new landmark for Orlando. But the story will only be truly complete when both phases are a reality. "Back when we started this project in 2003, we said it really needs to be as fantastic in terms of place-making as it is for performance. Our mission was to be an inspirational creative place where people love to be and love to work," Ramsberger says. "We are so close that, if we can get it finished, I think everyone is going to be very proud." ■

Above left: **The U-shaped Alexis & Jim Pugh Theater will include a thrust stage and orchestra level seating that can transform into a flat space for other events**

Above center: **The CNL Arts Plaza will be further enhanced by a marquee, fountain, lighting and music effects, transforming the area into an outdoor performance area, and designating it as the center's fourth theater**

Above right: **The lobby will span five stories. The main focal point is the wave wall, an 85ft-high curving masonary that separates the area from the performance spaces**

Author

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

GO RECONFIGURE

The Dr Phillips Center for the Performing Arts is designed to accommodate not just the major theater, symphony and opera performances, but also a wide variety of community events. That means being able to reconfigure the Center's trio of performance spaces quickly, easily and often. "Things are changing. You don't want buildings that have just one use. You want to be able to configure things to be multipurpose," says Robert Adams, US director of engineering at Serapid, which fashioned the Dr Phillips Center's stage lifts. "What we're seeing is systems with full sections of the floor that you can reconfigure. It can go from audience seating to maybe a flat ballroom or a fashion show runway. We'll even have different sections raise up for seating. You have a big empty ballroom one minute and a tiered theater the next. Allowing them to have more stage or more seating or orchestra pits, they can reconfigure the theater for things they couldn't do otherwise. The whole purpose is multipurpose reconfiguration."

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BY SIMON TAIT

Money talks

As austerity forces governments to curtail traditional subsidy sources, arts venues around the world are surviving – and in some cases thriving – through the development of alternative funding models

Theaters in the UK are in the middle of their biggest funding crisis in a generation following the recession, with national subsidy down by an average 18% since 2011, local authority grants down by around 20%, box office sales suffering as household incomes fall, and business sponsorship falling away as commerce reassesses its priorities. Yet, these venues are responding, and while some organizations are inevitably stressed, others are being enterprising, inventive and flexible not only to survive, but also to maintain quality standards.

The difficulties are not confined to the British Isles – there are lessons to be learned abroad. In many parts of Europe, subsidy has provided most of the costs of sustaining the performing arts, but the global recession has taken its toll.

In the Netherlands, culture is worth €18bn, (US$25bn), 3% of the GDP, but in June 2011 the arts community, some of which was receiving 80% of its budget from subsidy, was stunned when the government declared a 25% cut in its arts funding, with many companies losing all their funding – and the worst affected being the smaller organizations. And there are fears of further cuts. "It has been very hard and many have not responded well," says Naomi Russell, a fundraising analyst who has carried out a study for the Netherlands Theatre Institute. While there are exceptions, such as the Toneelschuur theater in the Dutch city of Haarlem, whose sponsorship income has in two years gone from nothing to €400,000 (US$545,000) a year, most are finding it hard. "Companies are struggling and their response has been tactical rather than strategic – in other words, short term – and it may be another three or four years before the full effects will be seen, even if there are no further cuts," says Russell.

Illustration: Alex Hedworth

Above: **The San Diego Opera reversed its decision to close after the venue exceeded its US$1m crowdfunding goal**

Above right: **Nixon in China is just one of many productions being programmed by the San Diego Opera following public fundraising efforts**

People power

The San Diego Opera (SDO) in California, USA, is approaching its golden anniversary in 2015. However, earlier this year it looked like the prestigious venue might not get to celebrate it, due to threat of closure through lack of funding. Its survival, despite its pedigree, is owed purely to an adventurous shot in the dark that has paid off handsomely in terms of cash and good will.

While the patronage system of arts funding in the USA is a model for the rest of the world, when it fails, it can be with devastating effect. Box office had been declining, and in March the company's general director, Ian Campbell, declared that philanthropic support had fallen away to such an extent that there was not enough money to pay for the next season. That same month it was announced, after a board vote of 33-1, that SDO would close, its assets to be sold, with effect from April 14.

Ironically, the last scheduled performance, of *Don Quixote*, was a sell-out, and the board met again 10 days before the last scheduled day, April 29, when 13 members resigned, including the president. Closure was put back to May 19 and Campbell stood down.

But the most remarkable decision of that meeting was to make one last effort through a practice never tried by the board before: crowdsourcing. A new chief operating officer was given a month to raise US$1m. "Moving quickly, and with no budget, we depended on social media, emails, and stories in local print, television and radio to get the word out. In just three days, we raised over US$300,000," says Edward Wilensky, the company's PR director.

Ten days before deadline, the campaign was approaching its US$1m target purely through cold digital marketing, and just as the first direct mailshot was being devised, a group of donors offered to match the US$500,000 of donations coming in after the US$1m mark had been hit. Many donations came in by mail, the US$1.4m mark was passed, and corporate sponsors started to come in. By the time the board voted to rescind the closure decision, crowdfunding had brought in over US$2.2m. More than that, SDO was given Copley Symphony Hall in the city by San Diego Symphony Orchestra, which provides the SDO's musicians with a principle employer.

Without this, SDO would not have its own theater and would rent the 3,000-seat San Diego Civic Theater for its four-month season – the loss of the booking would have put the viability of the theater itself in doubt. Not having responsibility for its own building frees the company up to perform elsewhere, including open-air performances.

The SDO will not need to resort to crowd funding again. The contact with its audience and community support has been made and the database created. Also, artistic advisor William Mason says a new, slimmer board is "energized and committed", providing an oversight the old board did not, a failure of governance that he believes led to the crisis.

Collaborative effort

The English National Opera (ENO) has been on a roller coaster ride of artistic success, financial calamity and Arts Council bale-outs. In 2012, the ENO won three Olivier Awards, the very season it recorded a £2.2m (US$3.7m) deficit.

There will be no more bale-outs, however, says the ENO's artistic director John Berry. The loss was canceled by using reserves the company had built up, and for last season will show a surplus of more than £200,000 (US$343,000). In April, Berry announced a development program that will change its business plan and the public's relationship with the company.

Ten years ago, foundations were laid to create a safety net with reserves saved from the good times, and since then a network of

"Money from the Arts Council has to be seen as a springboard for us to really be ambitious and excel with bringing money in from outside of the public funded circle"

John Berry, *artistic director*, English National Opera

In a time of post-war recession, what thrives? Bars seem to keep going, cabaret thrives, so does entertainment"

Steve Marmion, *artistic director*, Soho Theatre

co-production partnerships has been built across the world, even though its subsidy conditions mean the ENO cannot tour in the UK. There are 40 partnerships, the first having been with the Metropolitan Opera House in New York. The recent *Thebans*, Julian Anderson's first opera, would not have been possible if Bonn Opera hadn't paid for and built the set in exchange for David Alden's ENO production of *Lucia di Lammermore*. "It saved us half a million pounds," Berry says. "Our international connections are so extensive now that if we want to do something, we can raise the money for it."

Underneath the headline audacity, though, is sound populist support in the program, he says. Berry's target is to raise £3m (US$5m) next year and he has identified 75% of it. He has announced plans for a new production center, which will cost £10m (US$17m) and for which Berry believes he has enough of a promise from supporters to ensure it will be open by the end of 2016, while the company has had to use five or six different venues around London to rehearse. It will save the ENO £1m (US$1.7m) a year.

Berry has made a deal with two West End producers to create musical theater that they will fund with the ENO singers and orchestra, taking back some of the 17 weeks per year when the Coliseum is hired out, and which will transfer to other theaters after the initial Coliseum run. New audiences will be probed through keeping ticket prices affordable and schemes like Undress Nights when first tickets are available at £25 (US$43), and by an expanding database.

When the previous chairman, Sir Peter Bazalgette, stood down in 2013 to become chair of the Arts Council, he identified the ENO's ownership of the 2,300-seat London Coliseum as a liability, but now it will be exploited. The ENO is going into partnership with a restaurateur to provide a restaurant, foyer café and bars that will be open all day.

Berry says the money Arts Council England has available for the whole country is less than Berlin has. "They're under huge pressure, but money from the Arts Council has to be seen as a springboard for us to really be ambitious and excel with bringing money in from outside of the public funded circle. We are showing we can do that," Berry says. "We can increase what we want to do by getting commercial partners to take some of the risk. Opening the Coliseum won't make us a lot of money, but it will change our relationship with the public completely.

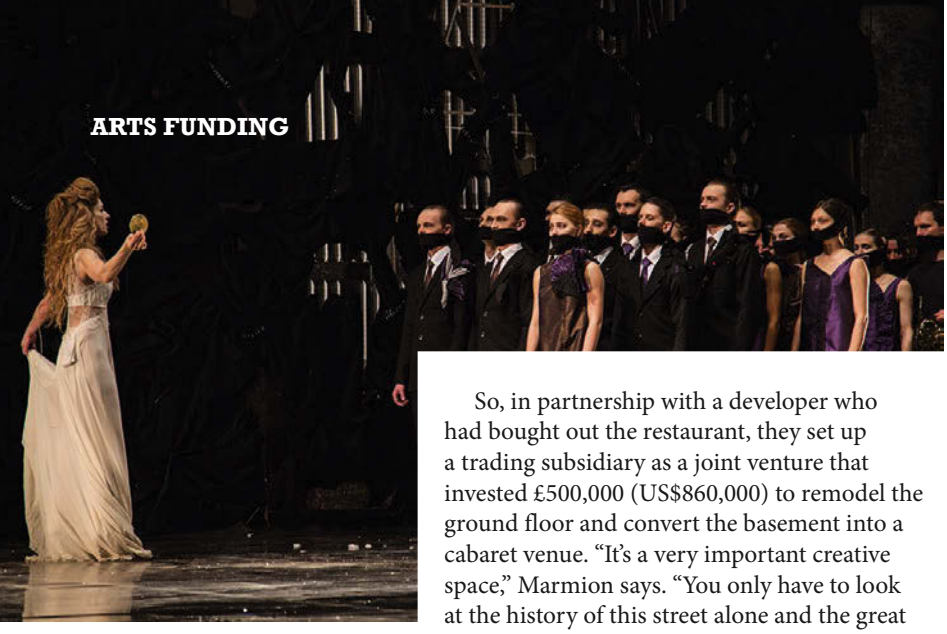
"We're going to be more efficient, have more work, give better public value, and try to create a model that is an opera house for the future."

Divide and conquer

Soho Theatre, which has been nestling comfortably in the polychrome of London's bohemia for 14 years, has been through a lot of reinvention. Its new home, with a 150-seat main house and a 90-seat studio, and costing £11m (US$19m), was partly funded by a National Lottery grant, but it was dependent on matching funding and had to find 25% of the cost.

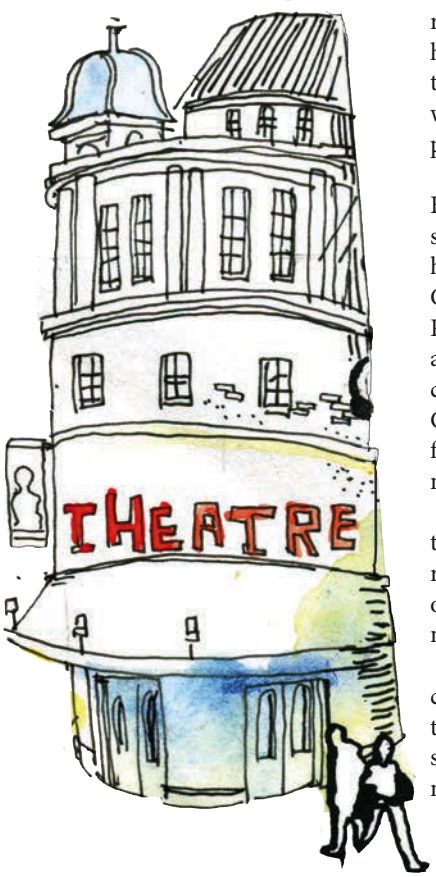
The solution was to go into partnership with private businesses, starting a cross-subsidization from private and public sources. First, a commercial property developer took responsibility for three flats on the top floor contributing to the capital cost of the whole building, and then a catering company was persuaded to rent the ground floor and create a restaurant in it. The restaurant arrangement worked well but in 2011, just as recession was taking its sternest grip and Soho Theatre was facing a 17.5% cut in its Arts Council grant, a new management team of artistic director Steve Marmion and executive director Mark Godfrey felt the relationship between the theater and the restaurant had become disjointed. And there is no such thing as guaranteed rent.

Above: **Since setting up a trading subsidy with a private developer to renovate its basement into a cabaret venue, Soho Theatre's turnover has increased from US$3.5m to US$8.5m**



Above/center: **The Perm Opera and Ballet Theatre is benefiting from programming new and original works such as Nosferatu, which was funded by a non-profit organization and resulted in increased audience numbers**

Above right: **Following near closure in the early 1990s, the Theatre Royal Plymouth is now the third biggest theater operation in the UK due to the implementation of a series of reveue generation strategies**



So, in partnership with a developer who had bought out the restaurant, they set up a trading subsidiary as a joint venture that invested £500,000 (US$860,000) to remodel the ground floor and convert the basement into a cabaret venue. "It's a very important creative space," Marmion says. "You only have to look at the history of this street alone and the great debauchery-fueled art that was created. And in a time of post-war recession, what thrives? Bars seem to keep going, cabaret thrives, so does entertainment." Since the development, Soho Theatre's turnover has gone up from £2m (US$3.5m) to more than £5m (US$8.5m), and audiences from 85,000 to 170,000.

Program shake-up

Culture is in the Russian bloodstream, and classical ballet and opera are still the pulse. The Perm Opera and Ballet Theatre is open six nights a week, year round, with seats costing from £1.70 to £50 (US$3 to US$80). The theater has a turnover of about £8.5m (US$14.5m) a year, and 90% of its funding is subsidy from the Perm regional government. It has an average of 85% houses, and more like 100% for its ballet, so the theater seems to have the best of all possible worlds: a guaranteed unearned income and a permanently faithful audience.

Its general manager is a 43-year-old Englishman, Marc De Mauny, who, after studying at Cambridge University, continued his academic pursuits at the St Petersburg Conservatoire, before being brought to the Perm in 2011 by the regional governor to join a new artistic director, his old conservatoire classmate Teodor Currentzis. The governor, Oleg Chirkunov, believed contemporary art was the future for Perm, although since leaving in 2012, much of his innovation has fallen away.

The problem, De Mauny says, had been that the theater was not moving forward. Its repertoire was staid and oriented to the works of Tchaikovsky, and the audience was coming as much out of duty as for pleasure.

"The Russian rep theater system is a very complacent model because we don't have enough time to rehearse and achieve the quality we should," De Mauny says. "So we're slashing the number of operas that were simply no longer of any interest and were badly prepared without enough attention being given."

He and Currentzis announced their artistic intentions in June 2014 with the world premiere of *Nosferatu*, a two-hour opera that, De Mauny says, "is more like an art installation than an opera". The Perm audience had seen nothing like it before. The production cost the theater nothing as it was paid for by the Stella Art Foundation, a charity set up by the wife of an oligarch, Stella Kesaeva, which put £400,000 (US$685,000) into the experimental piece.

And in August work started on a £160m (US$275m) extension – designed by British architect, Sir David Chipperfield – that will open in September 2016. Half the funding is coming from the regional government, an unspecified allocation is being made by the federal government, and the rest De Mauny will have to raise. The new stage will be nearly twice the size of the old one, with 1,100 seats to add to the original 850.

When he arrived, De Mauny stepped up the fundraising effort, still an alien concept in Russia, and in three years has increased it 100-fold, although it is still only worth 10% of the cost of production and, he says, should be 30%.

De Mauny's brief has also been to increase international awareness of the Perm and its theater, which he is doing with co-productions with companies in France, Germany and Britain so far – the ENO's presentation of Peter Sellars' *The Indian Queen* is a Perm co-production.

Adapt or perish

Twenty-two years ago, the Theatre Royal Plymouth, an Arts Council England national portfolio organization, was floundering in the recession of 1992 and at the point of canceling its producing program and closing its studio. The local authority had become disenchanted as audiences had melted away.

A new chief executive, Adrian Vinken, was brought in from the pop music industry to reverse its fortunes. Now, it has an annual profit of £10m (US$17m), a £26m (US$45m) impact on the local economy each year, and sells almost 400,000 seats. It has become the biggest theater operation in the UK after the National Theatre and the Royal Shakespeare Company.

First, Vinken reduced the workforce by 20%, which he says had an energizing effect rather than a demoralizing one. He refurbished the 1,300-seat main house, the Lyric, and established links with the community through an education program. And rather than cutting production, he developed it, pioneering co-production and collaboration with other theaters.

On drained marshland given by the city of Plymouth, he built a new production center for £7m (US$12m) – funded by the European Rural Development Fund and supported by the Bank of Scotland – that opened in 2003. There, the Theatre Royal builds not only its own productions, but others on commission, so that the *Miss Saigon* production that is now in the West End was made there, as was *Mary Poppins*, which opened this summer in Moscow.

In September 2013, Vinken opened an extension to the main theater to intensify income streams. This not only provides a restaurant double the size of the previous one, more retail space and public bars and cafés; it has also revived the Theatre Royal's corporate membership scheme. After the credit crunch of 2008, corporate income was halved, and in less than a year it has been restored by the attraction of the extra entertaining suites, which during the day, double as read-through rooms.

Vinken is also exercising control over ticketing, with self-selection online and many sales coming via social media so that he can keep prices low. But while the ticket-buyer no longer pays an agent's booking fee, Vinken charges 70p (US$1.20) per ticket, plus a £1 (US$1.70) heritage fund supplement to help pay for maintenance.

"As a producing venue, we're probably as commercially successful as you can get," Vinken says. "The trick is to be prepared to change all the time, because the market is always changing and income streams can be very variable." ■

Author

Simon Tait is editor of *Arts Industry* magazine and a former arts correspondent of *The Times*

THE NEW ART OF FINANCE

Nesta, a British innovation foundation, released a report in July that identifies three new arts funding models that it says could generate more than £70m (US$114m) of additional finance over three years.

In order to make money work harder for the arts, Nesta proposes that arts funders, such as the arts councils, local authorities and the Department for Culture, Media and Sport, should make public money work harder and leverage new sources of finance in three new ways: research and development (R&D) funding, venture funding, and matching money raised through crowdfunding.

According to the report, arts organizations should invest in R&D to expand their audience reach, identify new ways of generating revenue, and develop and evolve their missions to create new forms of cultural value. However, it says there is currently little targeted public funding in these areas despite the potential cultural, social and economic pay-offs. Nesta says arts organizations should at least match the UK economy as a whole in allocating a 1% share of their current spending toward R&D, and funders should allocate at least 1% of their money toward financing it. Following the example of R&D in other areas, Nesta says the state should fund and incentivize arts organizations to do the same.

According to Nesta, social ventures may also offer lessons for arts organizations that want to engage investors with those that combine financial, social and artistic impact. Furthermore, public backing for new arts accelerators to develop the most promising ideas into new ventures, and for venture funds to provide investment, would help bring new money into the sector.

Nesta has also been documenting the growing number of online platforms that connect small-scale donors or investors to new projects or ventures. Arts funders may be able to grow these potential benefits by making some grants conditional on matched funding from these platforms as a way of generating more money for the arts.

If, for example, Arts Council England were to ring fence 1% of its overall budget on R&D funding, currently equivalent to £6m (US$9.2m) a year, and public funders were between them to allocate £10m (US$16.3m) a year toward piloting venture funds, accelerators and crowdfunding, the report argues that after three years more than £70m (US$114m) of new funding for the arts could be generated.

Hasan Bakhshi, Nesta's director of creative economy, says, "The recent funding cuts in England will not be reversed any time soon. They reinforce the need to urgently explore new ways of supporting the arts. Now is the time to develop funding models that leverage in money from new sources."

"The trick is to be prepared to change; the market is always changing and income streams can be very variable"

Adrian Vinken, *chief executive*, Theatre Royal Plymouth

Designing for education

Creating academic venues that meet the needs of different clients calls for an investigative and collaborative approach

Designing successful creative spaces in an educational environment starts with asking the right questions in order to clearly understand the users' needs and goals. Will the space primarily be used for learning or will it host professional performances as well? What departments will use it? Will it have non-arts users? Is the school a conservatory, training students toward professional arts careers? Will it introduce students to the arts by providing performance opportunities? Theatre Projects Consultants explores how answers to these questions (and many others) drive the design decisions that ultimately result in a space that is uniquely suited to meet each institution's vision.

"We don't just reflect back to what the school asks for in its brief," says John Riddell, project manager for Theatre Projects. "We analyze it, ask questions and then offer a solution that encompasses what they've asked for, as well as what they need to achieve it."

Theatre Projects works with its clients to prioritize their needs, helping them identify primary and secondary uses for the space based on the school's curriculum and mission, which helps align needs with the developing design. "If they're teaching mostly drama, but also want to do some dance, they might not need a dedicated dance space, but a drama theater with the capability to also work for dance might meet both needs," says Riddell.

The other essential thing to remember when designing educational spaces is that first-time users are often untrained and inexperienced. "New users, especially young users, will not read the manual before they operate the equipment; they'll play first and ask questions later," says Tom Lamming, stage engineer for Theatre Projects. "In educational theaters, we can't make the same assumptions that we make in a professional environment – the actions of the user will be different. We have to design and specify equipment – especially mechanized equipment – with more safeguards."

"Our responsibility is simple, yet invaluable," explains John Runia, theater designer for Theatre Projects. "We're a catalyst, bringing all the various users together and facilitating an understanding of everyone's needs in order to shape the design."

Spaces for arts training

In spaces intended for arts training, understanding a school's arts curriculum is as important as evaluating the level of intensity dedicated to training students.

For example, the Guildhall School of Music & Drama in London is a conservatory, training actors, musicians and technicians. Its curriculum focuses on music first and classical drama second. For the school's new space, Milton Court, Theatre Projects designed a world-class concert hall that gives student musicians and technicians the opportunity to train in the same professional-level conditions they can expect to experience during their careers.

But, Riddell notes, "This kind of specialized training often benefits from different room forms to introduce students to the many types of activities they might encounter professionally.

Photos: Morley von Sternberg/RHWL Architects

Main: **Guildhall School of Music & Drama's new concert hall**
Insets: **Drama rehearsal room and studio theater**


Tom Kessler


Tom Kessler

Above/right: **New Mexico State University's Center for the Arts' new and intimate theater has been designed not only to bring the audience closer to the performers, but to give students the opportunity to use industry-standard equipment in the safest possible setting**

That will help them to understand the nuances of the spaces they'll be working in after graduation." So in addition to the concert hall, Theatre Projects designed two smaller spaces – a drama theater, focusing on theater and the spoken word, and a flexible studio theater for rehearsals and experimental performances. Both can also accommodate musical performances that need more intimate space than the large concert hall.

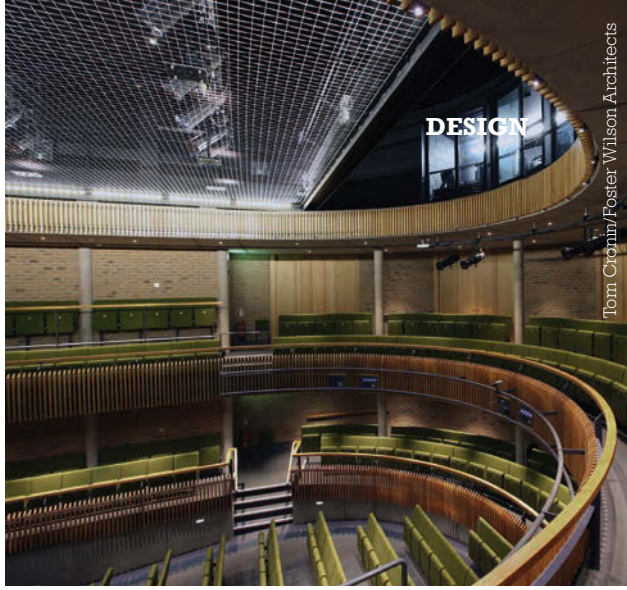
The liberal arts program at New Mexico State University's (NMSU) Center for the Arts in Las Cruces, New Mexico, wanted to encourage student designers and performers to take risks, but the university felt that its old facility – a small thrust theater with no fly space – restricted the school's performance training and hampered efforts to expand its technical program.

NMSU's arts curriculum concentrates on dramatic acting and musical theater, and also has the benefit of a professional acting company in residence. So Theatre Projects designed an intimate theater for the spoken word and musicals, with two sloping balconies, bringing the audience closer to the performers. Michael Ferguson, project manager for Theatre Projects, notes that the design team worked to extend creativity, safety and a supportive environment beyond the performing area. The new theater includes a full stagehouse with a contemporary counterweight rigging system, which gives students the chance to train on equipment common in the industry. "We want students to be able to operate everything in the safest environment possible – so the booths are bigger to hold full classes, and we used stairs backstage instead of straight ladders, which would require fall protection," says Ferguson.

Cheltenham Ladies' College in southwest England is committed to providing a very broad education for girls aged 11 to 18. The curriculum specifically encourages students to embrace things they are passionate about – from sports to intellectual pursuits and cultural activities. "It isn't a conservatory," Riddell says, "but the school wanted to support the arts really well with a great performance space for students."

For the design of its new Parabola Arts Centre, the school wanted a space for drama that could also support occasional small musical ensembles. In response, Theatre Projects designed a practical room, primarily for the spoken word, with manually adjustable features that enable the proscenium theater to host music performances. Large enough for students to learn proper performance techniques such as voice projection, and with contemporary equipment to learn current technical production practices, the Parabola Arts Centre is still small enough to nurture student performers and technicians in a safe, intimate environment.


Tom Cronin/Foster Wilson Architects


Tom Cronin/Foster Wilson Architects


Sammonds Photography

Spaces for global communities

Theatre Projects has seen an emerging trend among its educational clientele: schools with multiple international campuses. While the essentials are similar to other training programs, and the need to understand curricula and training intensity remains, Theatre Projects' approach to international campuses includes paying close attention to consistency and familiarity of spaces for students and faculty.

Two models with differing needs are becoming apparent. The first is a university developing an international campus linked to its primary campus. The second is a charter school, usually primary- and secondary-level education, with campuses in multiple countries.

Globally oriented universities such as New York University (NYU) are at the forefront of the university model. NYU's Abu Dhabi campus on Saadiyat Island (NYUAD) is the newest member of the NYU global network, which includes campuses in 13 countries. Curricula are designed to enable students and teachers to easily move throughout the network without leaving the university's resources. The idea behind NYU's global campuses is to mirror the diversity of the students and faculty, as well as fostering the ideal of the global citizen.

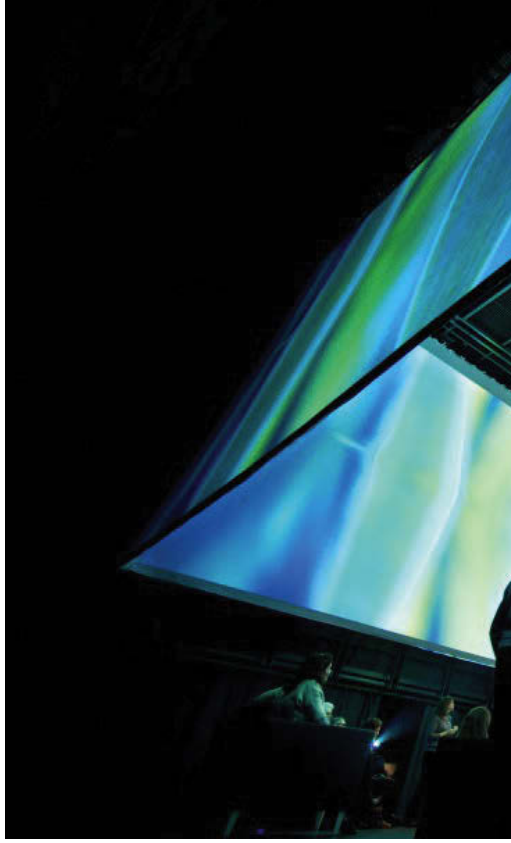
Theatre Projects is currently working as an independent advisor to NYU for the new theater at NYUAD. "We get to question, query, challenge and hold the design team to the brief," says Tom Davis, associate project manager for Theatre Projects. Recognizing NYU's emphasis on student training, Theatre Projects is making sure that the technical facilities are scaled appropriately to accommodate more people than usual. "They need to be able to take students to places where normally only one or two professionals would go. A whole class might need to go up to the roof, where a single rigger would usually work," says Davis.

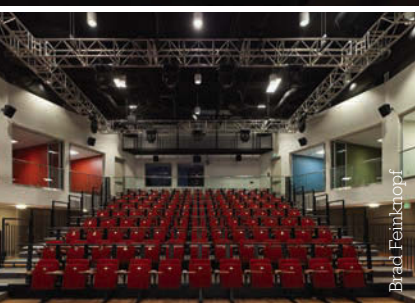
Davis continues, "Even our equipment purchases reflect the need for students and faculty members to seamlessly transition between international campuses. We want to give them a sound grounding in the equipment and technology, as well as safe operation, that they would see on other campuses in the NYU system – and, most importantly, when they graduate and work professionally."

But innovative, globally based educational models aren't limited to higher education. Avenues: The World School, a charter school based in New York City serving primary- and secondary-level students, plans to open campuses in most of the world's major cities over the next 15 years. Avenues' goal is to provide a single international school with multiple, integrated campuses connected by a shared curriculum.

Main/above: **The Parabola Arts Centre at Cheltenham Ladies' College has been designed with manually adjustable features for both spoken word and musical performances**

Brad Feinknopf





Brad Feinknopf

Above: **Northern Kentucky University's Griffin Hall is a multidisciplinary venue that features an integrated video wall and removable seating on retractable telescoping platforms for a flat-floor configuration**

Having a consistent pedagogy throughout all its campuses is important to Avenues, ensuring that students relocating with their families have a consistent education. When Avenues approached Theatre Projects about designing a theater space for its new campus in Beijing, it was clear that the design needed to be scalable to serve as a guide for future campuses, as well as customizable for the specific needs of the Beijing campus.

"There's a template for an Avenues classroom, but the school was less sure about the template for an Avenues theater," says Benton Delinger, project manager for Theatre Projects. "Our goal for this project was to provide a package of options to choose from throughout the system. The local architect in each country starts with the template scaled to the size appropriate to the location and then Theatre Projects provides advice tailored to the specific space being built. What's important is that there is now a footprint and a common vocabulary throughout the school system."

The space, now in design, will accommodate classes, assemblies, small music ensembles, school theater productions as well as local performing arts and event rentals. Students at Avenues Beijing will enjoy a space and equipment similar to what they can expect, not only at another Avenues campus, but also if they go on to study performing arts at university level.

Spaces for interdisciplinary exploration

High-tech, interactive laboratory spaces for exploration and research are at the leading edge of what's new in educational performing arts buildings. In contrast to buildings designed for traditional arts departments, these spaces are intended to bring the arts into other areas of education. "These clients don't want a traditional theater, they want to explore alternate, immersive educational environments," says Jules Lauve, project manager, Theatre Projects.

When Northern Kentucky University in Highland Heights, Kentucky, was pursuing its most recent space, Griffin Hall, it was the College of Informatics behind the brief, not the College of Arts & Sciences. And it wanted a unique space – a digital auditorium where collaboration and flexibility were key and integrated technology could expand student and faculty creativity.

The challenge in designing experimental spaces is to avoid restricting how the space can be used. Theatre Projects' solutions focus on providing infrastructure to support any possible setup. Griffin Hall was designed to bring together people from a range of disciplines – artists, musicians, doctors, scientists – to study information and communication in their broadest social context. Outfitted as a studio theater performance space, the main auditorium includes a large, integrated video wall and glassed-in breakout rooms around the balcony. The seats include removable, fold-down tables for laptop use and are on retractable telescoping platforms to create a flat-floor configuration.

"The multiple configurations and multiple uses in Griffin Hall permit exploring media, performance, collaboration and artistic statement

in ways that are unbridled by conventional configurations and technology," says Lauve.

Similarly, the creative drive behind the Collaborative Performance Lab (known as The Cube) at Virginia Tech's Moss Arts Center in Blacksburg, Virginia, was not the theater department, but the newly formed Institute for Creativity, Arts, and Technology – a research center whose mission blurs the lines between the arts and sciences, bringing together art, design, engineering and science to fuel innovation.

"We couldn't guess everything they would do in this space," says David H Rosenburg, project manager for Theatre Projects, about creating an arts laboratory capable of exploring the intersection of such diverse disciplines. "So we wanted to deliver something that was infinitely flexible." Essentially a robust black box theater, The Cube is a large performance, rehearsal and audience space surrounded on all sides by technical galleries.

Calling it "more laboratory than performance space", Rosenburg notes that the design team had to resist the temptation to install permanent features that might inhibit the creativity of the users. Instead, the focus was on infrastructure and equipment – chain motors, theatrical draperies and a 32ft-tall gridiron (instead of a typical pipe grid), capable of rigging lighting, scenery, props and video and audio equipment in infinite combinations.

"We gave them a blank canvas with infinite possibilities," says Scott Crossfield, theater designer for Theatre Projects.

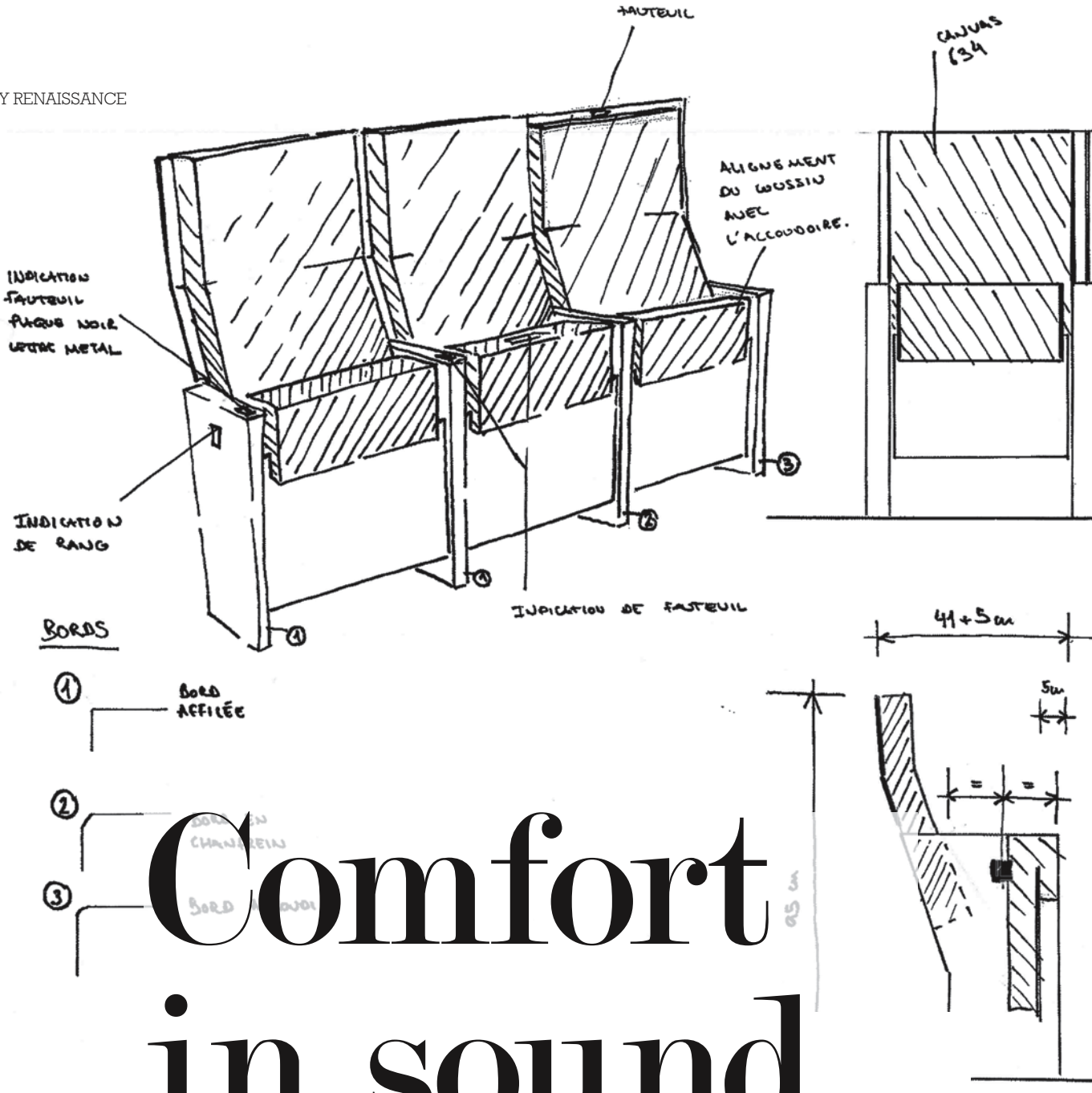
Curriculum-driven design

It's clear that the 'education' part of an educational performing arts space has a major impact on the final design. Success relies on the design team understanding who will be using the space and what the institution hopes to impart to its students. Conservatories – with experienced, pre-professional students – require professional-level facilities and equipment, often with multiple room types, to provide real-world surroundings. Teaching institutions require realistic facilities and extremely robust equipment to support less experienced students who may or may not make the arts into a career. Globally oriented schools – at every educational level – need facilities that are consistent throughout their systems. And experimental spaces belonging to schools at the cutting edge of technology, art and communication need rooms unconstrained by traditional models, allowing students and teachers the room to breathe, think and create.

Each institution will have its own approach to student training, but, as John Runia explains, "Every school wants its students to experience everything the arts can offer. In theater, that's not just performing. It's lighting and box office, front-of-house, marketing, costuming, stage-managing and all the stuff that's not onstage. For every performer, there are 10 people behind them doing all the things that have to be done. With thoughtful design, we can expose students to all of that." ■

www.theatreprojects.com

Main/above: **The distinctive Collaborative Performance Lab at Virginia Tech's Moss Arts Center provides a playground at the intersection of the performing arts, new-media and education**



Comfort in sound

Above: **Drawings of the seating as revised by the architect midway through the project**

An architectural revamp of Radio France's iconic Paris headquarters presented the opportunity to overhaul the venue's symphonic hall seating system with original solutions

Striking in its circular splendor on the banks of the Seine, Radio France's headquarters, Maison de la Radio, was commissioned and opened by president Charles de Gaulle in 1963. Supporting the art of broadcasting and pioneering musical excellence, Radio France's two principal missions are to create and expand radio programming across its stations, and to assure the development of the National Orchestra of France, Radio France Philharmonic Orchestra, the Choir of Radio France and Choir School of Radio France.

Built by Henry Bernard, winner of the Prix de Rome, this edifice stands out due to its 500m (1,640ft) circumference and 68m (223ft)-high central tower. For over 50 years, the Maison de la Radio, with its 1,000 offices and 61 recording studios, has stood as an emblematic figure, and remains one of France's most important media

Above: **QGR's initial prototype design for Maison de la Radio's grand auditorium chair, as submitted during the tender submission phase**

production centers for public broadcasting. It is also an entertainment venue, famous for its concerts at studios 102 and 104.

In 2005, Parisian firm AS Architecture-Studio won an international competition to refurbish this bastion of French culture. At its heart, AS Architecture-Studio's successful design preserves the building's unique qualities within a revised landscape. Turning the building's core purpose into its very fabric, the design takes inspiration from radio waves. At a cost of €241.5m (US$312m), construction is due for completion in 2017.

An icon reborn

A project with such visibility required a firm with the ability to translate the cultural resonance of the building into its structure. The history of AS Architecture-Studio, since its creation in 1973, has been one of projects that possess outstanding aesthetics infused with the purpose and essence of each place.

This project includes the construction of a 1,459-seat symphonic hall, the landscaping of exterior spaces that had previously served as parking lots, and the securing of a tower classified as a high-rise building. It also includes the removal of asbestos and the meeting of required accessibility standards. This 100,000m^2 (1,100,000ft^2) building is being remodeled on an occupied site – a constraint that requires careful phasing of work to control noise pollution and allow the antennas to operate.

When seeking a company to provide the seating for the auditorium and studio, AS Architecture-Studio contacted Quinette Gallay Renaissance (QGR), confident in its ability to conceive an elegant, creative solution, however demanding the environment and specification.

"Quinette offered the most comprehensive response on every point of the brief: sales, quality of the prototype submitted, technical drawings and specifications," says Gaspard Joly, associate at AS Architecture-Studio. "They have a wealth of strong references from highly prestigious clients and they offered the best price for the quality of the product."

Founded in 1947 as Quinette Gallay, QGR is one of Europe's most respected seating brands for cinemas and theaters, opera halls, conference centers and auditoria. The company's strength is its ability to understand the complex requirements of a brief and to originate a model that blends form and beauty with performance.

Photo: AS Architecture-Studio

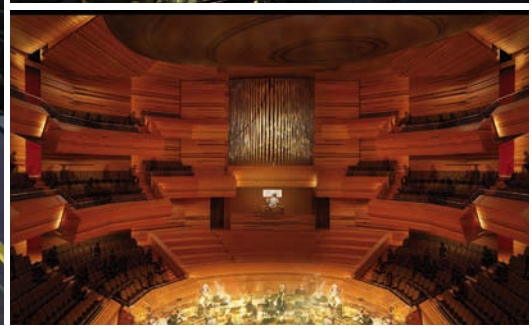


Photo: Maison de la Radio France

Earlier this year, the then Quinette Gallay was bought by the Kotobuki Group, bringing together two leading, innovative and design-led seating brands. Kotobuki was established more than 100 years ago with a pioneering approach to public seating design, which has led the company to become a market leader in Japan. The acquisition has provided the French company with strong financial backing, and a reinforced business plan to develop its business, refocusing on its core strengths. As part of the transition, the company was renamed Quinette Gallay Renaissance (QGR).

Evolutionary process

QGR was asked to provide the seating for Studio 104 and for the grand auditorium. For the former, QGR's Molière chair was the clear choice. Engineered for enhanced comfort, the Molière features robust structural elements in wood to create graceful protective back panels, integrating strong ergonomics with fashion-forward design in vibrant tones. One of the clever customized elements of the Molière for the Maison de la Radio project is that it includes seat numbers embroidered in Braille, to allow ease of access for partially sighted patrons.

Industry-leading acoustic engineering company Nagata has designed the grand auditorium for acoustical excellence. In response to Nagata and the architect's requirements, QGR's R&D team redesigned and engineered a practical yet elegant chair specifically for this project, naming it after the prestigious venue. The Maison de la Radio chair's high back and poised minimalism offer a sophisticated solution, as the tip-up mechanism provides a neat vacated position as well as safe, wide walkways.

Above (clockwise from top right): **The Maison de la Radio building is also home to a museum of radio and TV broadcasting and recording techniques; the 1,459-seat symphonic hall; QGR's vibrant Molière chairs as they appear inside Studio 104**

Below: **A four-year testing and development phase has resulted in the Maison de la Radio chair: a custom creation for the grand auditorium that matches its dark oak flooring**

The evolutionary process of the Maison de la Radio chair took it from a cherry wood creation with a perforated base, through a black-stained ash phase, to the final piece, which exactly matches the auditorium's dark oak flooring. The acoustic features of any chair are dictated by the space in which it will sit. In a round room, such as the Maison de la Radio's grand auditorium, the absorbency and dynamic features of the fabrics specified will be specifically tailored to maximize acoustic quality.

The prototype delivered by QGR exactly matched the architect and Nagata's specification, but through this collaborative development process the chair has been refined over a four-year period of testing and development. Midway through the project, the client amended the specification to include chairs that could accommodate a choir but still be sold as seating for patrons, dependent on the performance in question. This required further customization to ensure that, while these 120 seats offer the same level of comfort for patrons, with the adaptation of tip-up armrests, lift-in side panels and seats that can be locked in a horizontal position, they can also be transformed into bench seating suitable for a choir of up to 150.

QGR's Mélanie Aussanaire, project manager for the Maison de la Radio project, has enjoyed every challenge this prestigious building has presented. "Maison de la Radio has continuously been a work in progress, with some key confirmations finalized just two months before the project's conclusion. This is quite typical for this kind of project, and it's these hard-to-manage challenges that make for a thrilling and very rewarding experience." ■

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Photo: Paul Crosby

Balancing act

On October 22, 1929, the University of Minnesota's Cyrus Northrop Memorial Auditorium opened with a celebratory concert by the Minneapolis Symphony Orchestra. The program, featuring Tchaikovsky's *1812 Overture* and pieces by Wagner, Dvořák and Lizst, introduced the campus and public to Minnesota's newest landmark.

For decades to follow, Northrop Auditorium, named after the University's longest-serving president, served as an academic and cultural hub, staging everything from convocations and graduations to major arts and civic events – a model of 'town and gown'. Audiences experienced performances from artists ranging from the Metropolitan Opera to the Grateful Dead, and speeches by Martin Luther King Jr and the Dalai Lama. Northrop's prominent location within the university grounds, originally conceived in a campus masterplan by Cass Gilbert, together with its classic Beaux Arts design by state architect Clarence H Johnston Sr, made it one of Minnesota's most iconic buildings.

Restoring the University of Minnesota's once-heralded stage venue to its former glory involved creating a new, state-of-the-art performance space that retained the building's historical character

However, the facility – and its programming – began to deteriorate in the 1970s, beginning with the departure of the Minnesota Orchestra (the former Minneapolis Symphony Orchestra), which had made Northrop its home for 44 years. The venue's acoustics were a perennial concern; adjustments were made over the years, but none proved sufficient. (When asked for suggestions to improve its acoustics, former Minnesota Orchestra director Eugene Ormandy replied, "Dynamite.") While still a primary venue for dance and special events, falling plaster and bad sightlines dominated audiences' experiences. Without academic spaces, students rarely stepped foot inside, deeming the building a rock in the stream of campus flow. Eleven studies were conducted to address the building's growing obsoleteness; the most recent declared, "There is no aspect of Northrop without issue."

Preservation challenges

In 2010 the university hired HGA Architects and Engineers with Arup to re-imagine Northrop and re-establish it as a crossroads of learning,

Photo: University of Minnesota

The present meets the past in this juxtapositional image of the Cyrus Northrop Memorial Auditorium's opening night concerts in 2014 and 1929

discovery, arts and community while honoring its local significance. Northrop's historical identity necessitated several preservation studies, but some recommendations proved unworkable. "The university realized it couldn't preserve the original hall," says HGA lead designer Tim Carl. "So one of our key concerns was respecting the building, without allowing it to interfere with 21st century programming."

With acoustics and sightlines as primary drivers, HGA and Arup set about creating a world-class, multi-use performance hall. Arup project manager and lead acoustician Josh Cushner describes this as "a huge opportunity to be creative within the envelope of the building, but we recognized a radical departure would be a failure. We carefully crafted elements of the hall to function performatively, while considering it must still feel like Northrop."

SoundLab, Arup's proprietary 3D auralization room, enabled the design team and client to audition and evaluate room design options in real time from various locations throughout the hall. The priority was to right-size the 31,050ft^2 fan-shaped auditorium. Three of the four walls were moved in to create a shoebox configuration, eliminating 2,100 seats and 50% of the room's volume. Three horseshoe-shaped balconies replaced the single balcony, placing 80% of the seats within 100ft of the stage, rather than 20% as in the original hall. "This brought the majority of seats into what we call 'the zone of visual excellence', and created a more intimate space for audiences and performers," says HGA project manager Jim Moore.

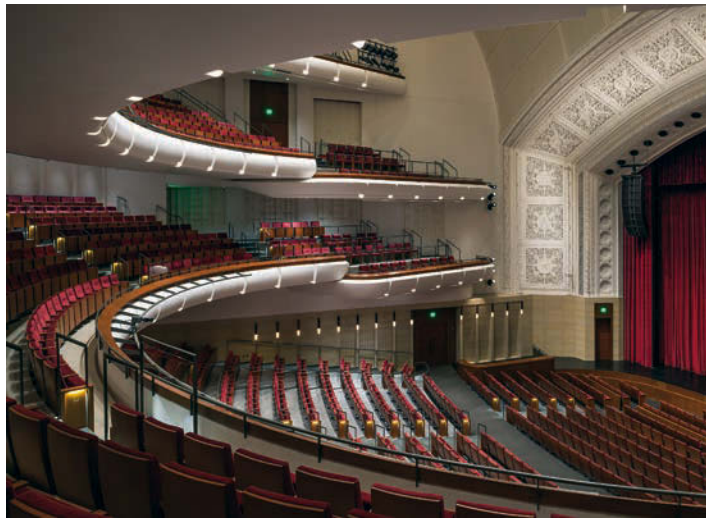
The architectural design features were fine-tuned in response to acoustic analysis and the needs of a modern performance infrastructure. "The exquisite proscenium arch was used as the genesis for design," Moore adds. "We integrated acoustical and theatrical needs invisibly, to maintain its integrity." Select panels of the proscenium were removed and recast in resin to improve acoustics. The balcony fronts were shaped with a complex curvature that balances and reflects sound; they also hide power and audiovisual systems. A metal screen wall above the proscenium serves as an architectural feature,


Arup

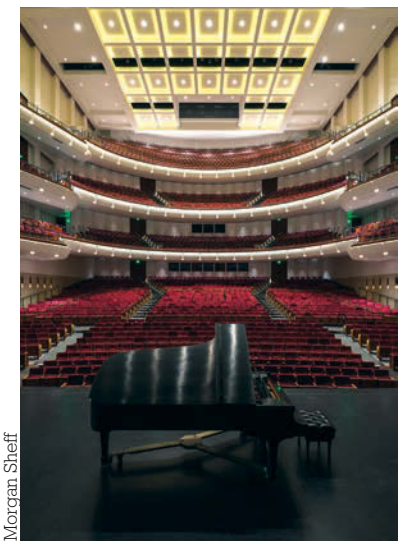

Paul Crosby


Morgan Sheff


Paul Crosby


Morgan Sheff

Northrop's reboot offers previously unimagined creature comforts, including wider seats, more generous legroom, a twofold increase in concession stands, a pair of conveniently located ticket offices, wheelchair accessibility, a coat check, 21 public restrooms and a new large rehearsal space


Morgan Sheff

at the same time concealing a forestage technical grid, loudspeakers and a curved ceiling designed to uniformly disperse sound.

Arup also integrated technology to encourage and accommodate current and future modes of connectivity, including projection, real-time interaction with mobile devices, live streaming and archiving.

Support spaces

Behind the stage, HGA created a crossover space and loading dock; the original building had performers crossing through the basement. Adjacent to the stage, and nearly the same size, is a rehearsal room with a lighting grid, dance floor, adjustable acoustics and floor-to-ceiling windows. Above sits a classroom and event space with views of the Minneapolis skyline. Finally, nestled beneath the third balcony is an intimate 168-seat flexible theater with an active architecture system that can create a warm and clear aural environment to support lectures by day and film or recitals by night.

Memorial Hall, Northrop's three-story entrance, was meticulously restored to "reflect the quality of the historical architecture in the hall," says Carl. Two loggias featuring plaster urns and some of the original proscenium panels – all from within the auditorium – now decorate the lobby. Two murals, painted in 1936 as part of the Works Progress Administration Program, adorn the stairwells. Updated performance amenities include a larger box office, more stairways, double the number of elevators, restrooms and concession stands, and a new café prominently located off the main lobby.

Reducing the hall's footprint allowed space for three innovative academic programs. The University Honors Program, Institute for Advanced Study and an Innovation Lab occupy the sides of the building, each outfitted with technological resources needed for collaborative work. "We understand the inherent social value of getting people from different disciplines to bump into each other," says Carl. "Innovation comes from having Northrop's arts programming coexist with academic programming."

On April 4, 2014, the US$88.2 million Northrop Auditorium re-opened with a performance of *Giselle* by New York's American Ballet Theatre. Artists and audiences raved, but the true test came when the Minnesota Orchestra re-created the concert from Northrop's 1929 opening — and the hall passed with flying colors. "Northrop is a quite astonishing visual and auditory experience," says the Minneapolis Star Tribune. "The sound, so distant and vague before, felt intimate and enveloping."

Northrop is now "unbelievably busy, beyond all of our expectations," according to its director, Christine Tschida, citing an already full schedule of main stage performances, festivals and interdisciplinary programs. With the daily flow of thousands of students and faculty, this rock in the stream of the past has been transformed into a center of activity for the future. ■

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Conquering the past

Accurate and authentic restoration was key to rebuilding a New Orleans theater after the devastation of Hurricane Katrina

Eight traumatic, challenging years after Hurricane Katrina ravaged the city of New Orleans, Louisiana, the Saenger Theatre, grand dame of Canal Street, reopened its doors in a flurry of music, dance and celebration. Shuttered since the storm in 2005, the theater stands as a symbol of the spirit and endless efforts exerted by the citizens of New Orleans to regain control of their city and their future.

Tasked with redefining the mission of the Saenger, David Anderson, president of ACE Theatrical Group, and Cindy Connick, executive director of Canal Street Redevelopment Corporation, turned to their design team, Martinez+Johnson Architecture, and theater planners and lighting designers, Schuler Shook, to create a program that would restore the historic venue, enabling it to host a minimum of 80 shows, and sell 100,000 tickets, annually.

In order to facilitate the rigorous demands of a Broadway and music tour program, new support spaces were created, including loading areas, dressing rooms and front-of-house amenities. "The entire stage lighting and rigging systems were replaced or enhanced to accommodate ease of tour installation and new technologies," says Schuler Shook theater planner Michael Burgoyne.

Sign of the times

Eager to demonstrate project progress to the citizens of New Orleans, the marquee was lit in a 2009 pre-opening ceremony and remained lit until the original 1927 blade sign and marquee were restored. "The signs and marquee boards that were on the theater at the time of the storm were not original," notes Gary Martinez, president of Martinez+Johnson. "Their replacement in the late 1940s was evident in the forms and materials used.

"We found old postcards that were in color," Martinez adds. "These gave us clues and direction as to the original colors used in these critical theatrical elements."

Detailed investigations examined the theater's exterior elements. Decorative wrought iron railings and light fixtures were salvaged or recreated from photographs. Wooden poster boxes were modeled after those found in the Basin and Rampart Streets secondary entrances. Stone and terracotta were extensively tested to find the most gentle, effective methods for cleaning and repair.

The team was fortunate to be assisted by the citizens of New Orleans, who continued to share photos and memorabilia collected over the years. Samples of the original carpet, drapes and signage placards were donated to the restoration team. The design team also discovered previously

Opposite: **To create the horizon effect of an early evening dusk slowly transforming to a deep blue midnight sky, linear LED color-changing fixtures were situated in hidden locations around the edges of the house**

Above: **Old postcards revealed that the signs and marquee boards fixed to the building's exterior at the time of Hurricane Katrina were actually replacements installed in the 1940s**

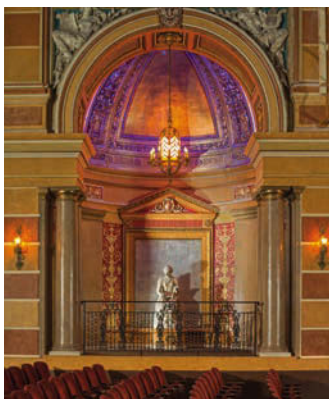
missing original drawings, which contained large-scale details of an ornate stone balustrade railing in the main lobby. In the new design, the balustrade was reinstalled and, with the original details to hand, recreation of the exact design of the railing was possible.

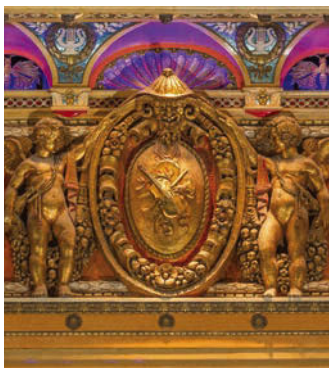
Exacting investigations were undertaken inside the theater by decorative finishes expert Evergreene Architectural Arts, which produced a series of detailed color studies from 'windows' created in the surfaces of the venue. The finishes in these examination areas were repeatedly scraped to reveal different layers of paint until original finishes were found. Final pigmentation was determined through microscopic examination of the scrapings. "Each study involves a bit of detective work," explains Terry VanderWell, Evergreene's director of restoration. "As we approached the upper reaches of the audience chamber, we were very pleased to find enough original material to conserve the finishes as opposed to over-painting them. It creates a truly authentic view of the theater as it was originally executed."

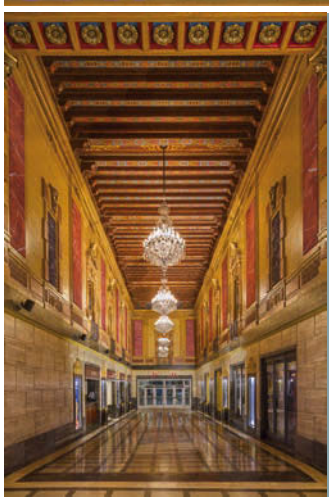
Lighting the way

As the architecture and the decorative surfaces were brought to life, a critical element of the entire atmospheric composition of the Saenger was also undergoing an important transformation – the specialty lighting systems. The original interior design, which recalls an outdoor courtyard surrounded by an Italianate village and a myriad of architectural details (most of which had been hidden during the Saenger's existence), is dependent on specific environmental illumination. Responding to this challenge, Michael DiBlasi and Julia Gordon of Schuler Shook created an array of fixture solutions to solve the missing lighting conundrum.

Their design concept emphasized the surrounding buildings and plaster gazebos of the courtyard with shadow patterns cast by theatrical ellipsoidals, while at the same time spotlighting elements such as the statuary and vegetation that stand along the upper edges of the seating area. "We enhanced the dramatic effect of the house with the added specialty lighting," notes DiBlasi.







The original interior design recalls an outdoor courtyard surrounded by an Italianate village. Nine of the original chandeliers were found in an antique shop in New Orleans' eclectic French Quarter and reinstalled in the theater's lobbies and main arcades

"It creates a dynamic environment in the room as the audience is being seated."

One particularly curious set of elements was the Louisiana buck moths, set in alcoves around the proscenium arch. Highlighted in gold paint with interspersed medallions of translucent blue and pink by the artists of Evergreene, the insects draw attention as all patrons look toward the stage. As an important focal point of the proscenium, Schuler Shook used RGB striplights concealed below the moths to uplight their three-dimensional quality.

To create the horizon effect of an early evening dusk slowly transforming to a deep blue midnight sky, linear LED color-changing fixtures were situated in hidden locations around the edges of the perimeter elements of the house, where the sky meets the top of the village. Once night falls, the stars begin to twinkle. Star locations and constellations, which emulate the New Orleans sky on the theater's opening night in 1927, consist of fiber optic endpoints. The fibers were set into holes drilled through the ceiling with different size fibers used to create brighter and receding stars. 'Twinkle wheels' set in the attic space above the ceiling create motion in the stars as four cloud machines project images across the ceiling in slow motion, enhancing the night sky effect.

The existing historic lighting was restored or replicated to complete the restoration of the venue. Directed by Schuler Shook, St Louis Antique Lighting removed the irreplaceable fixtures of the theater to its studio, where it faithfully rebuilt each unit. Decorative fixtures that were missing, or beyond repair, were replicated from photographs to present a complete representation of the theater as it appeared when it opened.

Of special interest were the chandeliers in the main arcades and lobbies of the theater. Only one original, large chandelier remained in the venue, with 11 more requiring replication in the inner lobbies. Thanks to the immense interest in the project from the citizens of New Orleans, nine original pieces were located in an antique shop in the French Quarter. ■

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Born again

An extensive addition to, and renovation of, the Municipal Auditorium in San Antonio, Texas, has turned one of the city's great cultural venues into a stunning performing arts hub

Photo: La Casse Photography

Combining the historical preservation of one of San Antonio's most beloved architectural icons with one of the most flexible multipurpose performance halls in the USA, the Tobin Center for the Performing Arts embraces the multifaceted cultural identity of the city with a complex tapestry of form, materiality, light and landscape. Designed by LMN Architects of Seattle in association with Marmon Mok of San Antonio, the new facility provides a diverse architectural experience capable of continuous transformation in response to artistic programming and environmental influences. The architectural form and detailing draws inspiration from the Spanish colonial style of the original 1926 Municipal Auditorium, as well as San Antonio's rich vernacular of color, pattern and public celebrations.

Aspirations for the renovation/expansion project were threefold: to create a large, flexible, multiuse performance space with acoustics comparable to the world's finest concert halls; to restore the iconic historical building for future generations; and to create a vibrant connection between the city's main cultural venue and the River Walk.

Old meets new

While retaining the Municipal Auditorium's treasured historic architecture, the Tobin Center weaves a new 183,000ft² facility into its framework of public space – including a 1,768-seat main performance hall and 230-seat studio theater. This substantial facility reconfiguration called for a grand, unifying design gesture to integrate new and old architectural components. The solution, a porous, shimmering metallic veil, enwraps the new program volumes and creates a sculptural, environmentally responsive expression that celebrates the cultural life of San Antonio. The veil begins low at the River Walk, and rises through irregular sheer planes to form an unmistakable architectural presence in the San Antonio skyline.

An important characteristic of the veil is its simplicity, blending with the color of the original

Restoration of the historic building, soft lighting of surfaces and a shear glass entry wall create architectural transparency that breathes new life into the facility's civic presence within downtown San Antonio

Photo: La Casse Photography

façade, as well as with the scale and patterning of its limestone blocks. The aluminum panels reflect the sky and capture daylight, imparting a diffuse quality that concedes first position to the historic stone façade. The veil also filters the bright south Texas sun, creating shade patterns over the River Walk below – much like trees over an arroyo. As night falls and the River Walk transforms into a festive, carnival-like atmosphere, the veil reveals a second life with internal, programmable LEDs, allowing facility operators to create custom light displays expressive of the evening's performance.

Open green space bridges between the below-grade River Walk and the street level, capturing space for a third peroformance venue – a riverside amphitheater with rows of plaza seating and a giant video screen incorporated into the veil. Here, venue programmers can simulcast live performances as well as host outdoor cinema, music and other curated events. The high, glassy entrance lobby of the studio theater opens directly onto the space.

Just inside the front colonnade, the grand lobby greets visitors with a wall of white. Made of sculpted plaster panels, the wall follows the compound curvature of the performance hall as it swells outward to engage the full height of the lobby volume. Subtly changing panel forms recall the flow of the river and traditional San Antonio masonry. A row of small, brightly colored openings reveals clues about the performance hall beyond.

The lobby forms the venue's social epicenter, a sequence of volumetric spaces at the intersection of the historic building and new construction. Standing on the lobby floor with its swooping terrazzo pattern, one can look up to see people on all five lobby levels – the social experience animated by the interplay of balconies, sky bridges and sculpted surfaces. A deep red color spills from openings, peppered in and around the lobby wall, orienting the patron to the performance hall volume and its points of entry.

Transformative experience

Themes of transformation and diversity come to their fullest expression in the main performance hall. Employing a variety of customized systems, the room can rapidly change its seating and stage geometry, lighting, color and acoustics to suit the unique qualities of each performance – in effect providing the city with many venues in one and giving local arts groups unlimited possibilities to attract new audiences with innovative programming.

Central to the high level of programming and operational flexibility is the first large-scale use of the Gala moveable floor system in the USA. Operated by computer-controlled presets, the system enables each row of seating to be moved individually. The integral seats deploy automatically, and within 10 minutes


Photo: LMN Architects

Left: **An integral pattern of programmable LEDs provides a distinctive and changeable nocturnal presence that embodies the festive character of the San Antonio River Walk**

Main: **Customized interlocking aluminum panels sheath the performance hall exterior, creating a shimmering texture of solid and void with continually shifting patters of light and shadow**

Top right: **The performance hall's balcony fascias are made of Anegre wood with perforated patterning, washed with light from the front and backlit with programmable LEDs**

Bottom right: **The main lobby, situated between the renovated historic building and the new performance hall, functions as the social epicenter of the Tobin Center**

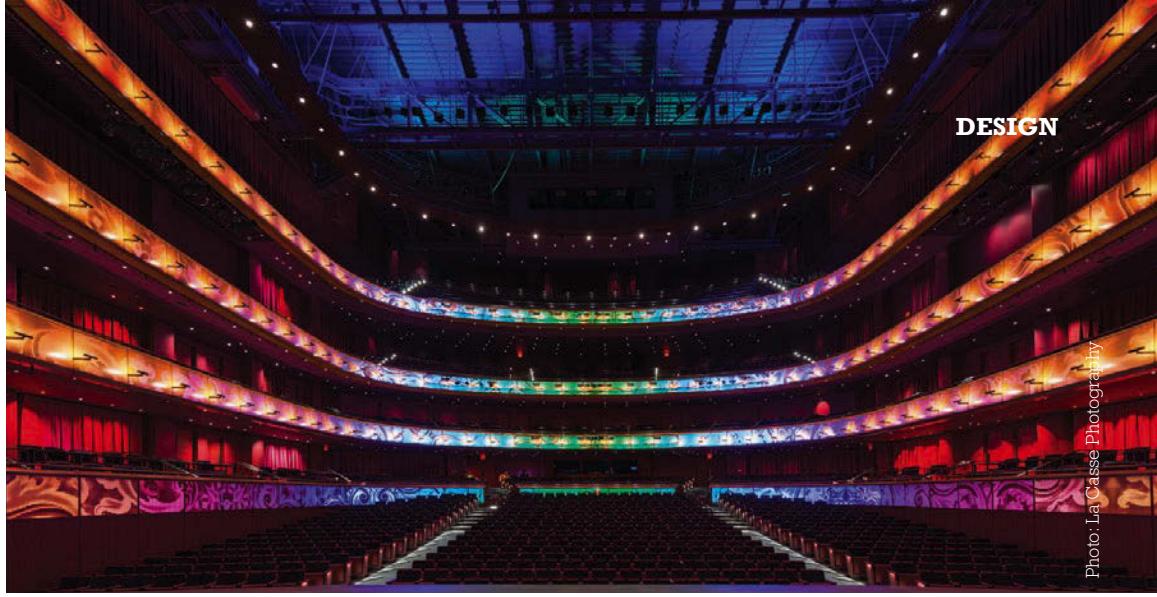
Photo: LaCasse Photography


Photo: Mark Menjivar Photography

the hall can be fully transformed between any of six basic configurations – symphony, cabaret, rock concert, opera, dinner theater and conference gala – with virtually endless sub-configurations.

Anticipating a wide range of uses, the hall's acoustic design creates a rich reverberation characteristic of the world's great symphony halls, accomplished through materials, geometry and articulation designed to produce early lateral acoustical reflections. From this starting place, the acoustics are highly adjustable to suit the specific needs of each performance type, including tunable absorption elements to dampen the hall's resonance for theater, the spoken word and amplified music. A carefully designed forestage reflector has two settings – one specific to symphonic music and the other to balance sound between stage and orchestra pit for opera and ballet. In addition, an electronic sound reinforcement system, tailored to the room's acoustics, supports touring Broadway shows and headliner acts.

The fascias of three balcony tiers define the inner volume of the audience chamber, providing optimal acoustical reflections through composite assemblies of Anegre wood veneer and dense polycarbonate resin. Perforations in the fascia form a Spanish arabesque colonial pattern in a pixelated expression made possible through modern digital manufacturing processes. As the house lights dim, these perforations come alive as LEDs with a limitless array of visual effects – such as soft glowing candlelight for the symphony, complete blackout for opera and ballet, or intense bursts of color for a popular music act.

As San Antonio continues to grow as one of America's great cities, the Tobin Center for the Performing Arts stands ready to serve all comers with a vast range of programming and theatrical experiences. Just as the main hall adapts to accommodate nearly any large-scale performance event with dazzling style, the studio theater and outdoor plaza supplement the palette of venues to serve forms of artistic aspirations – exemplifying the ideal of a performing arts center for everyone. ■

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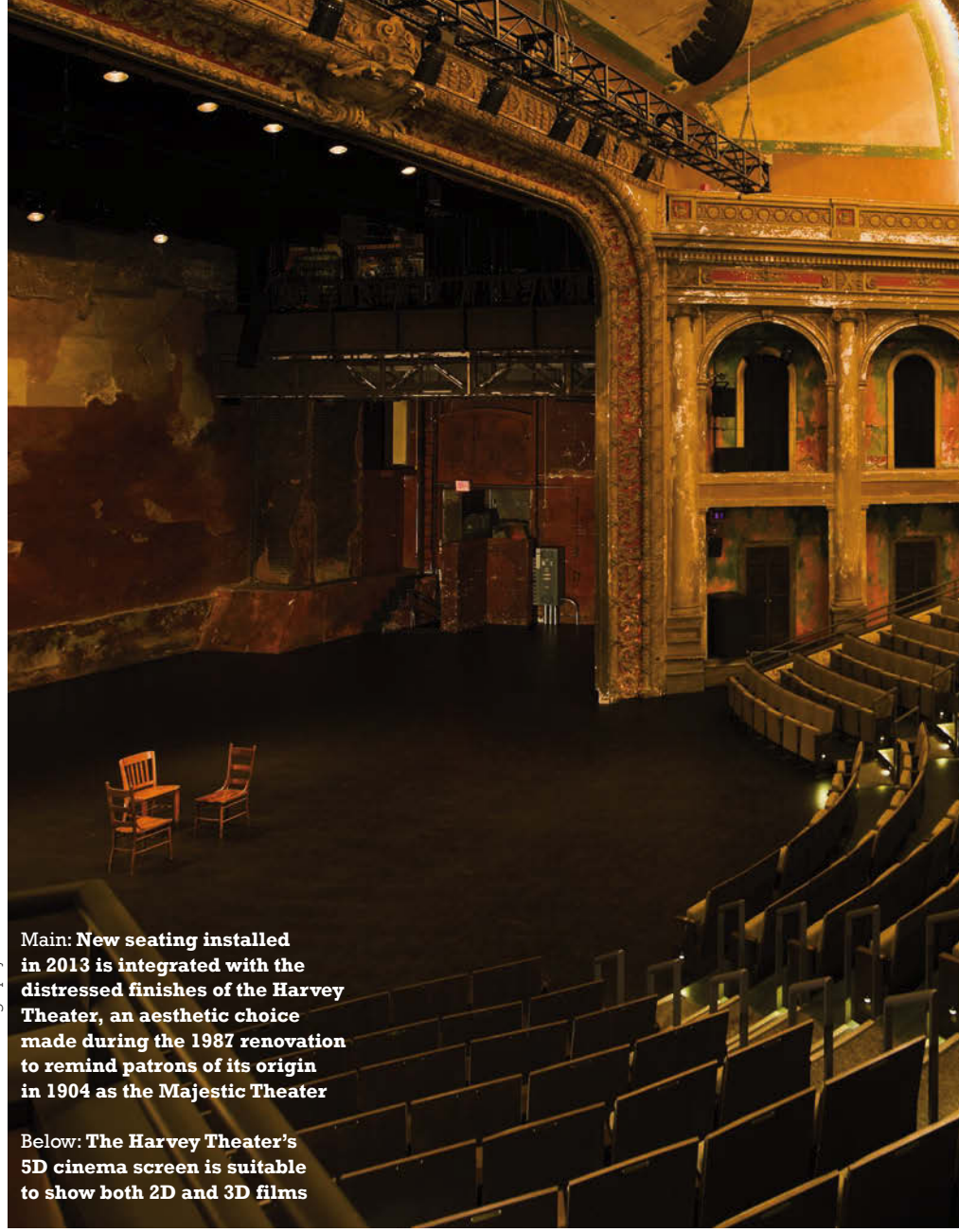


Photos: Elliot Kaufman Photography

Main: **New seating installed in 2013 is integrated with the distressed finishes of the Harvey Theater, an aesthetic choice made during the 1987 renovation to remind patrons of its origin in 1904 as the Majestic Theater**

Below: **The Harvey Theater's 5D cinema screen is suitable to show both 2D and 3D films**

In the name of progress

A renovation to the rigging systems of the USA's oldest performing arts center's theater has led to a decade-long collaborative effort to overhaul several other aspects of the famous institution

Since relocating to Brooklyn's Fort Greene district in 1908, the Brooklyn Academy of Music (BAM), which this year celebrates its 152nd anniversary, has grown to encompass theater, dance, music, opera, film, arts education and more. Through the decades, BAM's campus has expanded as well, incorporating historic and new buildings and sparking the creation of a surrounding cultural district.

This year also marks the 10th anniversary of the working relationship between BAM and Auerbach Pollock Friedlander, a leading theater, media facilities and lighting consulting company, as the organization enhances its facilities to support its innovative programming. BAM first hired Auerbach Pollock Friedlander in 2004 to renovate the rigging systems in the Howard Gilman Opera House and the Harvey Theater.

The project at the Harvey required more than a simple overhaul. The theater began life in 1904 as the Majestic Theater, first hosting live performances before later serving as a movie house. It was boarded up in the 1960s, decaying with age and water damage, until BAM's then-president, Harvey Lichtenstein, spotted it as the perfect place to stage Peter Brook's nine-hour production of *The Mahabharata*. Completed in 1987, BAM's renovation intentionally left the interior with a distressed appearance.

A custom hydraulic rigging system had been installed as part of the renovation. After careful examination, Auerbach Pollock Friedlander determined that the aged system could no longer be maintained safely, so the team replaced it with a state-of the-art equivalent. That proved to be the start of a multiyear process to adapt and refine the Harvey to meet contemporary audience and performance needs.

Audience analysis

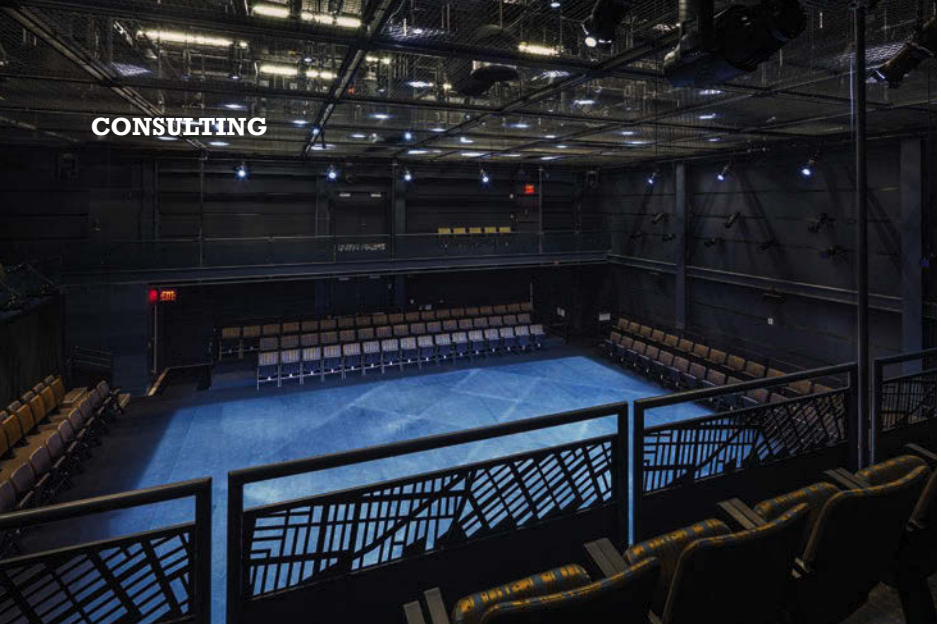
The next big project was to replace the seats. Bench-style seating had originally been installed for *The Mahabharata*, but BAM eventually replaced it with more conventional fold-down seats that preserved the bench-style look. By the turn of the millennium, these second-generation seats had started falling apart and replacement parts were hard to find.

BAM asked Auerbach Pollock Friedlander to retain the distinctive curving bench-style look while increasing comfort. The team worked with Mitchell/Giurgola Architects and seating manufacturers to develop a bespoke solution that consists of individual seats that fit side by side in such a way that it preserves the unbroken visual line of the backrests. As part of this process, the team also reviewed audience circulation paths and safety, as well as ADA compliance, and identified anomalies that needed addressing. As a result, BAM enlarged the scope of the project to include replacement of the front section of the orchestra seating and the entire stage floor with modular platforms.

"Auerbach Pollock Friedlander did a fantastic job collaborating with the architect to optimize the seating layouts, to minimize the loss of seats, and to make the new seats look like they had always been there, evoking the quality of what had been there before," says Jonathan Jones, director of capital projects for BAM. "The company's solutions are indeed innovative and the seats are very comfortable."

Creating a 5D experience

The next task was to add a cinema screen so that BAM could provide programming during the summer months after the performance season ended. BAM wanted to be able to show first-run 2D and 3D films on a single screen, as opposed to two screens, which was typical for a commercial



Left: **The Fishman Space and Scripps Stage in the Richard B Fisher building can be configured in a variety of ways to provide BAM with many staging opportunities**

Right: **The Richard B Fisher building was the first new construction at BAM in a century. Pictured is the Fisher Hillman Studio, a 1,600ft² rehearsal and performance space**

cinema. The screen – 35ft wide and 19ft high – needed to be easy to strike and store quickly, but there was no room for it in the stage house. On top of that, because the venue had been designed for live performance, acoustic finesse would be required to avoid excess reverberation from modern movie soundtracks.

Fortunately, a new type of screen became available just as the team was developing the project. Previously, 2D projections required a white screen while 3D projections used a screen made of silver material. The new 5D screen can handle both types. Auerbach solved the storage problem by creating a space beneath the modular stage floor. BAM staff simply open up the floor, lower chain hoists from above, and connect them to the screen case to lift it. The changeover process can be completed in less than two hours.

Auerbach Pollock Friedlander worked with Akustiks to design motorized and individually adjustable acoustic banners to increase the intelligibility of movie dialog. "The acoustic banner installation was required by the new cinema system, but it has proved useful for other programming as well," says Auerbach's principal-in-charge, Steve Friedlander.

Flexing the black box

To add an intimate black box venue to its campus that would support local and emerging artists and more experimental productions – while also housing BAM's education facilities – BAM undertook the adaptive reuse and expansion of the historic Salvation Army structure into the Richard B Fisher building. Designed by H3 Hardy Collaboration Architecture, it is the first new addition to BAM's campus in more than 100 years. BAM Fisher opened to audiences in the autumn of 2012.

Auerbach Pollock Friedlander designed the Fisher building's 250-seat Fishman Stage and Scripps Stage for maximum flexibility. The retractable seating can be arranged in a wide variety of configurations, including end stage, thrust stage, theater-in-the-round and flat floor setups. The 21ft-high tension-wire grid covers the entire room. Rigging lines can be attached to the structural grid above the wire grid, anywhere in the room. Extensive lighting, audio and video systems infrastructure is distributed around the space in order to enable sophisticated multimedia productions.

"The black box theater in the Fisher has definitely been as flexible as we'd hoped, and in some ways even more so," says Jones. "We were expecting to be able to do four seating configurations but we've been able to do 10. We've also been able to do things like fly a piano during a show."

Auerbach Pollock Friedlander was also involved in the design of the Fisher Hillman Studio, a second performance and rehearsal hall on the fourth floor that can seat up to 125 and features a floor-to-ceiling glass wall providing a panoramic view of Brooklyn. The Fisher building also includes offices, classroom space and a rooftop terrace, and provides additional space for visual art exhibitions.

The collaboration continues with further improvements to the Harvey Theater, including replacement of the seats in the balcony sections with new ones similar to those on the main floor. With its mission of supporting cutting-edge emerging artists as well as modern masters, BAM has continually evolved its campus to meet the needs of today while honoring the legacy of the past. The recent enhancements and additions represent its long commitment to the arts and the community, which has made it a cornerstone of cultural life for local and global audiences. ■

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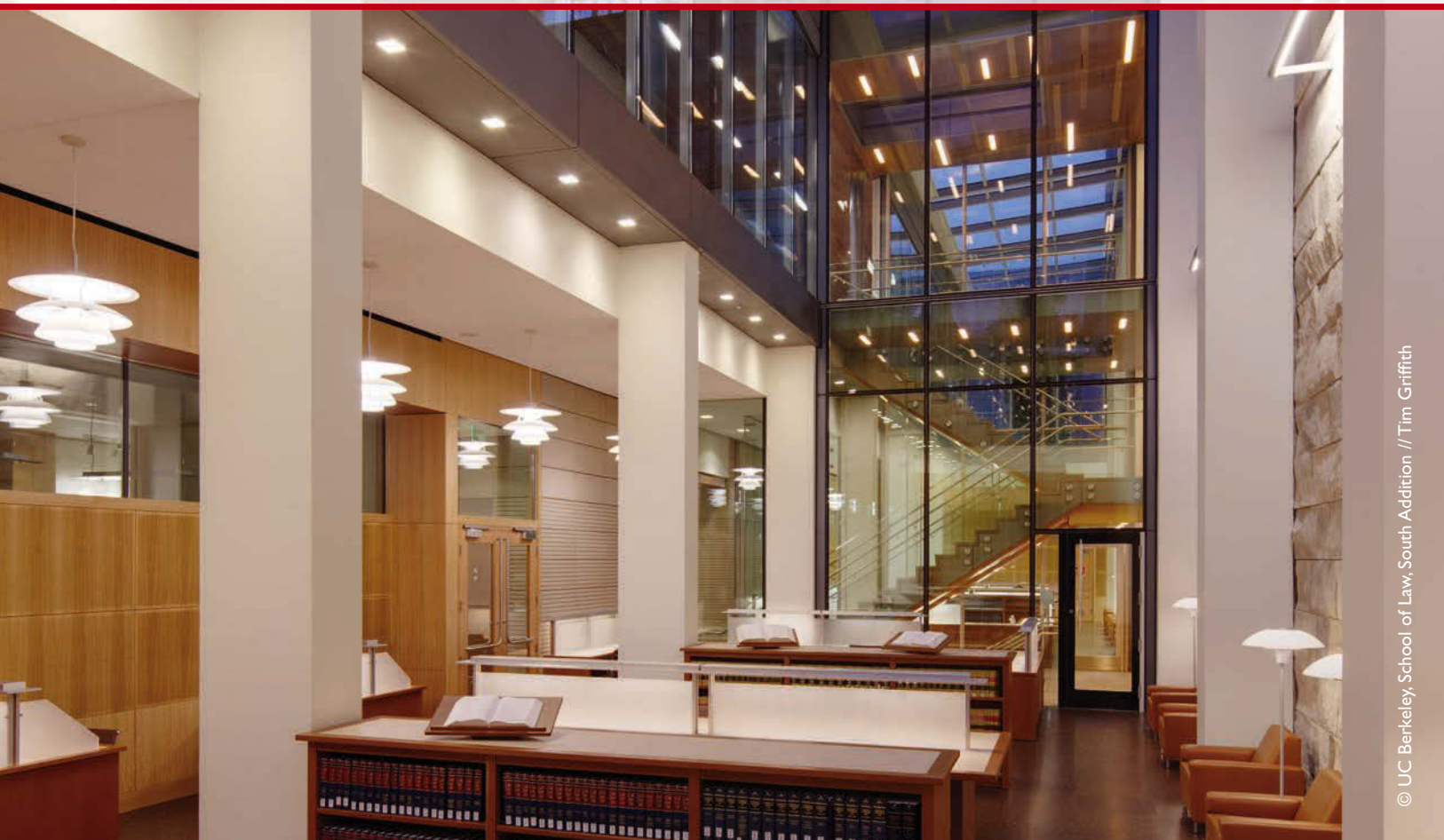


Let there be light

London's iconic Savoy Theatre has turned to a revolutionary new lighting system to bring its auditorium into the 21st century while also restoring the venue's original charm

The much loved Savoy Theatre on the Strand in London's West End was regarded as the most beautifully fitted theater in Europe when it opened in 1881. Built by Richard D'Oyly Carte to showcase the operas of Gilbert and Sullivan, the Savoy has seen all manner of change across the years. Gutted and completely refitted by D'Oyly Carte's son Rupert in 1929, and ravaged by fire in 1990, it reopened in a blaze of publicity in 1993 with a Royal Gala performance in the presence of the Princess of Wales. The theater has hosted countless prestigious productions across the decades, from plays by Coward and Stoppard to performances by the Royal Shakespeare Company and English National Ballet. Never forgetting its roots, the D'Oyly Carte Opera Company returned to the Savoy Theatre in 2000 to stage a season of Gilbert and Sullivan productions.

Given the dazzling array of stars that have graced its stage, the Savoy has little need to stake any further claims to fame. Ultimately though, there exists one fact about this 123-year-old institution that perhaps trumps all others. When it opened in 1881, the Savoy Theatre was the first public building in the world to be illuminated by incandescent electric lighting.

A modern makeover

Assured of its place in the pantheon of iconic theaters for its artistic history and technical importance alike, the Savoy Theatre has now experienced another twist in its fascinating tale. Fittingly, this development once again concerns the theater's provision for lighting. Just as the Savoy first opened its doors with the cutting edge of technology to the fore, now it has embraced the LED revolution in a move that demonstrates a commitment not only to enhancing the experience of its audience, but toward improving its environmental sustainability as well.

Early in 2014, the Savoy's owners took the decision to replace its existing house-light system, which comprised traditional 40-60W tungsten candle-lamps and cold cathode tubing, with an energy-efficient, environmentally friendly system. When the Savoy invited Global Design Solutions (GDS), in conjunction with installers White Light, to consult over the best way forward, the legendary theater was once again the focus of some cutting-edge thinking.


Photos: John MacKenzie

Main: **Installed by White Light, the new lighting system is based entirely on LED technology**

Opposite: **GDS's 4W LED candle-lamps replaced the existing 40-60W tungsten candle-lamps**

Above: **The house lights can be controlled from the stage door area as well as from the auditorium. This dual feature is for the convenience of staff closing the theater at the end of a working day**

Main: **Cold cathode tubing around the ceiling edges and other areas was replaced by an LED strip (19.2W/meter) with GDS's wireless constant voltage drivers**

Right: **269 clear and frosted ArcLamp fittings installed in the theater are wirelessly driven by 52 D4 drivers via two transmitters, controlled from three eight-button panels**

The new system was to be retrofitted with no impact on the fabric of the historic site and, given the spectacular nature of the interior, the installation was to replicate as closely as possible the way in which the auditorium had traditionally been lit, ensuring that the detailed architectural features were not compromised by the characteristics of the new lighting. The system was to be wireless throughout, with a further specific requirement that the house-lights should be operable from the stage door as well as from the auditorium itself, for the convenience of staff closing the theater at the end of the day.

To satisfy the demands of the brief and reflect the pioneering spirit of the Savoy, GDS employed its brand new ArcLamp product. The existing 40-60W tungsten candle-lamps were replaced by equivalent 4W LED candle-lamp fittings and the cold cathode tubing was swapped for LED strip (19.2W/meter) with GDS's exclusive wireless constant voltage drivers. Using ArcLamp in the Savoy also enabled GDS to tackle a problem that had previously been impossible to overcome. The lighting on the circle fronts, for example, could in theory have been replaced with existing mains LED options. Crucially, however, these options could not be fully and uniformly dimmed from 100 to zero. ArcSystem technology combined the ability to retain the integrity of the feature lighting (something only possible with a candle-lamp in such settings) with perfect dimming.

In total, 269 clear and frosted ArcLamp fittings were installed, wirelessly driven by 52 D4 drivers via two transmitters, controlled from three eight-button panels. The requirement that the system be controlled from the stage door area presented a different challenge. The distance from the auditorium to the stage door prevented the use of a wireless signal, so GDS modified one of the panels to run as wired from this location. It was a neat, retro solution – and ironic, given the nature of the rest of the installation.

Setting the stage

After an installation that took less than two weeks, the Savoy witnessed a 90% energy saving. The warm light offered by the ArcLamp fittings and LED strips highlight the beautiful interior of the theater like never before, while remaining completely faithful to the way in which the venue was designed to be illuminated.

"To our knowledge, ArcLamp is the world's first low-voltage candle-lamp that dims from 100 to zero absolutely smoothly," says GDS managing director Matt Lloyd. "Fundamentally, up to this point that was simply not possible and that's what makes this development such an exciting achievement. The results at the Savoy Theatre speak for themselves and it is fitting that our latest innovation should find a home in a venue of such historical magnitude."

"The ArcLamp fixtures are show stealers," agrees Simon Needle, special projects director at White Light. "To have created a low-voltage candle-lamp that can be quickly and easily retrofitted somewhere like the Savoy Theatre and deliver the kind of dimming control it does, is some achievement. The ArcLamp fixtures enable the theater to stay true to the intentions of its original interior designers, while the warmth of the light actually enhances the outcomes they were seeking."

In the Savoy's early days, audiences marveled not only at the productions but also at the beauty of the auditorium, lit as it was by the wonder of electricity. More than a century later, amid the impressive facts and figures that represent the hugely positive environmental impact of this installation, ArcLamp enables audiences to see the glorious interior of this iconic venue just as its creators intended, while enjoying the dramatic 21st century enhancements afforded by perfect dimming and cool running. ■

www.gds.uk.com

DESIGN
JOHN SERGIO FISHER & ASSOCIATES

Photos: Cielo Coelho

Phoenix rising

Almost seven years after a fire destroyed Garfield High School's auditorium, a new state-of-the-art performing arts center named after its most famous faculty member has risen from the ashes

Jaime Escalante, a mathematics teacher at Garfield High School, which is located in a Latino neighborhood of Los Angeles County, put the school on the map when he taught its students how to excel in mathematics and particularly in calculus. Edward Olmos earned an Oscar nomination for his portrayal of Escalante in the 1988 award-winning Hollywood film, *Stand and Deliver*.

The high school's original auditorium, built in 1930, was destroyed by a fire in 2007. The architectural joint venture between LHA (now gkkWorks) and JSFA (John Sergio Fisher & Associates) was hired to design the replacement auditorium and the administrative/classroom wing attached to it. JSFA was responsible for the design and documentation of the theaters, including a black box performance space and support areas, while gkkWorks was responsible for the exterior design skin and designed and documented the administrative and classroom functions. JSFA was also the theater consultant and Venaclausen the acoustical/AV consultant.

Garfield has made substantial contributions to the USA's entertainment industry from students who have performed in its auditorium. The administration and faculty desired a state-of-

the-art performance facility for drama, musicals, dance and many forms of music so that the tradition could be continued and strengthened.

The original auditorium had a capacity of 1,500 with 1,000 in a sloped orchestra/parterre level and a balcony seating 500. The new design has a capacity of 1,300 seats with 330 in the orchestral section and the remainder in the parterre, which rises with a gentle stadium rake to a second-story outdoor lobby separated by a cross aisle level with the stage for easy wheelchair access via side stages. There is also an orchestra pit with a motorized Spirolift platform that provides a stage thrust or an additional 35 seats.

Technology rollout

Since the performances put on in the auditorium attract audiences of various sizes, roll-drops with black scrims fall on the railing at the back of the cross aisle to visually reduce the capacity of the space. An audience member looking back sees black, but the scrim is acoustically and visually transparent from the central room when the stage is lit. Windows 30ft tall line the sidewalls with angled solar central devices on the exterior to prevent direct sunlight penetration. Acoustical banners black out the windows during the day or when the hall needs damping. There is a correlation between daytime concerts with daylight and a longer reverberation time. The chamber also has adjustable reverberation times from 1 second for the sound system or unreinforced drama to 1.7 seconds for band and orchestra. In addition to the acoustical banners there are moving draperies at the rear of the tension grid and along the sidewalls.

The diamond-shaped coffered ceiling is reminiscent of the former ceiling. It has tapered flutes that help diffuse the soundwaves.

All of the anteproscenium lighting positions are on pipes mounted on a double-wide tension grid that segmentally curves with the seating. There are box boom positions and four flying electrics on stage. A follow-spot booth sits on top of the control room.

The stage is 39 x 90ft with a 4ft apron and a 50 x 24ft proscenium opening. A manual counterweight rigging system was used for teaching purposes with 30 line sets including the electrics. There are flying light ladders and a pin rail for spot rigging. A gridiron with stair access was used to ensure the safety of the high school's students. There are traps on the stage that open to a trap room below.

Opposite: **The lobby, box office, concessions and audience restrooms of the Jaime Escalante Performing Arts Auditorium are all located outside the venue**

Above: **The new 1,300-seat theater has had roll-drops with transparent black scrims installed at the back of the cross aisle to partition the room to cater for different audience capacities**

Below: **A 100-seat box theater doubles up as a video studio with a green infinity wall or a dance studio with a mirrored wall covered by draperies**

Facilities aplenty

A stagecraft shop with tall sound doors is immediately adjacent stage right. Stage left has a corridor that acoustically isolates a 100-seat black box theater that also doubles as a video studio and sometimes as a dance studio. For dance it has one mirrored wall, covered by draperies. For video production it has a green infinity wall. A catwalk system above is accessible by elevator for wheelchairs. A deeper catwalk becomes the drama control position. Video control is in the basement with camera viewing. The black box theater has a subtle performance platform that opens to Escalante Plaza, which has murals commemorating the famous teacher's career. The dressing rooms and green room are in the basement along with a costume shop, costume storage, prop room and other utilitarian spaces.

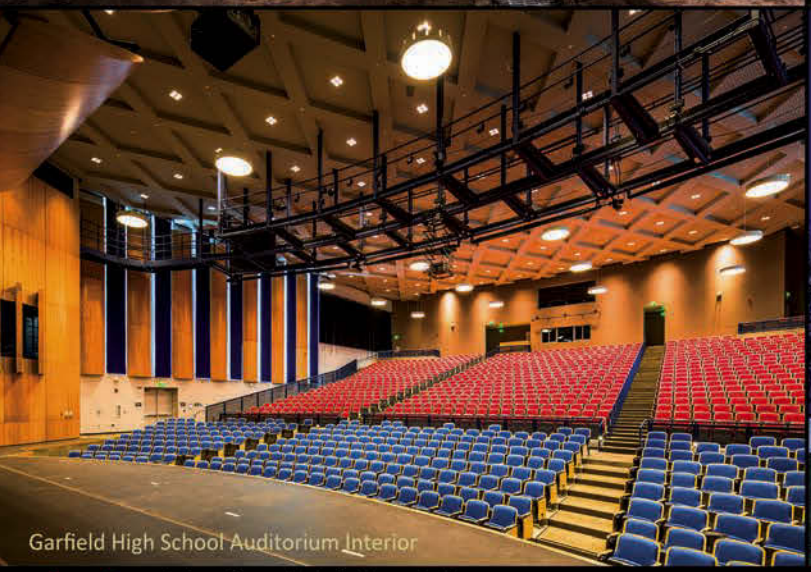
The lobby is located outdoors and protected by a large overhang that supports photomurals of performers. The box office, concessions and audience restrooms are also outdoors, in the idyllic California climate. The gross enclosed area for the performing arts center is 25,300ft^2.

The Los Angeles Unified School District, school administration and staff have praised the building and theater as being beautiful, an inspiration for learning and furthering Latino contributions to the arts. ■

www.jsfarchs.com

Agoura High School Performing Arts Education Center

Calabasas High School Performing Arts Education Center



Garfield High School Auditorium Interior

Santa Barbara City College Drama-Music Building Modernization

jsfa **John Sergio Fisher & Assoc.**
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Times Square Broadway 4D Theatre Renovation

Long Beach Arena Pacific Ball Room Opening Event

Long Beach Arena Pacific Ball Room Opening Event

Long Beach Arena Pacific Ball Room Renovation

Tailor-made

One firm's work in Scandinavia is helping the region realize design solutions that respond to the different needs and cultural identities of its individual communities

Independent engineering, design and consulting firm Arup aims to be a long-term partner for its clients and the communities it serves. This is particularly true of the company's work as an arts planner and design consultant, where the firm is typically at the very center of coordinated efforts to maximize the positive impact that the facilities have on their communities and regions.

Raj Patel, Arup director, says, "In Scandinavia, Arup has been fortunate to play a leading role for several decades, shaping the acoustical and theatrical experience of audiences across the entire region. Through a remarkable period of investment in performing arts infrastructure in the area, Arup has been pivotal in the delivery of a remarkable number of venues, spanning a wide range of investment levels."

Arup's work as a performing arts design consultant providing integrated theater, acoustics and audio-visual design and planning services include such lauded facilities as the Operaen (opera house), Skuespilhus (national drama theater) and Tivoli rehearsal room in Copenhagen; the Norske Opera in Oslo; the Sibeliustalo Congress and Concert Center in Lahti; the Musikhuset Concert Hall in Aarhus; the Alsion Concert Hall in Sønderborg; the Kilden Performing Arts Centre in Kristiansand, and the Harpa – Reykjavik Concert and Conference Centre.

Some of this experience is enhanced through the integration of Artec into Arup and collaboration with local consultants, including Gade Mortensen, Cowi, Brekke & Strand Akustikk, among others. Individually, and seen as a whole, this is a fascinating collection of venues. Each is loved by the artists and audiences alike, but they also represent a diversity that demonstrates responsiveness to the specific needs of each individual community.

"Every aspect of each venue is individually tailored to the community, while also delivering experiences to national and international standards," says Rob Harris, Arup director. "Acoustics, for example, reflect specific cultural preferences."

The 1,300-seat concert hall in the North Jutland House of Music in Aalborg, Denmark

Collaborative solutions

The North Jutland House of Music in Aalborg, Denmark, opened in late March of this year with an ambitious week of concerts aimed at reaching out to audiences in the large Danish city, spanning performances by the Aalborg Symphony Orchestra, Jamie Cullen, the Danish Radio Symphony Orchestra, the Royal Philharmonic Orchestra of London, and the Disney Pirates of the Caribbean.

Carefully designed with Wolf D Prix of renowned Austrian architectural firm Coop Himmelb(l)au to respond to the needs of four resident organizations – the Musikkenhus management, Aalborg Symphony Orchestra, Aalborg University's music department and the Royal Academy of Music in Aalborg – the facility is an exciting and vibrant platform that will support the long-term sustainability of the performing arts in the region for generations to come. While meeting the individual needs of the groups, the facility promotes a real sense of

Photos: Duccio Malagamba

Rendering: DRDH Architects

community within the building, actively creating an environment where the students, professionals and audiences will interact in different ways.

The focal point of the building is a stunning 1,300-seat concert hall that provides a visually and acoustically unique experience for audiences and artists alike. There are also three smaller performance spaces – each acoustically tailored for different usages – and a multitude of rehearsal, teaching and practice studios. Ed Arenius, Arup associate director and a lead designer on the project, remembers, "Working with the Coop Himmelb(l)au team has been a very close and iterative collaboration. Each and every curve, line and surface within the facility has been looked at holistically to ensure that the end result works for the visual aesthetics, the technical and spatial needs of the artists, and the audience's visual and acoustical experience of the performance."

Tateo Nakajima, Arup director and another lead designer on the project, has been working closely with the artists and educators in the facility as they have taken possession of their new home. "Post-opening support to the communities and stakeholders is a key part of our work in ensuring the long-term sustainability and impact. As acoustics and theater designers, we have a responsibility to see that our work is as effective and responsive to the needs of the community as intended."

Variability without compromise

In Bodø, Norway, Arup is providing acoustics and theater design consulting services to the community as it completes an impressive development, the Kulturkvartalet, with a new library and three performing arts venues. The Kulturhus will be home to the Arctic Philharmonic Orchestra, and the main venue has been designed to its needs, while allowing for a broad range of other uses, including conferences, theater, cinema and musical theater.

Upon completion, the Kulturkvartalet in Bodø, Norway, will become the new home of the Arctic Philharmonic Orchestra. It will also cater for conferences, cinema and musical theater

Photo: Arup

"Achieving the variability of the main performance space without compromising on the quality of the symphony acoustics was of key importance in the project," says Ian Knowles, the Arup director responsible for the project. "This flexibility of usage is being achieved through adjustable acoustics elements on the wall surfaces and an innovative and unique approach to the transformation of the proscenium area into a concert enclosure for the orchestra."

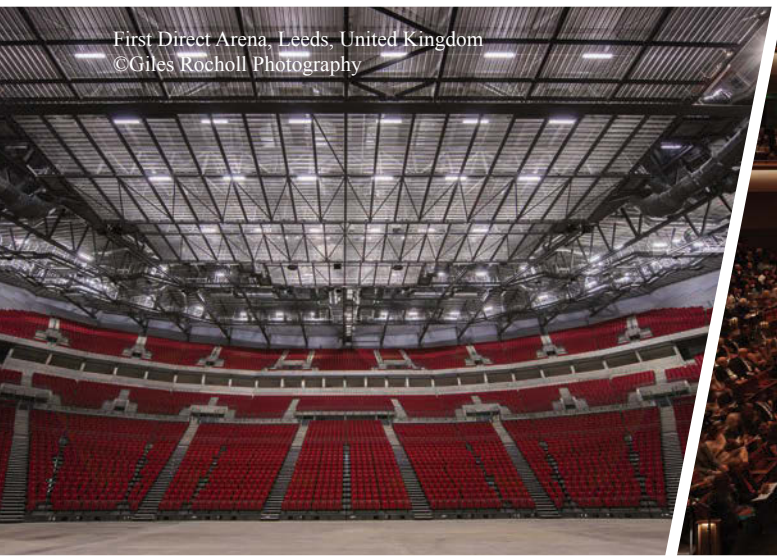
The result of a close collaboration with London-based DRDH Architects, the facility also includes a smaller speech drama performance venue and a small space that will be the home of Bodø's jazz club.

Arup is proud of its work across Scandinavia – creating spaces of community gathering and positively influencing the way people experience the arts. The company's presence in Copenhagen in particular is emblematic of its commitment to the region. Sandra Akmansoy, director of Arup Denmark, says, "We are very happy to be able to build on many years of work in Scandinavia, and great collaborations around the world with designers from Scandinavia, by establishing an office in Copenhagen. As members of the community ourselves, we will continue to invest here and provide ongoing support to the development of cultural infrastructure." ■

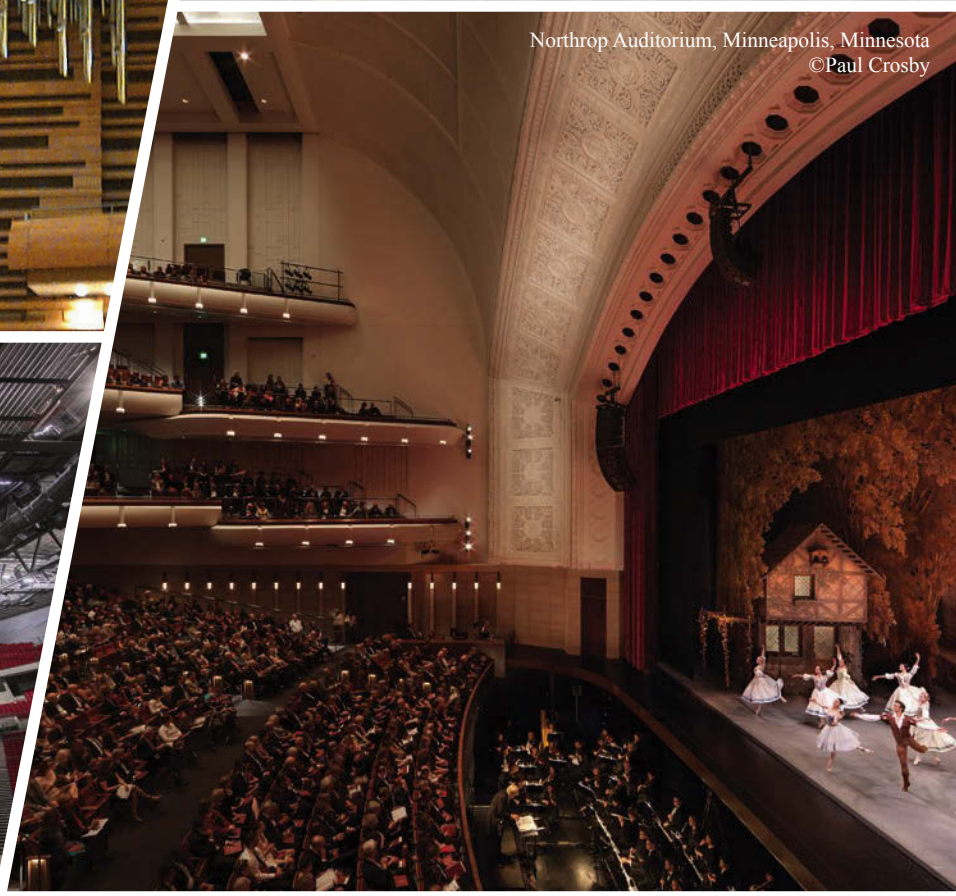
www.arup.com

Maison Symphonique de Montréal, Montréal, Québec

HARPA, Reykjavik, Iceland



First Direct Arena, Leeds, United Kingdom
©Giles Rocholl Photography



Northrop Auditorium, Minneapolis, Minnesota
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DESIGN

DIAMOND SCHMITT ARCHITECTS

FISHER DACHS ASSOCIATES / MÜLLER-BBM

Theater studies

The design team behind the Mariinsky II Theatre in St Petersburg set out to create a contemporary venue that harks back to the prestigious days of its predecessor

The first new Russian opera house since the time of the czars, the Mariinsky II Theatre – which opened in St Petersburg in May 2013 – is a contemporary hall based on the principles of the opera houses of the 18th and 19th centuries. This homage is particularly appropriate given the new venue's location. It is adjacent to the original Mariinsky Theatre, which opened in 1860 and whose neoclassical façade is reflected in the welcoming bay window transparency of the lobbies of the new theater.

To meet the demands of the Mariinsky Theatre Company and its artistic and general director Valery Gergiev, the 2,000-seat auditorium had to succeed in ways the former theater could not – providing an exceptional experience for audience and performers alike. The company's production aspirations had badly outgrown the 19th century hall.

Gergiev selected his architect after a visit to Toronto's Four Seasons Centre for the Performing Arts, the first purpose-built opera house in Canada. "I was struck by its beauty, its practicality and friendliness with neighboring buildings and its superb acoustics," he explains.

Toronto's Diamond Schmitt Architects and New York-based theater consultant Fisher Dachs Associates (FDA) joined with German acoustician Müller-BBM, which had previously been part of an unrealized scheme for Mariinsky II. The three firms, together with Gergiev, shared a common goal – to deliver first-rate acoustics in a room that resonated with the history of the art form and its rich Russian traditions.

Above: **Open stairways in the lobby surround a floating bridge enclosed in glass**

Right: **The main hall features convex elements and a pattern of horizonal grooves on the walls to counter the scattering of sound that results from its concave horseshoe shape**

Below: **The orginal Mariinsky Theatre's neoclassical façade is reflected in the transparent bay window of the new theater**

Photos: Tim Griffith

Sound effects

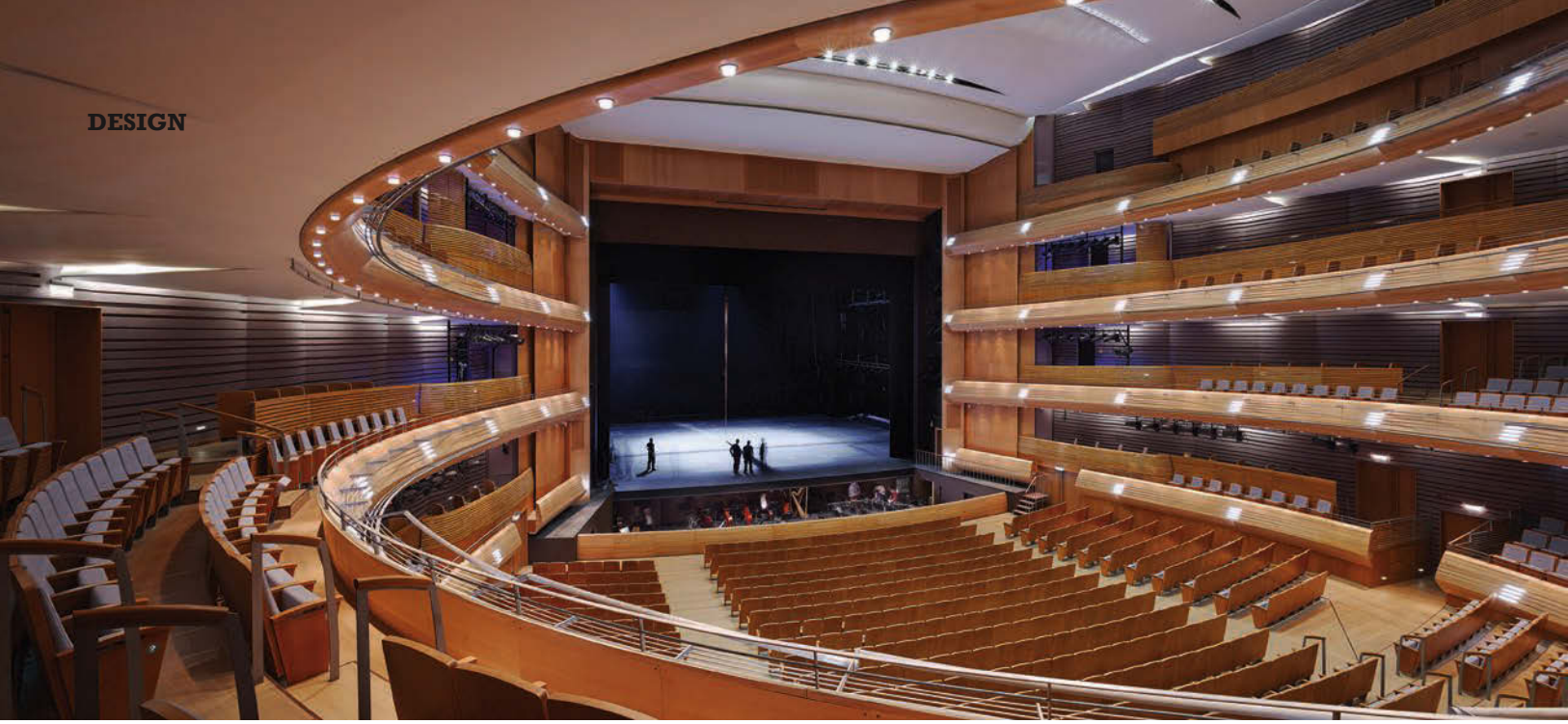
"The essential ingredient of good acoustics is good sightlines," says architect Jack Diamond, a belief echoed by FDA's Joshua Dachs: "You hear with your eyes." The acousticians' role was to give their partners the freedom to create a customized room and support them and the architectural design. "We leave the design to the architects and then create excellent acoustics within the spaces they design," says Müller-BBM's Andreas Wagner.

A traditional horseshoe shape was selected for the auditorium, to create a rich, vibrant space wallpapered with viewers' faces. The trio of theater specialists set about optimizing the performance of the room – the configuration of the walls, their sound reflection or absorption qualities, their strategic disposition, and the volume and shape of the auditorium.

The ideal volume per listener in terms of acoustics led to the determination of the required ceiling height. "With a height of more than 18m (60ft) above the orchestra pit, the acoustic requirements for a sufficient volume and Gergiev's wish for 'breathing space' above the musicians are fulfilled," says Müller-BBM's Jürgen Reinhold.

Since the concave curve of the horseshoe focuses sound, the acousticians provided for the scattering of sound by means of convex elements and a pattern of horizontal grooves on the walls. The material itself offers additional functionality, with a special plaster prepared on-site and applied to the wall surfaces adding to the sound diffusion. The sculptured shape of the solid beech wood balcony fronts augments the reflective properties of the room.

Unlike many large classical theaters, which often include five balconies, the Mariinsky II features only three. With greater height between



Above: **With fixed acoustics, the auditorium conforms to the demands of ballet and opera. However, the orchestra pit, which can accomodate up to 120 musicians, is flexible in size and depth to balance orchestral-vocal demands**

each level, more sound energy reaches into them, allowing the audience to enjoy perfect acoustics even in the rear rows of balcony seats.

Seeing is believing

To further enhance the audience experience, computer modeling of the view from every seat ensured that proper sightlines were established. Architecturally, this is accomplished by varying the elevation of balcony floors. Though it is relatively simple to produce such a design on the computer, it is more difficult to realize in construction. It was therefore essential to integrate FDA's geometric calculations for good sightlines, and for Diamond Schmitt to translate those specifications into constructible solutions.

When Gergiev expressed his preference for fixed rather than variable acoustics in the auditorium, the design team shared his belief that a designated opera/ballet house should conform to the specific demands of those musical genres. To accommodate the wide Mariinsky repertoire, the orchestra pit is flexible in size and depth to balance many orchestral-vocal demands. "Up to 120 musicians can be arranged in the pit, and by means of mobile partitions its total area of 150m² [1,600ft²] can be reduced to 110m²[1,180ft²]," says Reinhold.

In a further nod to classical European theaters, the auditorium has a wooden floor that rests on a wooden substructure. The light structure enhances the orchestra's fortissimo with subtle floor vibrations, which can be felt in the orchestra seating as well as the balconies.

One unusual feature of Mariinsky II stems from traditional Russian venues – the sumptuous czar's box, or VIP box. This exotic design element posed a challenge. "How would the intimacy we were striving for be affected by an enormous break in the loge and balcony-level seating?" explains Dachs. Diamond Schmitt and the group devised a clever solution – a double-height room with a seamless transition, whose finishes would be the same as the rest of the hall. Only a chandelier indicates its relative pomp. Secure access was achieved with a floating bridge enclosed in glass, snaking in full view among the lobby's open stairways and lookout points.

At the venue's opening, something magical happened. Diana Vishneva, star of the Mariinsky Ballet, had just finished dancing the Bolero, choreographed by Maurice Béjart. As Vishneva took a bow, the audience stood, turned, and began clapping toward the back of the hall, raising their eyes and hands toward the czar's box. A slender woman in green stood, greeted Vishneva with a wave and a kiss, and bowed. The woman was Maya Plisetskaya, for whom the piece was originally choreographed. The audience turned back to the stage and applauded with even more gusto toward Vishneva, who was waving at Plisetskaya. "The moment brought the house alive," says Dachs. "The box turned out to be a second stage in the room and the combination of the two was wonderful."

The Mariinsky design team has created a dynamic theater, an inner sanctum of effective sound isolation surrounded by engaging public spaces. The curved auditorium walls in the lobbies feature backlit onyx and animate not only the theater space but are also a visible beacon from the street. ■

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“I feel certain 25 years from now, **Mariinsky II** will be seen as a St. Petersburg landmark in its own right, recognized for its superb acoustics, dazzling production facilities and unsurpassed level of audience comfort.”

Valery Gergiev, Artistic & General Director of the Mariinsky Theatre
Reuters, May 2013

Diamond Schmitt Architects

FDA
Fisher Dachs Associates
Theatre Planning & Design

MBBM
MÜLLER-BBM GROUP

photo © Tim Griffith

Mariinsky II
St. Petersburg, Russia

www.dsai.ca www.fda-online.com www.muellerbbm.de

DESIGN
JOHN SERGIO FISHER & ASSOCIATES

Heightened senses

After standing vacant for 20 years, New York City's Times Square Theater is being transformed into a state-of-the-art 4D cinema that also honors the building's elegant regency-style aesthetics

The Broadway 4D Theater is an adaptive reuse of Times Square Theater, which was originally built in 1920 on West 42nd Street in the Times Square area of New York City. Designed by the architects De Rosa & Pereira, it was initially a live performance and theatrical venue before being converted into a store and movie theater. It has, however, been vacant for the past 20 years. Until now. The current project, which has started construction, will see this historic building transformed into a state-of-the-art 4D cinematic experience. The project and show design is by Gary Goddard Entertainment; the architect, theater consultant and acoustician is John Sergio Fisher & Associates; the audio-video engineering is by Electrosonic; and the special effects and lighting is by Grayson Production Services.

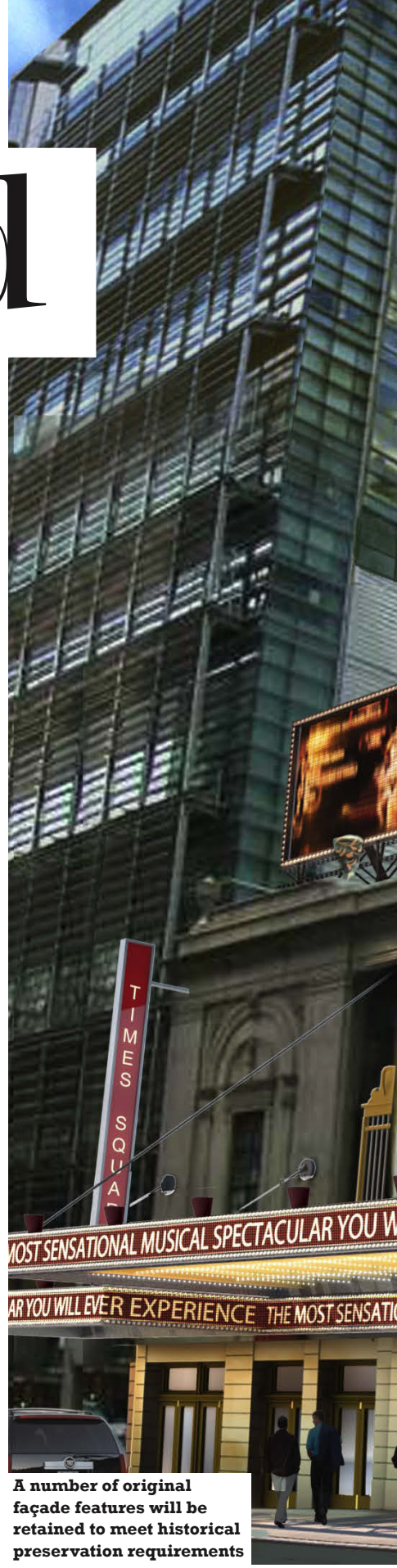
The intended show program will showcase the pageantry and dynamism of Broadway theater productions such as *South Pacific*, *Oklahoma* and *Phantom of the Opera*, which the audience will not only experience in 3D, but they will also feel their seats move, smell scents, see confetti and be immersed in numerous other effects. These special effects will use equipment positioned in the attic, balcony cavity and cellar. As patrons enter the building past the box office, their experience will start with a pre-show projected onto one of the old fly tower walls. They will be provided with a glimpse of the typical mayhem that occurs behind-the-scenes, simulating the experience of being in a working theater and whetting the patrons' anticipation for the forthcoming 4D experience.

Negotiating with history

The requirements for a 4D theater are demanding on any building's design, however they are compounded in this particular case due to the historical preservation requirements of the Times Square Theater. The lease agreement from the landlord, New 42nd Street Company, states that certain historical elements of the building must remain intact. Both interior and exterior requirements are dictated and critically reviewed by numerous stakeholders.

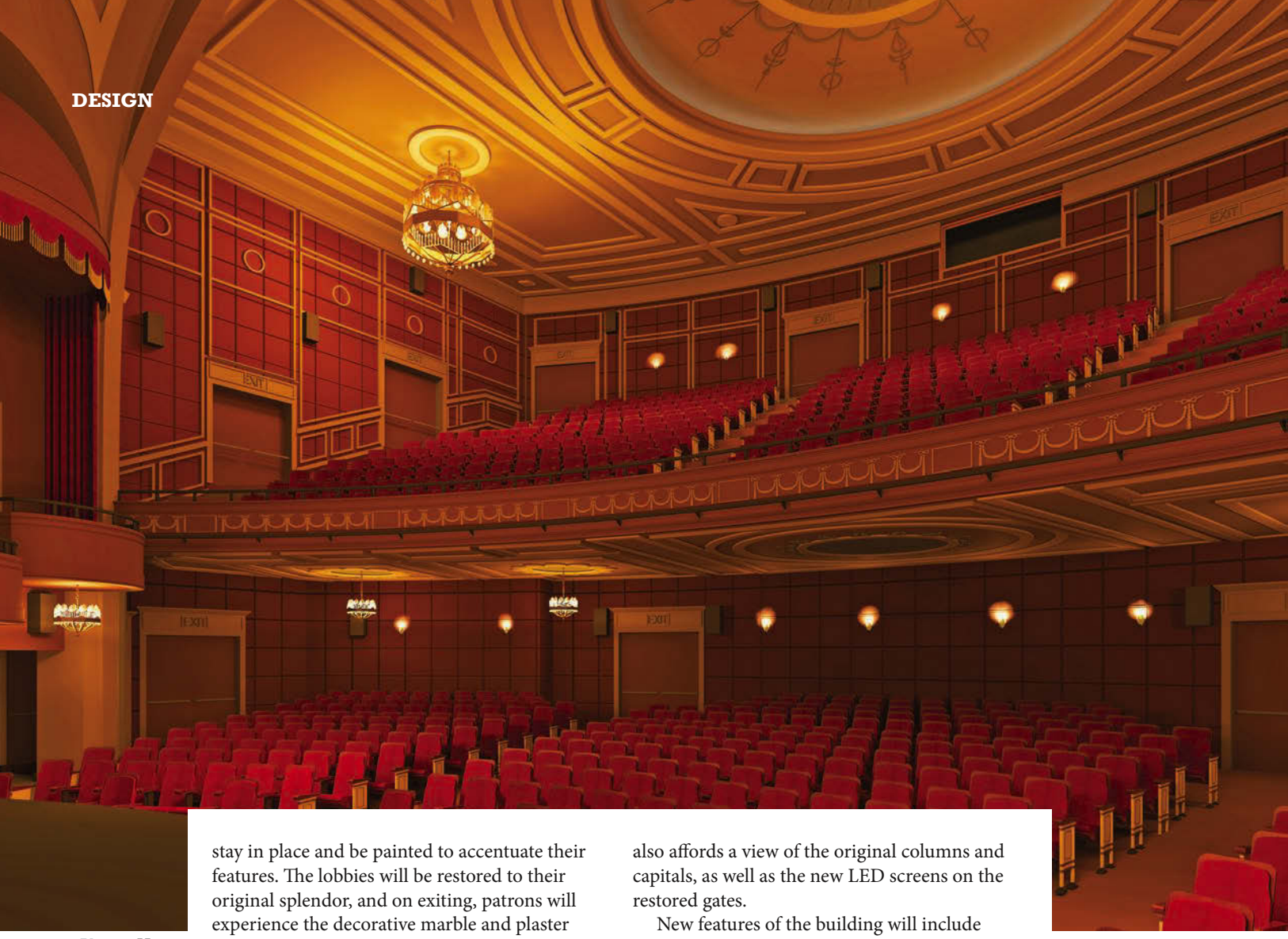
One of the primary challenges is converting the audience chamber to be code-compliant, requiring a new firewall at the rear of the venue. This is necessitated by the landlord's reconfiguration for exiting the Foxwoods Theater to the north, another venue under its domain. The new firewall will restore the legal egress and convert the former stage into an entrance area; however this new firewall will also affect the decorative plaster ceilings at the underside of the balcony. The final layout ensures the least amount of disruption to the historical plasterwork and provides an efficient means of egress.

Additional show production requirements identified the need for creating an appropriate reverberation time, providing areas for rigged special effects equipment, appropriate speaker and light placement, and ensuring that the projection room functions correctly given the existing constraints. These requirements will be melded to the existing building's historical trim moldings and plaster features and kept in place. The new acoustic panels with tapered edges will fit into the existing molding areas. The plaster rosettes, garlands, molding and wainscot will



A number of original façade features will be retained to meet historical preservation requirements


TIMES SQUARE THEATRE
BROADWAY
SPIDER-MAN TURN OFF THE DARK
FOXWOODS THEATRE
SPIDER-MAN TURN OFF THE DARK
217 WEST 42nd STREET
BOX OFFICE



Above: **New acoustic panels with tapered edges will fit into the theater's existing molding areas**

stay in place and be painted to accentuate their features. The lobbies will be restored to their original splendor, and on exiting, patrons will experience the decorative marble and plaster features of the regency-style architecture that is referenced throughout the building.

Preservation society

For the theater's exterior, numerous existing features must be preserved, including the limestone and stone façade, Corinthian capped-column open colonnade, the bookend arches with large steel-mullioned windows, and limestone parapet urns. Augmenting these base features of the building façade's rehabilitation will be a restored blade sign and gates within the colonnade, which will serve as announcement boards for the show (originally on canvas though now LED screens), and a new marquee that will reflect the original design intent of a glass canopy and be highlighted with LED streaming-edge announcements, shielded lighting and an occasional performance announcing the 4D experience. The use of glass for the marquee will protect it from the elements and keep the original building impression as visible as possible to the public. Thus, the marquee not only provides protection from the weather but also affords a view of the original columns and capitals, as well as the new LED screens on the restored gates.

New features of the building will include a set of three segmented LED screens above the parapet to highlight the venue's current show. These signs will also reflect the threefold aspect of the building's façade. An additional channel-letter sign, reflecting the old-fashioned theater signs, will announce the original name of the theater: Times Square Theater. It will be positioned above the original fly tower. This is meant to symbolize the resilience and determination of restoring such a dilapidated old theater in the Times Square area and represents the reinstatement of the building into the family of theaters that comprises the Times Square theater district.

The vision for this renewed theater is that it will serve as a magnet and provide affordable entertainment in a classic venue in the heart of New York City. The use of new technology will entice people into the West 42nd Street, Times Square area to enjoy what this historic theater has to offer: an innovative cinematic experience of classic Broadway stage productions. ■

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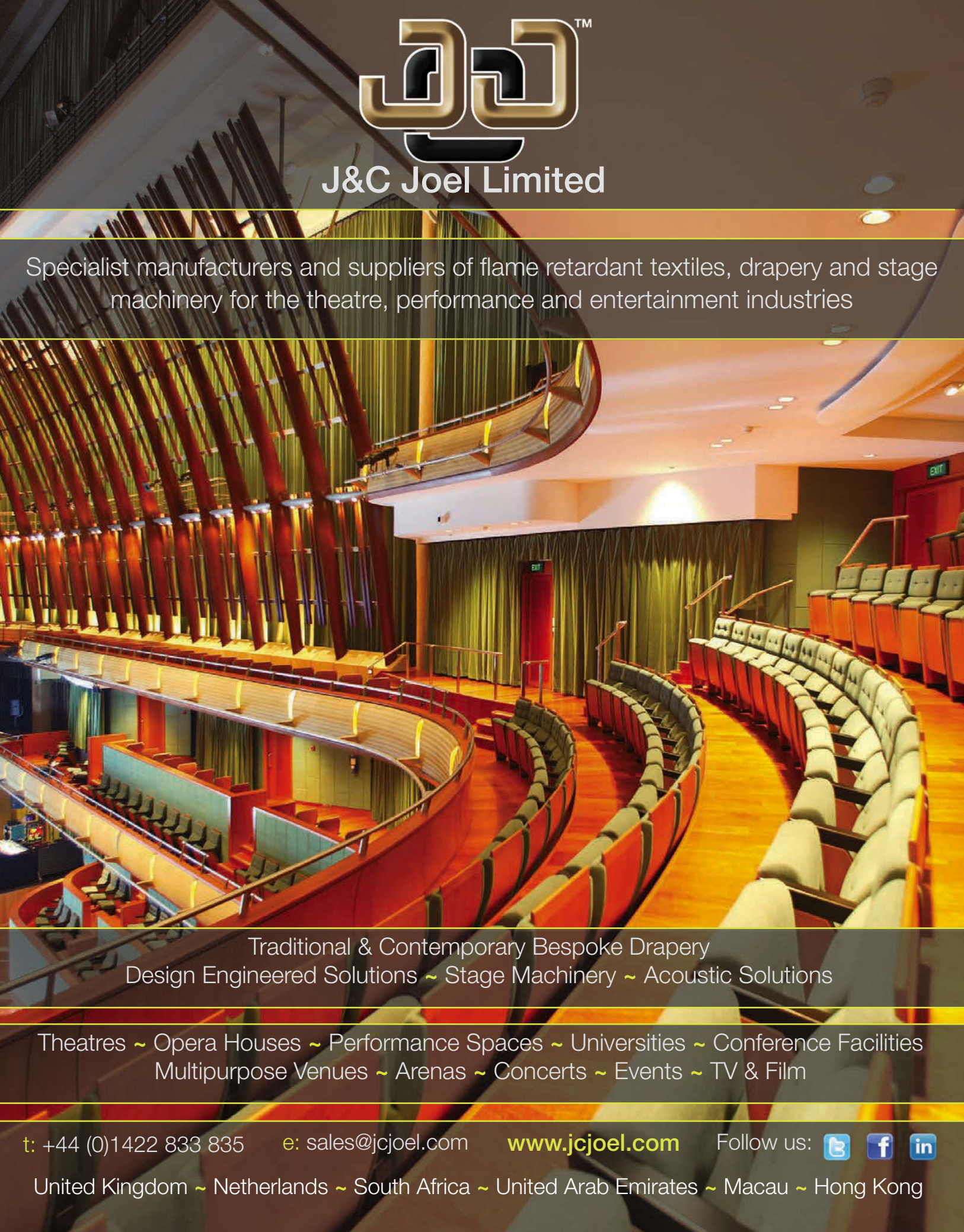

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Be seated

An Italian seating manufacturer is prospering in the intersecting point between design and functionality to produce bespoke fixed seating systems for a range of disparate projects

Poltrona Frau Contract has a long tradition of manufacturing high-quality seating. Audiences the world over have enjoyed first-hand the comfort, design and elegance of the company's seating solutions in the most prestigious theaters and concert halls. Poltrona Frau Contract stays up-to-date with perpetually changing developments in the sector so that it can continue to create the best seating systems. It combines advanced technology, rigorous safety testing and expertise in auditorium/theater acoustics and visibility with highly skilled workmanship. The mastery of craft achieved by Poltrona Frau Contract in more than 100 years ensures that it can express the designer's creativity down to the finest detail. The focus is always on providing a finely tailored product and turnkey service that includes all phases from engineering and prototyping to installation and post-sales assistance.

The company has completed more than 1,000 projects in more than 50 countries from a range of 20 customizable seating collections and 1,200 compliance certificates. In 2014, it was involved in three very important projects that showcase the company's ability.

Playing with the senses

After four years of construction, Queen Margrethe II ceremoniously opened the House of Music in Aalborg, Denmark, on March 29, 2014. The venue extends the concept of space as a liquid box, combining cultural and educational functions in an open system to enable synergy and exchange between the public,

Poltrona Frau Contract supplied 1,300 Pitagora Rosso chairs to the House of Music's concert hall in Aalborg, Denmark

artists, students and educators. The cultural center was designed by Austrian architectural studio Coop Himmelb(l)au as a school and concert hall. Its hybrid structure includes public and performance spaces as well as a range of dedicated infrastructures.

"The idea behind the building can be read from the outer shape," explains Wolf D Prix, design principal and CEO of Coop Himmelb(l)au. "The school totally embraces the concert hall."

The exterior's geometric and strict shapes are combined with the dynamic and sinuous internal forms of the concert hall. This style of architecture applied by Coop Himmelb(l)au is designed to support and encourage creativity.

The project was also an extraordinary opportunity for Poltrona Frau Contract to demonstrate its ability to converge design and function and bring life to the vision of any project. Important both in terms of numbers (1,300 Pitagora chairs were supplied) and prestige (another international project managed with one of the most influential and dynamic architectural and design studios in the world), the concert hall forms the core of a compact, U-shaped block with rooms for music education and practicing. The flowing shapes and curves of the auditorium inside are in stark contrast to the strict, cubic outer shape. The seats in the orchestra and curved balconies are arranged in such a way that offers the best possible acoustics and views of the stage. This highly complex acoustic concept was developed in collaboration with Tateo Nakajima, a director at design consultancy Arup.

Above: **The Swiss Tech Convention Center features an amphitheater with 3,000 seats that can be reconfigured into a 19,000ft² banquet hall**

Conference lab of the future

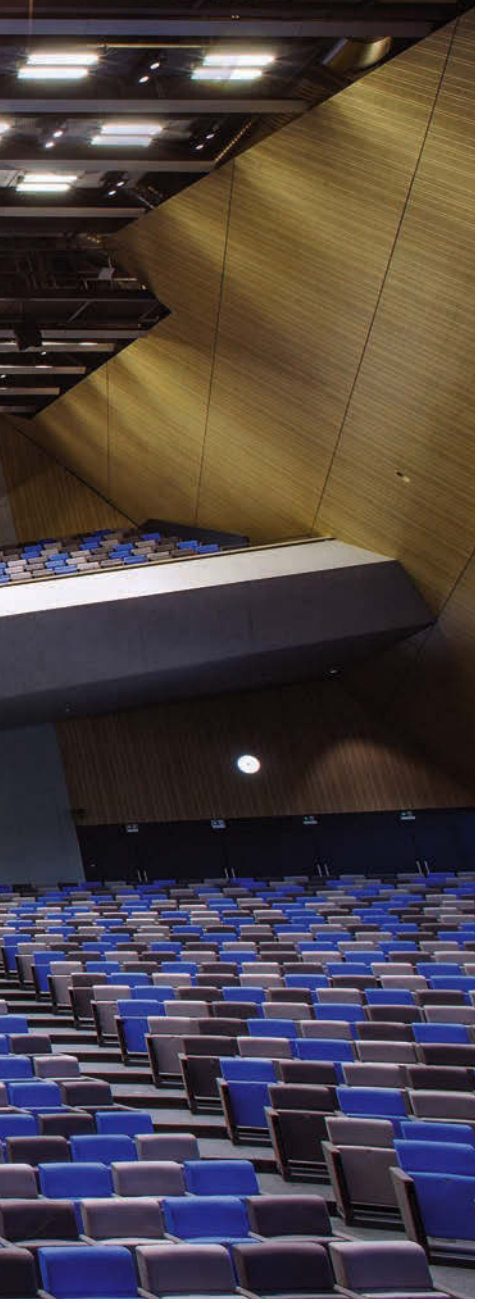
The Swiss Tech Convention Center, opened in April 2014, is one of the most modern and best-equipped conference centers in the world. With this new tool making it possible to organize the most ambitious meetings, École Polytechnique Fédérale de Lausanne (EPFL) – a school located inside the building – has reaffirmed its position at the heart of Europe's scientific community.

"The Swiss Tech Convention Center is a world-class tool for the exchange of knowledge through which our school can make critical contributions to solving major societal challenges," explains André Schneider, vice president of planning and logistics at EPFL. He wants the new venue to be far more than just one of the most modern academic institutions in the world. "As one of the few convention centers in Europe to be established on a university campus, it will also serve as a smart conferencing lab – a place to experiment with the most innovative technologies for improving the flow of ideas in scientific conferences and making these exchanges more fruitful."

Poltrona Frau Contract is the seating supplier for the 3,000-seat amphitheater, which uses Canadian company Gala Systems' stage equipment technology to automatically transform the large auditorium into a banquet hall of more than 19,000ft² in around 15 minutes. Multiple intermediate configurations offer event organizers unsurpassed flexibility. The ground floor offers the possibility of countless workroom configurations across an area of nearly 16,000ft².

Planetarium chairs

Poltrona Frau Contract has teamed with Grimshaw Architects for the Patricia and Phillip



Frost Museum of Science in Miami, Florida. For this project, Grimshaw designed both the building's exterior and interior. This monumental work will bring a 269,000ft² museum space to the city of Miami that will host exhibitions and events related to the fields of science and technology. The museum will also house a planetarium with 250 planetarium chairs, a laser projection system and a dome screen where images from any known point in the universe can be displayed.

Since the architectural practice was founded, a central element of Grimshaw's work has been industrial design pieces, and this expertise has been directly applied in the study and design of the museum.

With a mixed structure of wood and metal, the chairs will be made with different inclinations to ensure that visitors attending the presentations at the museum space have the best user experience possible. Under the direction of Grimshaw Architects, Poltrona Frau Contract's technical team has engineered seats that will meet the high expectations of clients, for a dynamic and fascinating space and a highly edifying learning experience.

Once again, Poltrona Frau Contract is an active participant in the creative development of a product designed by an international architectural firm, combining the philosophy behind seating with complex engineering features to create a unique and innovative product that can ensure perfect comfort. ■

www.pfgroupcontract.com

Above: **The 250 planetarium chairs will be made from wood and metal and have different inclinations**

Safe and sound

The latest stage technology is supporting the flexibility and ensuring the safety of the Czech Republic's first new theater of the 21st century

Right: **Jízdecká Theater, as seen from Palackeho Street**

Bottom right: **The theater will be completed in time for Pilsen's European Capital of Culture events in 2015**

A modern stage concept requires maximum versatility of use. It should be able to cover the production requirements of drama, opera, ballet, talk shows, musicals, various ceremonies and other public events. It is also necessary that it meets the minimum number of required changes over time and any necessary retrofitting, all while functioning with low operating costs and with ease of use of the technology.

The stage technology of a new theater on Palackeho Street in the Czech city of Pilsen – the country's first new theater of the 21st century – meets these requirements thanks to a bespoke solution developed by German engineering company and stage technology specialist Bosch Rexroth. It encompasses the upper and lower stage machinery, the stage control system, storage equipment and transportation platforms, as well as rehearsal room technology. Bosch Rexroth has also designed a versatile system using eight hydraulic drives and more than 160 electro-mechanical drives. Dubbed the SYB 3.0 stage control system, it delivers convenient operation.

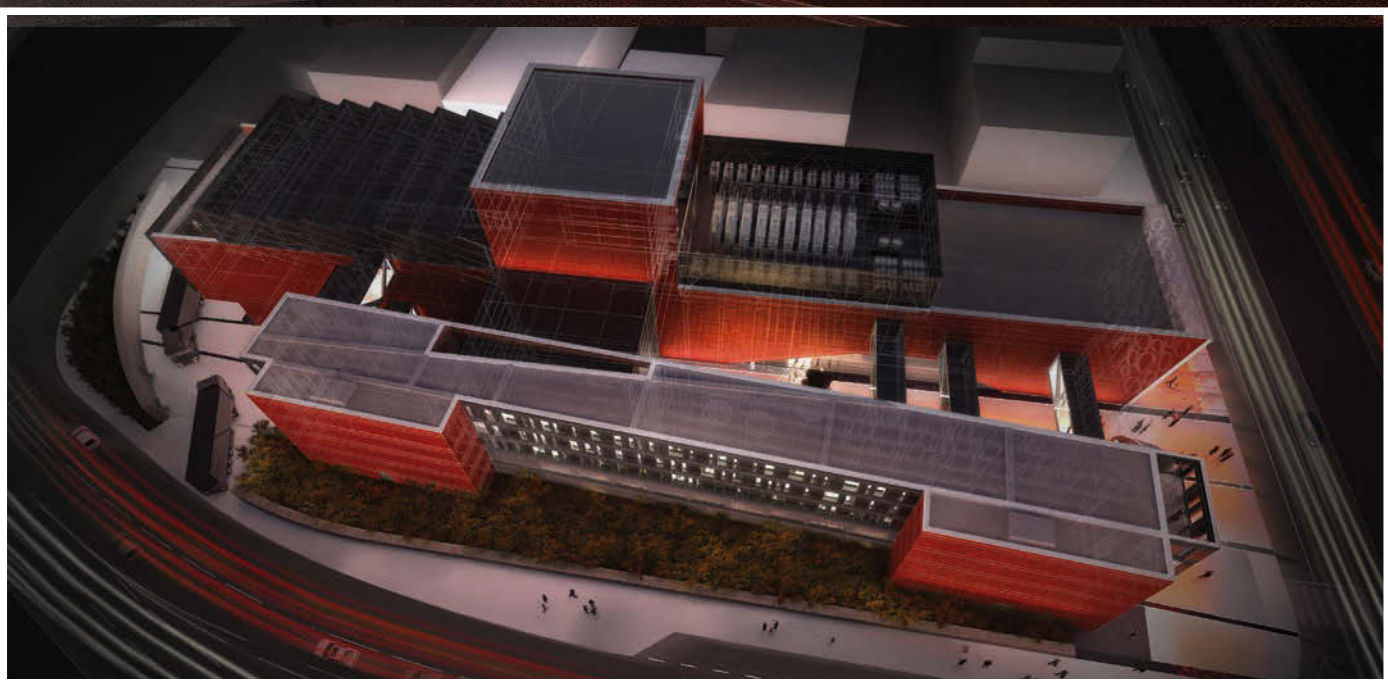
The principal foundation of this technology is an innovative concept involving the upper and lower stages and their connection with the auditorium. The Jízdecká Theater includes a main stage for 461 spectators for a wide range of drama and musical performances, while an adjacent building offers an intimate studio space for 150 people for chamber music and other experimental performances.

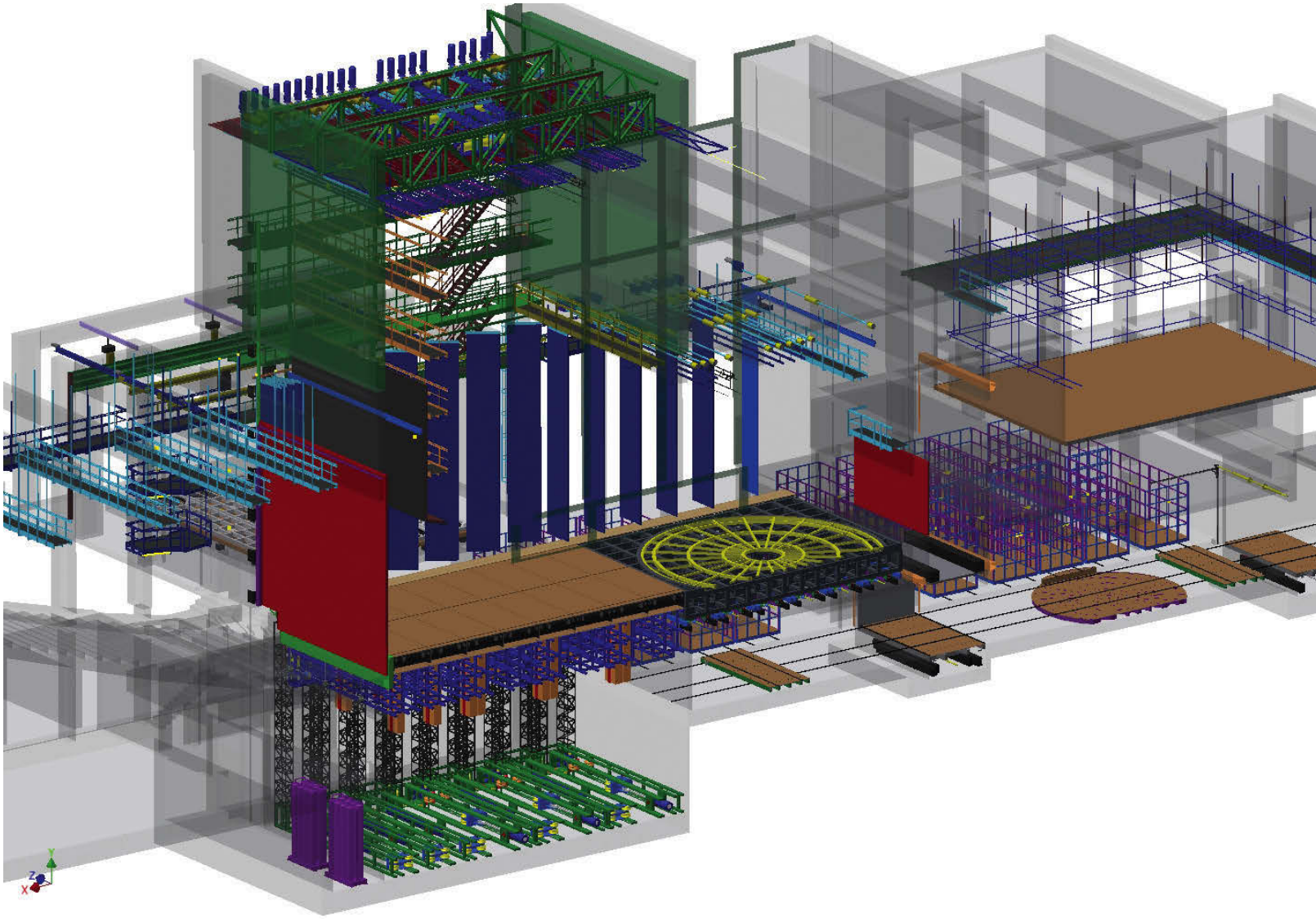
At arm's length

The stage has been designed so that the actors are in close contact with the audience. They are literally an arm's length away – no more than 3ft from the first row of the auditorium – and without any fixed parts spread across the front and back of the stage to the back wall of the theater. The lower stage machinery offers a nearly endless amount of stage design variations for theatrical and musical performances.

The main stage comprises three primary orchestra podia and five primary stage podia, each measuring 6 x 40ft. The total size of the acting area is 40 x 55ft. A hydraulic single cylinder drives each primary podium. The five segments are subdivided into three secondary podia that are moved by electro-mechanical


BALET





Above: **3D model of the stage technology used at Jízdecká Theater in Pilsen. Bosch Rexroth used many modern simulation tools to configure and optimize all drives**

Opposite top left: **The fly loft with the stage hoists' electro-mechanical drive units**

Top right: **Upper stage machinery at the Franz Liszt Academy of Music, Budapest**

Bottom left: **Bosch Rexroth's SYB3 stage control system meets all safety requirements**

Bottom right: **With the main stage's cassette turntable, endless configuration variations are possible**

drives. In addition to their independent lifting from the primary podia, the lower stage machinery can create a slant by bevel-tilting the upper part to the fixed column. Bosch Rexroth used most modern simulation tools for the configuration of the drives, including modal frequency analysis. The result is a set of weight-optimized drives that maintain sufficient dynamic stiffness.

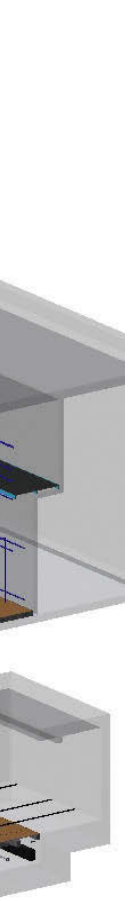
Expanded variation

The flexibility and variability of scenic options is expanded by the application of five 40 x 6ft side-access carriages with individual battery drives. Cassette turntables measuring 40 x 30ft that traverse the upper surface of the stage rear complete the design. Fast scene changes can be achieved using the lateral access carriages on each side of the stage, each of which can roll onto its secondary stage podium on the main stage.

Optical division of the scene, in any position, can be achieved by sliding the portal bridge to the extent of its traveling range. The fitting of scene decorations above the main stage and their subsequent lowering and lifting is ensured by point and fly-bar hoists, and by the use of mobile-point hoists. Stage lighting comes from fixed lights hung on catwalks, the portal bridge and portal towers with optional settings, as well as from the lighting batteries of the main and back stages. These enable the lowering and lifting of the fitted lights within the lifting range of the hoist, thus providing perfect illumination of the entire scene.

Modular controls

The upper and lower stage machineries are controlled by the SYB 3.0 modular control system. Its modular design increases investment security through high flexibility for all drive



technologies and enables cost-efficient system design and stage operation. The stage control system architecture increases availability and uses cutting-edge safety engineering technology. Integrated 3D simulation, various operating modes and multi-user abilities considerably increase workflow efficiency for preparing and realizing performances. The production computer and control panels that form part of the Bosch Rexroth control system operate independently of each other. Parameters can therefore be entered at the exact same time motion sequences are being controlled from other desks.

All Bosch Rexroth stage technology devices meet the strictest European standards, such as DIN59650, and are certified in terms of functional safety by the accredited organization TÜV SÜD Czech. Functional safety of the SYB 3.0 control systems is according to the SIL3 category. The electrical power consumption of the drive systems – an important factor for the total cost of ownership – has been greatly reduced in comparison with older designs. And due to the use of hydraulic drives, the movement of the stage podia tables is completely quiet and their control is precise.

For this project, Bosch Rexroth has supplied all drives and controls for the upper and lower stages, rehearsal room technology, storage equipment and transportation platforms, including the assembly work and commissioning. Effective project management was a prerequisite for meeting challenging deadlines. And despite the delay in civil works for the erection of the fly loft steel structure of the upper stage, the new theater will be ready in time for Pilsen's European Capital of Culture events in 2015. ■

www.boschrexroth.com

Trading information

A new trade fair for theater, media and event technology will launch in 2015, bringing together key companies from across the world

The stage is set for the first Stage|Set|Scenery – World of Entertainment Technology, which will take place from June 9-11, 2015, at the Berlin Exhibition Grounds. Stage|Set|Scenery is the international trade fair and congress for theater planning, architecture, film, event services, stage, lighting, sound, video and media technology, make-up, costume and stage-set design, acoustics, studio, exhibition and museum technology.

With less than a year to go before the event opens its doors, demand is high for space, with 7,800m^2 (84,000ft^2) of display space in halls 1 to 4 expected to be occupied. Based on current booking levels, organizers are anticipating around 300 exhibitors and 7,500 trade visitors.

Key players from various branches of the industry have already confirmed their attendance. These include Bosch Rexroth, Bühnenplanung Walter Kottke, Bühnenbau Wertheim, Elation Professional Europe, ETC, Fülling & Partner Ingenieurgesellschaft, Gala Systems, Gerriets, A Haussmann Theaterbedarf, HOAC Schweisstechnik, JR Clancy, Kunkel Consulting International, Maquinas Iberica-Ingenieria Escenica, Müller-BBM, Räder-Busch, Salzbrenner Stagetec Mediagroup, SBS Bühnentechnik, Serapid, Skena Planungsgesellschaft, Studio Hamburg Media Consult International, Studio Babelsberg, Tüchler Bühnen- & Textiltechnik, Waagner-Biro Austria Stage Systems and Wenger Corporation.

Stage|Set|Scenery targets the industry's forward-looking international markets. Its partnership with international associations and close cooperation with Messe Berlin's international representatives has already paid off. Partnerships and sponsorships have been secured with the International Organization of Scenographers, Theater Architects and Technicians (OISTAT) and associations from Austria (OETHG), Switzerland (SVTB-ASTT), the USA (USITT), the UK (ABTT), Sweden (STTF) and China (CETA). To date, exhibitors from 15 countries – Austria, Belgium, Canada, China, Finland, France, Germany, Italy, the Netherlands, Poland, Serbia, Spain, Switzerland, the UK and the USA have registered to attend.

Stage | Set | Scenery will present lectures, workshops, seminars, round tables and presentations to enable exhibitors and visitors alike to find out about current and future industry developments

Strong partnerships

Deutsche Theatertechnische Gesellschaft (DTHG) is the association co-organizing the event with Messe Berlin. Founded in 1907, DTHG is one of Germany's oldest trade organizations. Its main responsibilities include coordinating theater planners, the theater technology industry and technical specialists from the art world in their role as users, formulating job requirements for training

courses and acting as advisors in legal matters. DTHG provides content advice while an advisory committee ensures that the trade fair and congress are developed to meet the requirements of all exhibitors.

"The advisory committee of Stage|Set|Scenery will provide input on the subject matter of the trade fair, actively contribute toward shaping the event, represent the interests of exhibitors and visitors, and support us in our communication with the industry," says Werner Mocke, director at Messe Berlin.

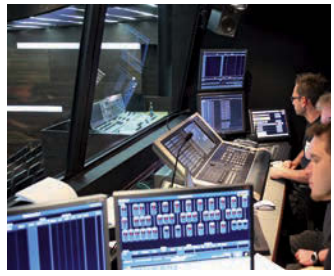
The committee includes high-profile members from a number of professions, including theater and stage technology and equipment, audio technology, professional and advanced training and trade organizations. Dr Gabriele Högg, managing director of HOAC Schweisstechnik, and member of the board of DTHG, was appointed to chair the board of Stage|Set|Scenery: "The committee members will provide substantial input to shape the individual formats of Stage|Set|Scenery."

The international conference promises to be a headline event. Organized by DTHG, the International Stage Technology Congress will be an integral part of Stage|Set|Scenery, featuring an international symposium, lectures, workshops, seminars, round tables and presentations, all of which offer an ideal opportunity to find out about current and future developments within the industry. In 2013, DTHG held its first international symposium on 'Creative Places in Urban Cities', which attracted numerous high-profile speakers. The event set a benchmark for specialist planners.

Stage|Set|Scenery will also host awards ceremonies including the presentation of the Weltenbauer national award, the Theater Architecture Competition (organized by OISTAT) and Germany's entry for the Prague Quadrennial 2015.

The Weltenbauer national award, presented by DTHG, honors the most original and accomplished technical implementation of an artistic concept by a stage performance, show or event production.

At Stage|Set|Scenery, the OISTAT Architecture Committee will present the nominees of the Theater Architecture Competition, which takes place every four years. This competition has been held since 1978, and aims to promote new ideas in theater architecture as well as interdisciplinary collaboration in this field. The best entries will be exhibited at the Prague Quadrennial 2015 and will be published in a catalog documenting contemporary theater architecture. OISTAT will be holding its annual general meeting of the Architecture Committee at Stage|Set|Scenery 2015 for the first time.



At Stage|Set|Scenery, Bund der Szenografen will be exhibiting a project it has been working on for the Prague Quadrennial 2015. This project is supported by DTHG and Messe Berlin. "By exhibiting Germany's entry for the Prague Quadrennial 2015, we would like to specifically attract scenographers to our show," says Juliane Trempler, project manager of Stage|Set|Scenery. "The interdisciplinary approach of the scenography industry is reflected not only by this project, but by the activities of Stage|Set|Scenery as well. We will be featuring various exhibits from the world of theater and film as well as exhibitions that are of particular interest to scenographers." The Prague Quadrennial for scenography and theater, which has adopted 'Gemeinsamer Raum: Musik, Wetter, Politik' (A Common Area: Music, Weather, Politics) as its slogan, will take place the week after Stage|Set|Scenery, from June 18-28, 2015.

Stage|Set|Scenery also has a wide range of vocational and advanced training courses to offer to schoolchildren, students, career starters and experienced professionals. As part of its career guidance service, Stage|Set|Scenery will be organizing a national and international job exchange and advertising a range of professional training courses held by academies, technical colleges and universities. There will also be live demonstrations (including those from trainees) by stage set artists, stage set sculptors and professional make-up artists.

The issue of visitor safety at events will be dealt with at the Safety in Action Stage in Hall 3.2. Based on the example of a traditional evening event, a look will be taken at the safety issues involved in various work routines, from the moment trucks are unloaded through to sound checks. Trade visitors will be able to witness the various routines first hand. In addition there will be fascinating, scientifically researched lectures on safety, pyrotechnics, lasers, rigging, stress analysis, fire protection and stage set design. Beuth Hochschule für Technik Berlin and xEMP Extra Entertainment Media Publishing are the partners of the Safety in Action Stage.

At the Visitor Safety meeting point, trade visitors will be able to find companies promoting products and services dealing with topics including safety barriers and signs, digital signage systems, accident prevention and occupational safety, fire protection in buildings, preventive fire protection, non-flammable and flame-resistant materials, intrusion detection systems, visitor safety, voice-activated alarm systems, security lighting, paramedic services, stewards, surveillance systems, and safety planning and consultation.

At a specially equipped SoundLab, audio companies will be inviting visitors to experience the sound delivered by the latest audio systems. Live demonstrations of innovative developments will be given, and experts will be on hand to deliver advice regarding these products. A program of excursions to various studios and event venues in the greater Berlin area will provide trade visitors with an opportunity to directly experience the practical uses of audio and lighting technology.

Making connections

Numerous attractive services will be available to exhibitors, enabling them to target new audiences and cultivate existing contacts. The Virtual Market Place lets exhibitors profile their companies online, 365 days a year, together with images and descriptions of their products, services and contact details. The online directory of participants enables exhibitors to get in touch with trade visitors ahead of the fair so that they can set up meetings at their respective stands. A free online matchmaking service directs trade visitors to exhibitor stands whose product portfolios match the relevant conference topics.

Stage|Set|Scenery helps innovative startups to present their business models to the event industry's decision makers. Startups will be able to showcase their products and services to an international audience of exhibitors, enabling them to establish important business contacts and secure new markets.

Regardless of whether the company is an established family business or an innovative enterprise, a small newcomer or a major market player, the Stage|Set|Scenery team looks forward to welcoming all comers to Berlin, Germany, on June 9-11, 2015. ■

www.stage-set-scenery.com

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Messe Berlin

Poise and elevation

The auditorium of the Fondation Louis Vuitton complex features an advanced stage system that can convert its configuration from a flat reception area into tiered seating

Above: **The striking glass and steel exterior of the Fondation Louis Vuitton**

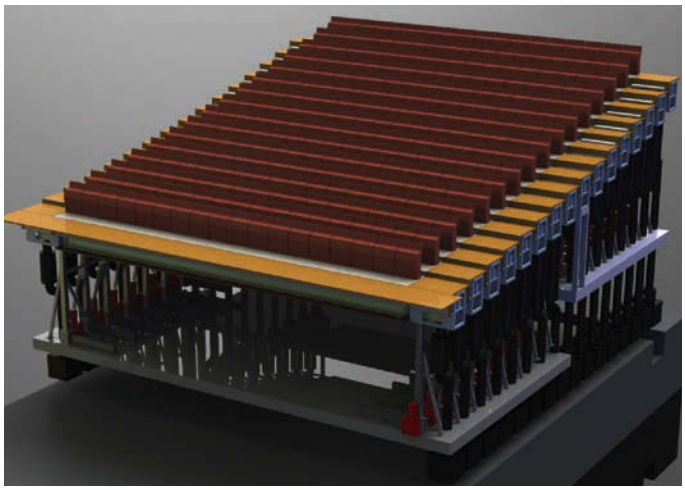
Opposite left: **The LinkLift driven platforms rise from a flat stage floor to as high as 8ft, with seating rotating from under the stage up to position**

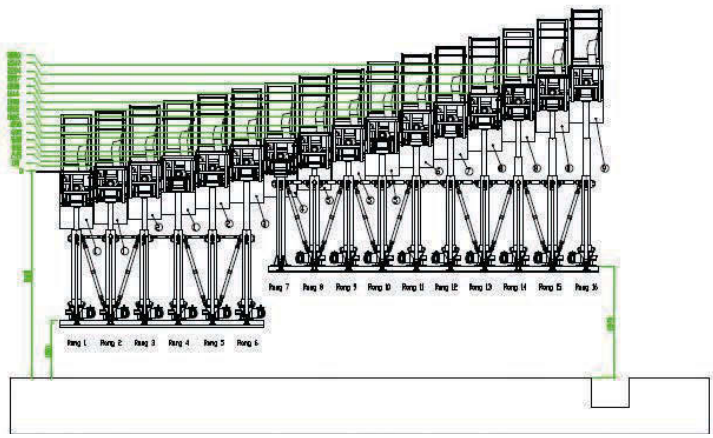
Opposite right: **A side view of the theater's 16 rows of independently operating LinkLift driven platforms**

During a flight more than a decade ago, famed Los Angeles-based deconstructivist architect Frank Gehry took a single sheet of paper and sketched out a design for an impossible-looking building made of 12 immense glass sails. Now fully realized, and set to open its doors in Paris, France, in autumn 2014, Gehry's stunning project – the Fondation Louis Vuitton – is a truly technical achievement. The US$143m glass and steel structure, inspired by the Parisian glass architecture of the 19th and 20th centuries, is not just a museum for contemporary art but a remarkable sculpture in its own right.

LVMH Moët Hennessy (LVMH), the well-known multinational luxury brand conglomerate, has established itself in recent decades as a major patron of the arts, opening a contemporary art exhibition space, the Espace Culturel Louis Vuitton, on the Champs-Élysées, holding a number of art exhibitions, international arts and fashion competitions, distributing grants, prizes and even lending Stradivarius violins to an array of talented musicians.

Bernard Arnault, CEO of LVMH, and an avid art collector, first approached Gehry in 2001 about his decision to build an exceptional new cultural center devoted specifically to arts





and creation. For inspiration, Gehry visited the proposed site next to the Jardin d'Acclimatation, in the Bois de Boulogne.

Gehry recalls his thoughts during that visit: "I dreamed of designing a magnificent vessel symbolizing the culture of France." His vision was a building among waterfalls, streams and ponds, that would fit into the natural environment, appearing as lightweight as a winged insect. "I wanted to express a notion of transparency," states Gehry.

New methodologies

The unprecedented design that resulted called for new methodologies at nearly every step of the building's construction. To facilitate the design, a collaborative software program, Digital Project, was developed by Gehry Technologies to allow a team of more than 200 professionals to work with a common 3D model. The 145,000ft² of glass that forms the roofing was accomplished by a new shaping process that called for the creation of a new furnace. Studies were done to determine the best methods for fire safety, condensation risk and leak tightness, heat, durability and maintenance constraints as well as user comfort.

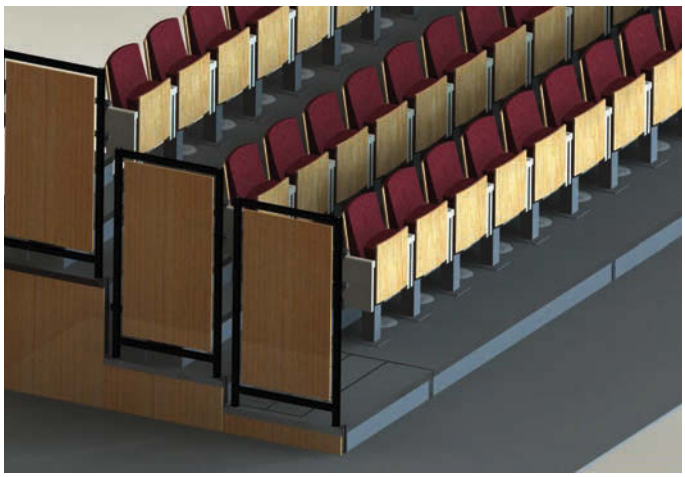
The site itself presented challenges as the project became the subject of court battles, with the building being ruled as encroaching on a public right-of-way and a disruption of the park's atmosphere. A landscape project including revisions to walkways and replanting of botanicals was carried out, and changes were subsequently made to the original plans. After a successful appeal of the court decision, construction resumed.

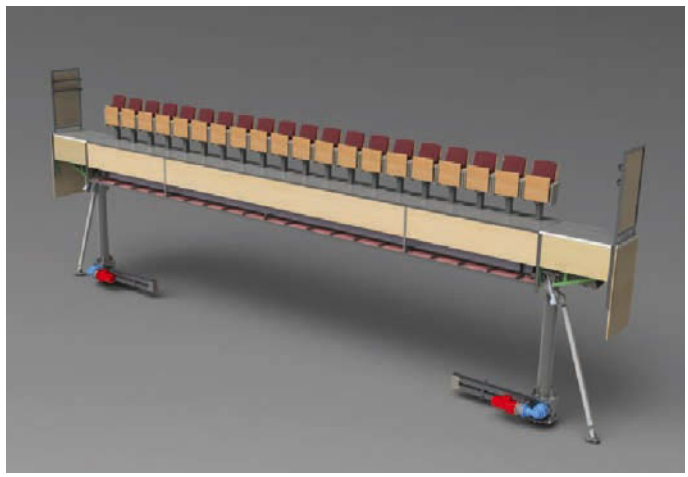
"Its aim is to underline French creativity," says Arnault. "We want to link timelessness and extreme modernity." To this effect, the center has 700,000ft² of exhibition space to contain modern and contemporary art, as well as some from Arnault's own extensive art collection, and temporary exhibitions of established and contemporary artists.

As Louis Vuitton began his career as a suitcase maker, the theme of travel is a common thread. The desire to create a dialog and exchange of ideas that support exploration and adventure created the need for an auditorium space that would host lectures, press conferences and concerts, as well as art installations involving extensive use of video and sound projection. Renowned French scenographers dUCKS scéno were called in to bring their expertise to the project, designing a 350-seat multipurpose theater with a multitude of configurations, to be accomplished using Serapid's LinkLift system.

Quality lift

Three large galleries open out onto the 5,000ft² auditorium. Designed as a highly flexible performance and lecture space, the theater has 16 rows of independently operating LinkLift driven platforms that rise from a flat stage floor to as high as 8ft, with seating that cleverly rotates from under the stage up to position.





Left: **The platforms have a static load of 750daN/m² and a dynamic load of 255daN/m²**

Right: **Each platform unit is operated by 2-3kW motors for lift and 2-37kW for rotation**

Bottom right: **The venue's bleacher style seating in its fully raised position**

Retracted to floor level, these platforms together comprise a 2,000ft² flat stage floor, slightly less than half of the entire auditorium. The LinkLift columns lift the platforms as quickly as 2in per second. Intended to open up into rows, bleacher style, the seats rotate into position with a minimum turnover time of 39 seconds.

"The platforms have a static load of 750daN/m² and a dynamic load of 255daN/m² and are operated by 2-3kW motors for lift, and 2-37kW for seat rotation," explains Eric Michaut, Serapid STI's product manager for theater. "The entire array is operated by a user-friendly touchscreen interface, which allows for performance setup to be swift, highly variable and extremely easy. In addition to the flexible auditorium, the venue possesses six stage platforms, one rehausse [raised] platform and one access platform."

With the ambition of encouraging and promoting artistic creation both in France and internationally, LVMH has not only created a remarkable space for cultural patronage, but also an architectural landmark for the ages. Serapid is proud to have participated in the fulfillment of this vision. ■

www.serapid.com

Art of motion

Stage configurations:

- Flat
- Racked, with two angles: 11° and 26°
- Can be organized as a pit with or without seats
- Allows for creation of a stage in front of the rows with use of six scissor-lift platforms

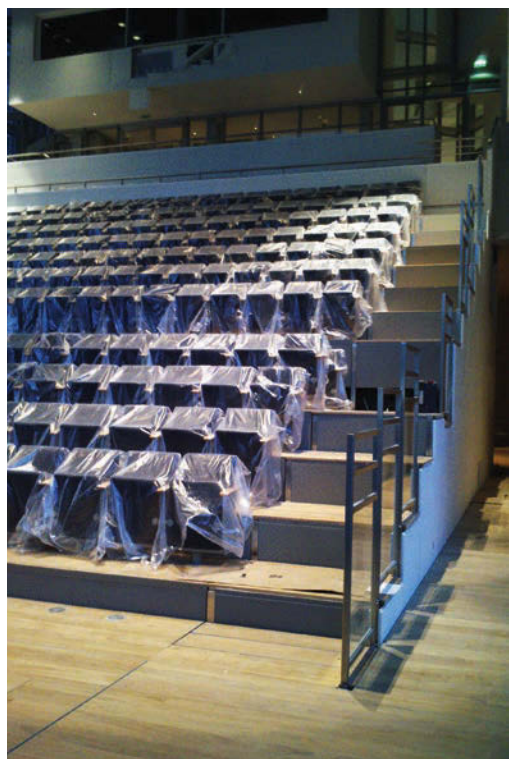
Possibilities:

- Television and studio productions
- Press conferences
- Concert and theater productions
- Cocktail receptions, seminars
- Artist and fashion collection promotions
- Special presentation of major artworks – the mobile wall allows the exhibition gallery to be extended

Serapid lifting systems used:

- The service platform uses one LinkLift size 80 chain
- The six stage platforms each use two LinkLift size 50 chains
- Flexible seating system is made of 16 complete Quick Seating Exchange rows with structures and mechanical stairs
- The rehausse platform underneath rows 7 to 16 uses eight LinkLift size 100R chains
- The access platform uses four LinkLift size 80 chains

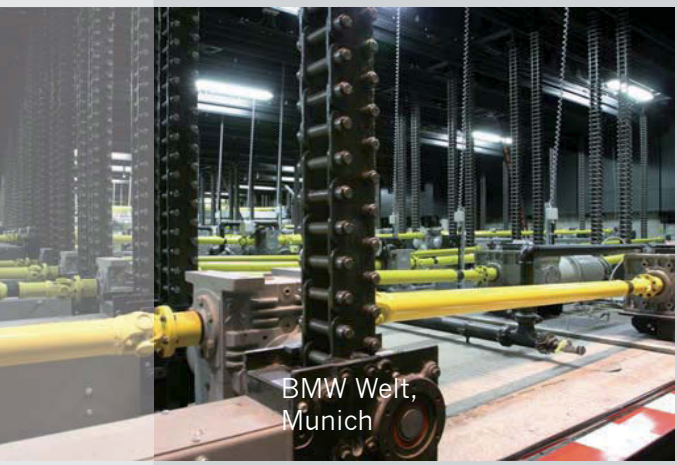
Summary:
Serapid LinkLift chains provide electromechanical vertical movement of large weights in a compact and robust format

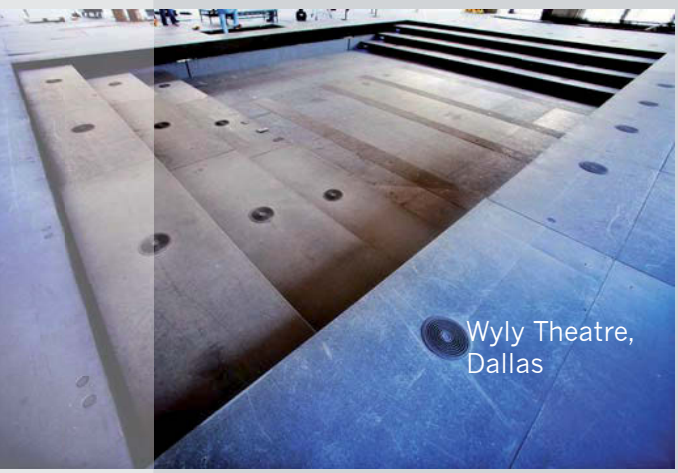


the art of motion

SERAPID
LinkLift systems for creative lift engineering

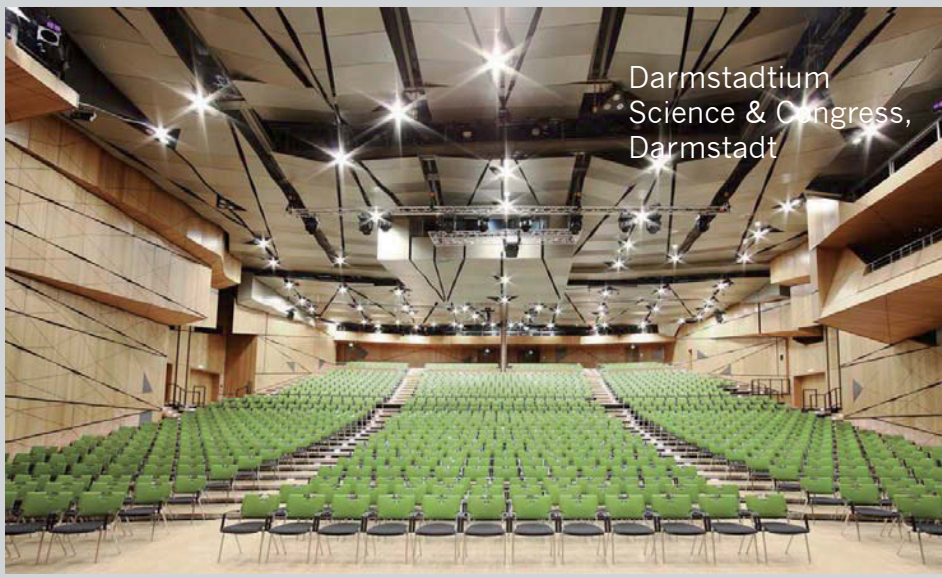
- Theatre Stage Lifts
- Trap Lifts
- Orchestra Lifts
- Stage Wagons
- Turnkey Systems
- Telescopic Seating
- Flexible Venues


BMW Welt, Munich


Wyly Theatre, Dallas


Franco Parenti Theatre, Milan


Wyly Theatre, Dallas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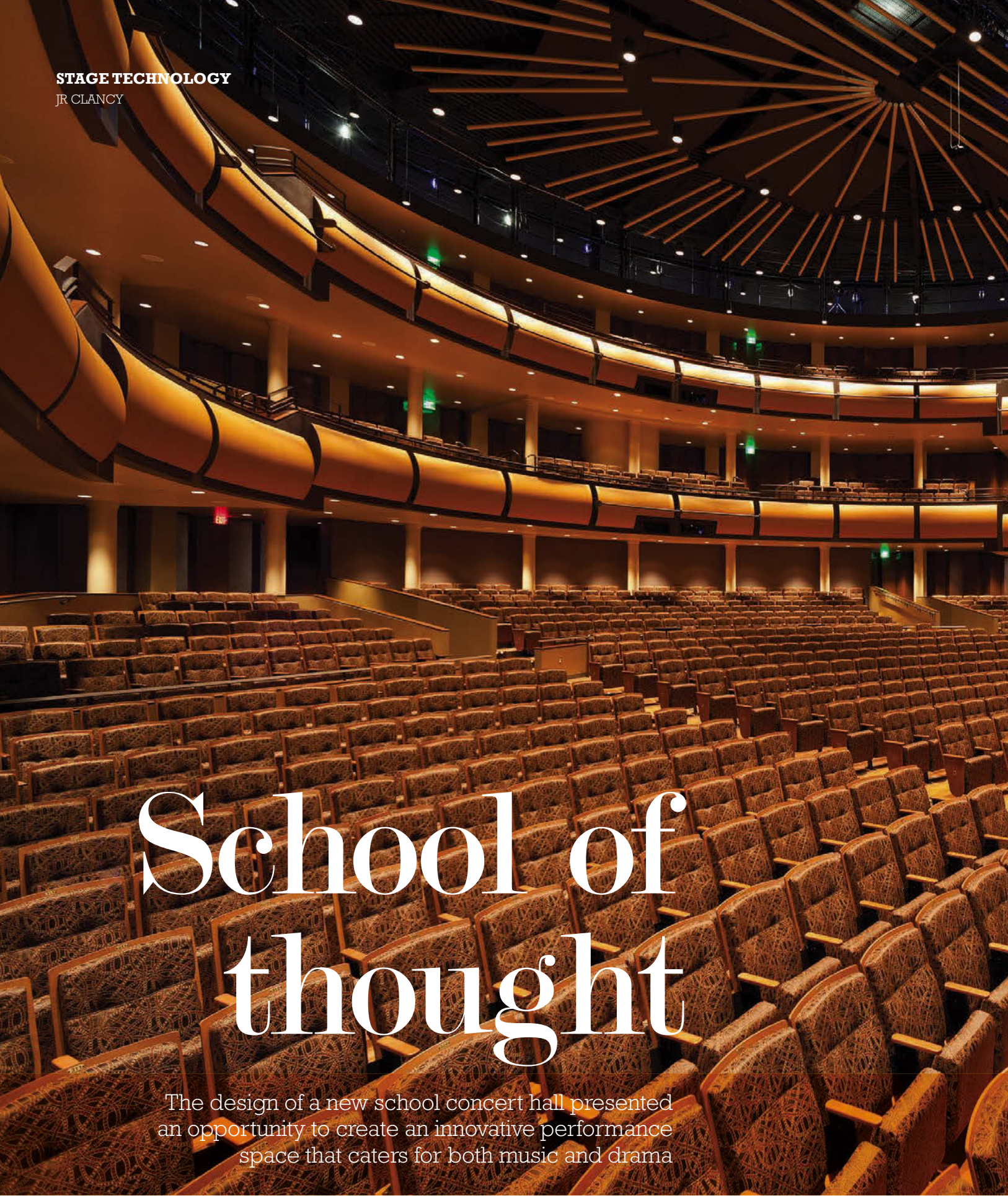

School of thought

The design of a new school concert hall presented an opportunity to create an innovative performance space that caters for both music and drama

When theater consultant Van Phillips and senior design architect Fred Gore began planning their most recent educational facility project, Phillips saw the potential to make a major leap forward in performing arts center design.

"For years I've been saying to Fred, 'We're doing it backward,'" says Phillips, the owner of theater design consultancy Jones Phillips Associates. He and Gore – a senior design architect with URS Corporation – have completed more than 20 projects together. "Most performing arts programs in American secondary schools are more driven by music than by drama. Drama programs are relatively small, and music programs are huge, and involve as much as a third of the student body. We've been building theaters and trying to put the orchestra on that stage."

Phillips and Gore got the opportunity to take this new approach to the Jenison Public Schools Center for the Arts in Jenison, Michigan, where a focus on music made solid, practical sense. The school district's orchestra program alone includes more than 500 string players, with three orchestras at the middle school level and four in the high school level. The high school band program welcomes 120 new players every year into three ensembles, and every school in the district has at least one choir.

"I said, 'We need to build a concert hall and have it work as a theater,'" says Phillips. "I was confident I could fit a theater into the footprint we needed for a full orchestra."

The rigging challenge

The Jenison Center for the Arts design – now under USA copyright as 'Concert Hall that transforms into a complete working stage Theater' – features a 90ft stage opening. At its full width, the stage can accommodate a large high school orchestra and a choir in the loft that surrounds the stage. To accommodate a theatrical production, tall sliding walls can move onto the stage to form the 40ft-wide proscenium.

Over the top of the forestage, Wenger Corporation created a 6,000lb (2,700kg) front-of-house eyebrow that serves as the ceiling for the acoustical shaping. The eyebrow assembly is 17ft

Above left: **A 6,000lb (2,700kg) front-of-house eyebrow by Wenger Corporation provided the greatest rigging challenge**

Above right: **The 90ft-wide stage can accommodate a large high school orchestra and a choir in the surrounding loft**

Below: **The striking façade of the Jenison Center for the Arts**

deep and 48ft long, and features a major speaker cluster within the structure.

To achieve the flexibility Phillips and Gore planned for the space, contractor Beck Studios turned to JR Clancy for the required rigging.

The Clancy/Beck team provided three line shaft hoists to raise and lower the onstage ceiling panels, and a separate front-of-house line shaft hoist to lower a portion of the eyebrow. "The orchestra ceiling pieces were provided by another contractor, and they came in heavier than specified," says Dan Ilhardt, president of Beck Studios. "Clancy went back and designed a more powerful motor. It's great when you have the product line to do that."

The eyebrow provided the greatest rigging challenge in its size and aesthetic requirements. "The house crew needs to move the eyebrow to match the over-stage ceilings to create a continuous look," says Kevin Auses, JR Clancy's project manager. "We designed a custom line shaft that allowed us to pick up this heavy eyebrow on the upstage and downstage end at the same time, and move it and the speaker cluster as a unit. It's one hoist with 12 lift lines for the eyebrow plus two for the speaker cluster."

The eyebrow itself was all in a day's work for the Wenger team. "We've been doing projects like this for more than 60 years, and we pride ourselves on making a custom design/build panel," says Mark Ingalls, Wenger's product manager for the performing arts. "The eyebrow is a welded-steel tube frame with our 2in-thick honeycomb composite panels on the face side. There is also an area in the middle where the speakers are located, and we just covered the steel frame with an acoustically transparent fabric."

This kind of construction is fairly common, explains Ingalls, but on this job the assembly required some tricky coordination. "Typically we assemble the eyebrow on the stage floor and bring the rigging down to pick it up," said Ingalls. "The design did not allow us to do this, so we had to assemble it in the air. It takes a lot of experienced people to do that."

Wenger worked closely with the Beck team to maneuver the eyebrow into place in midair. "We were all pleasantly surprised at how quickly and easily it went together," Ingalls says.

"Clancy and Wenger had to work together on this, and it was great to see them do it so well," Ilhardt agrees. "This was the first time we'd worked with both Wenger and Clancy on one project since Wenger bought Clancy, and now we really see the benefit of that collaboration."

Taking control

In addition to the rigging for the ceiling and eyebrow assemblies, JR Clancy supplied 23 PowerLift motorized hoists above the stage for raising and lowering scenery, soft goods and electrics. Twenty-one of these hoists can move scenery at variable speeds from 0 to 120ft per minute. The two fixed-speed hoists are used for the electrical battens, which do not require special moving speed variations.

To control the rigging system and make it easy for a crew of volunteers and students to use, JR Clancy supplied its Altus control console. Altus provides touchscreen programmable capabilities that enable users to create up to 200 cues using as many as 48 hoists. Users have direct up/down control and a joystick for adjustments on the fly, with the ability to program acceleration and deceleration for dramatic effects. "Altus enables the operators to program the PowerLifts and the onstage shell ceiling," says Auses.

With the Jenison Center for the Arts now open and booked with nearly daily events, Phillips and Gore have had the opportunity to hear from their clients about the versatility of their innovative performance space.

"It opened on December 3, and they were doing a show a night until the day before Christmas," recalls Phillips. "We have heard nothing but good things. The whole concept required quite a bit of rethinking on the part of everyone involved – from a technological standpoint, from the performers who are using the space, and from the management who will promote the hall. Also, it takes an owner who is willing to try something entirely different." ■

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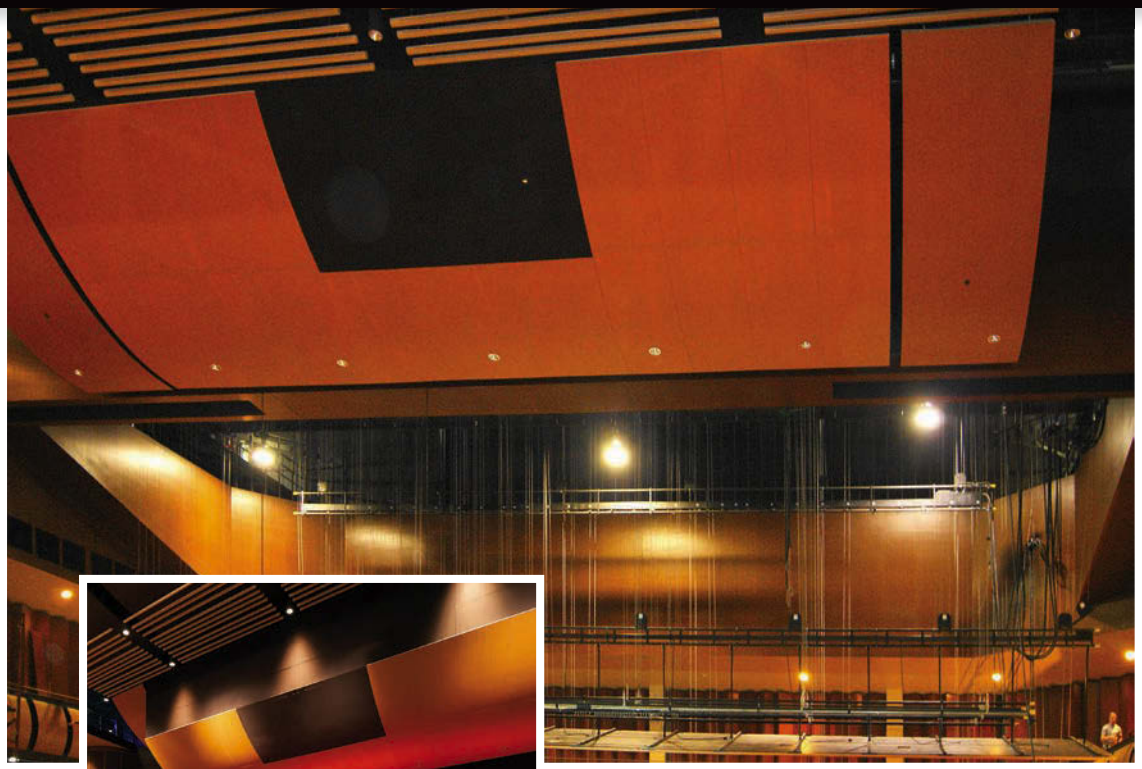

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Flurry of sound

Acoustical shells play an important role in shaping the sound quality in a music hall, with inspired aesthetic design further enhancing the audience experience

The new wood veneer acoustical shell incorporates images that evoke clouds, ocean waves and wind currents into the design

Acoustical shells strive for harmony, both musically and aesthetically – supporting the on-stage performance while complementing the hall's architecture. A new performing arts center in Texas, USA, beautifully illustrates such an achievement.

Opened in September 2014, the Tobin Center for the Performing Arts in San Antonio incorporates portions of the city's historic Municipal Auditorium, while dovetailing a new 1,768-seat auditorium and stage house into the existing footprint. Other elements include a 250-seat studio theater and an outdoor performance plaza connected to the city's famous River Walk.

"Excellent auditorium acoustics were essential for the various resident companies," says Vicki Dickerson, owner's representative with The Projects Group. "The right acoustical shell plays a huge role in this."

Standard, but custom

"We wanted a semi-standard shell we knew and trusted – Wenger's Diva model – with enough customization to make it look special," says Adam Huggard, senior associate with theater consultant Fisher Dachs Associates. "Custom-built shells can be a little fussy sometimes."

Huggard believes the Diva system offers technical advantages including user-friendly operation, along with readily available parts and strong warranty. "We're not reinventing the wheel," he states.

Wenger has manufactured hundreds of acoustical shells for performing arts facilities worldwide. This is the first shell that incorporates a digitally printed overlay pattern along with the traditional woodworking craftsmanship and fabrication. The overlay was inspired by the arabesque ornamentation of the original auditorium's Spanish Colonial Revival architecture, but the resulting design also evokes other images, such as clouds, ocean waves and wind currents.

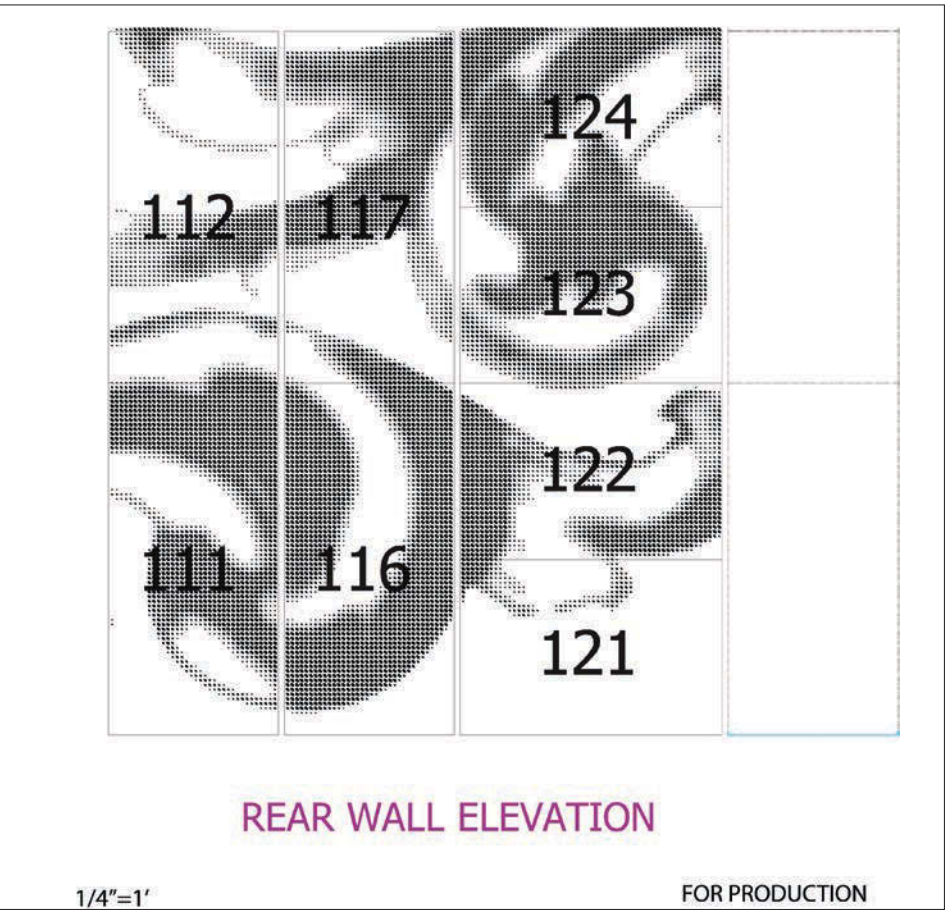
"Any of these multiple interpretations – or others – are encouraged," says Miles Mazzie, associate with Sussman/Prejza graphic design studio. "Some visitors will attend numerous concerts and see the shell many times."
The shell's graphics were intended to feel comfortable in the space, according to Mazzie, and in scale with the overall architecture. The graphics also appear in other interior design elements, such as on the auditorium balcony fronts where they are enhanced with color-changing LED illumination.

Mazzie says today's digital technology can seamlessly integrate such images into architecture on almost any material, including wood, metal, glass and vinyl. Printing on the wood veneer was performed at Image Mill, where John van Rensburg states that the challenge was creating an image that didn't look too overt, yet appeared very intentional from a distance.

Beauty shows through

"Printing with translucent ink allowed the veneer's wood grain to show through the dot pattern," notes van Rensburg. He adds that the Anegre wood's natural coloring creates interesting variations depending on the viewer's perspective, while transforming the ink's nut-brown color into more of a plum hue.

To ensure visual consistency, Wenger obtained the shell veneer on 0.25in plywood from Fetzer Architectural Woodwork, fabricator of the Tobin Center's interior millwork. Wenger incorporated this veneer into the Diva's honeycomb-core composite panels, attaching all the necessary framework and hardware. For the three ceiling rows and 10 x 38ft-tall wall towers, more than 7,400ft^3 of veneer was required. This tropical African hardwood is noted for its natural luster and straight-to-interlocking grain pattern.



Above: **A production detail shot from Sussman/Prejza showing how the wall surfaces were panelized, numbered and essentially fit together to form the larger pattern**

Top right: **The audience sees the shell image formed by the collective printed dots as a backdrop for the musicians**

Below: **Printing with translucent ink allowed the veneer's wood grain to show through the dot pattern**

"The project team reviewed numerous veneer samples to ensure proper matching," explains Brent Gilbert, engineering manager with Linbeck/Zachry Joint Venture, the construction management firm. He praises Wenger's attention to detail throughout the project in execution, coordination and communication. Akustiks was the acoustical consulting firm.

As prime architect, LMN Architects took part in the design development of the shell. Rich Johnson, AIA, who coordinated architectural design intent during the construction phase, visited Wenger's Minnesota facility to view the shell mock-up.

"Everyone was very knowledgeable and accommodating," recalls Johnson of this visit. "And the quality of the mock-up was excellent." He claims Wenger met all the design criteria and accommodated any changes they could.

In the project's final stages, Wenger made engineering modifications to the approved tower specifications, meeting the owner's request for a standard manual wheeled mover rather than an air caster system.

The shell will be reconfigured often: the Tobin Center is already booked solid for its first six

months. When stored, the towers nest backstage. If necessary they can all fit in a footprint measuring only 16.7 x 9.3ft.

Double vision

During the design process, Huggard asked Wenger if they had ever done a printed shell. "They said, 'No, but let's figure it out together.'" He adds, "It's really nice that Wenger will spend the time with you up front – even if they're not guaranteed the project – to work through issues and understand what's possible."

Huggard believes the shell blends two looks – organic, natural wood and high-tech printing – to create a dualistic visual effect analogous to painted scenery on stage. "With a scenic painting, every brush stroke is visible; up close it is hard to make out the pattern," he explains. "But from the audience's vantage point, everything makes sense and looks perfect."

The audience sees the shell image formed by the collective printed dots as a backdrop for the musicians, a gestalt greater than the sum of its parts. Meanwhile, the musicians on stage do not perceive the overall pattern, they only bask in the warmth of the stained wood veneer, suggesting the richness of a finely crafted musical instrument.

"Although the shell's visual element does not directly influence the musician's craft, there are a number of psychoacoustic benefits," states Huggard. "A comfortable, natural-wood surrounding helps relax the musicians, enabling them to play to their best."

In a way, the shell's dualistic visual effect also mirrors its twofold acoustical impact. On stage, performers benefit from enhanced early reflections and improved communication. In the auditorium, audience members hear a blended, focused and fuller sound. ■

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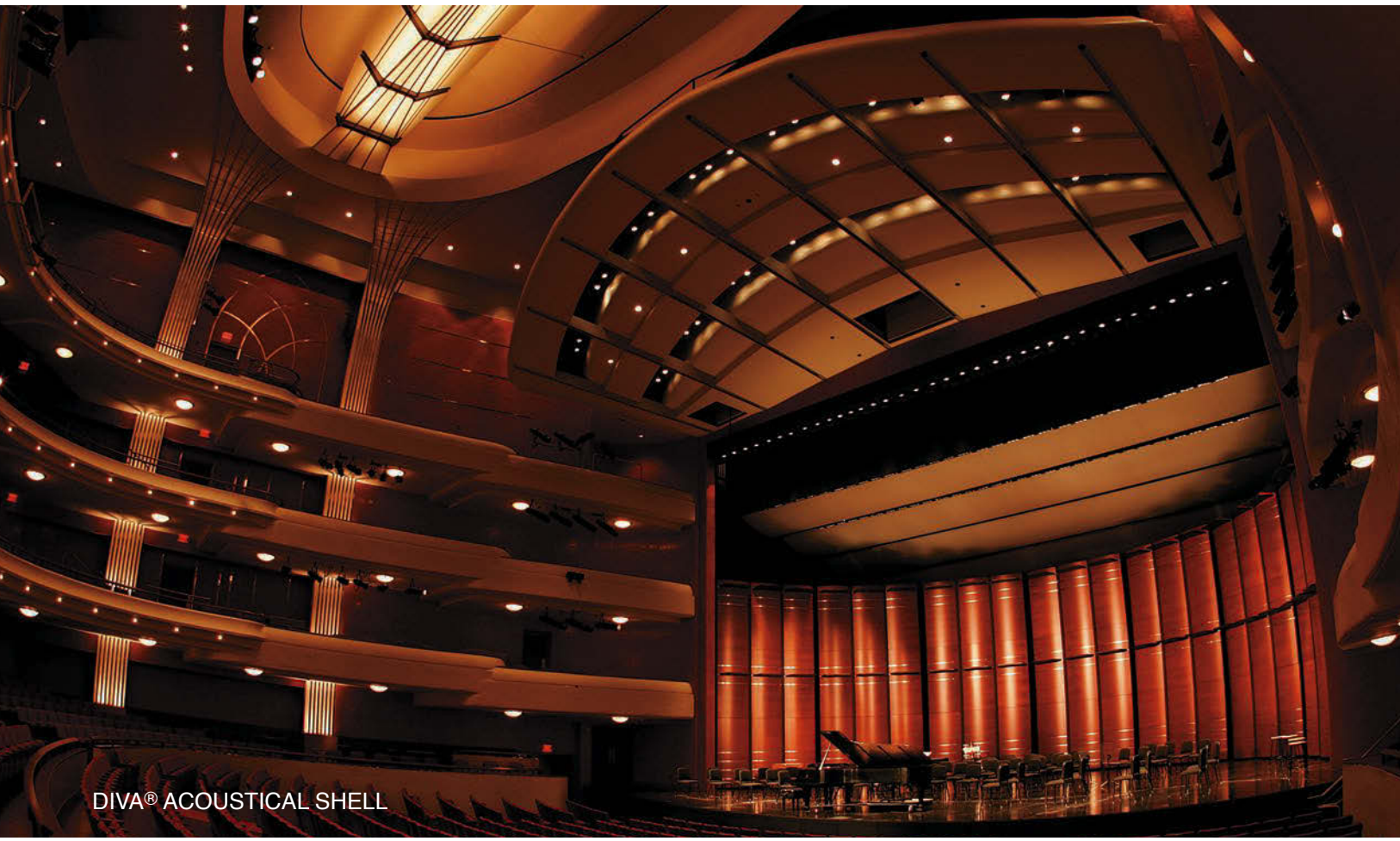

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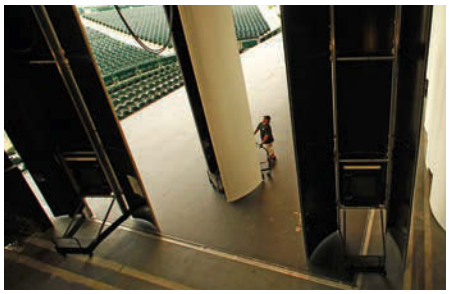

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A custom-built retractable and reconfigurable seating solution for a revamped civic hall's octagonal performance space is shortening turnaround time and increasing setup opportunities

Stratford ArtsHouse, formerly known as the Civic Hall

Nestled close to the famous Shakespearean playhouses in Stratford-upon-Avon, UK, is another performing arts venue, long popular with those who live in the town but less well known than its neighbors to those further afield. Built in 1985, the Civic Hall features a beautiful sprung maple floor and warm Scandinavian pine ceiling, and offers a large, octagonal, flat-floored space with a small proscenium stage that accommodates all manner of entertainment, from drama and musicals to meetings, boxing, orchestral concerts and tea dances.

Over the past year, the Civic Hall has undergone a substantial, US$3m (£1.8m) refurbishment, culminating in a new name – Stratford ArtsHouse – to emphasize its rebirth. Around the performance space, the project has refurbished the bar and foyer areas and added an atrium, landscaped gardens, an art display space and a new rear entrance. Internally, there has been a substantial technical overhaul, the creation of three dressing rooms, and the addition of a versatile moveable and retractable seating system created especially for Stratford ArtsHouse by theater consultant Giles Favell and seating and stage structures specialist Steeldeck Industries.

One major problem that Nicolas Walsh, the venue's general manager, was keen to solve concerned the venue's widely varied and busy

programming and the resulting constant need for different staging and seating configurations. Switching from one format to another with the existing seating platforms and loose seats took most of a day. Walsh therefore decided to investigate the possibility of creating an adaptable seating system that could be arranged in different configurations, and moved between them or packed away entirely much more quickly and with a minimum of crew.

Shapes and sizes

The complication was the venue's octagonal shape. "It quickly became very apparent that using conventional blocks containing straight rows of seats would take up a vast amount of space and yield relatively few seats in return," explains theater consultant Giles Favell. "The answer was to create bespoke retractable units that echoed the shape of the hall, tapered and able to link together to form arcs instead of straight lines. This would also make it possible to push the units back toward the hall's eaves, making better use of the space and giving a more theatrical feel."

Once identified, this concept was easy to describe, though much harder to design in detail and engineer. Favell's design features 10 seating modules, six of one type and four of a second, the two differing in the number of rows of seats and their handrail configuration. The modules can be arranged in a variety of ways, allowing

for the creation of seating facing the venue's proscenium stage, surrounding a thrust stage, or even a complete theater-in-the-round – up to a maximum capacity of 450. Alternatively, they can be cleared away completely to provide an 85ft-wide open space.

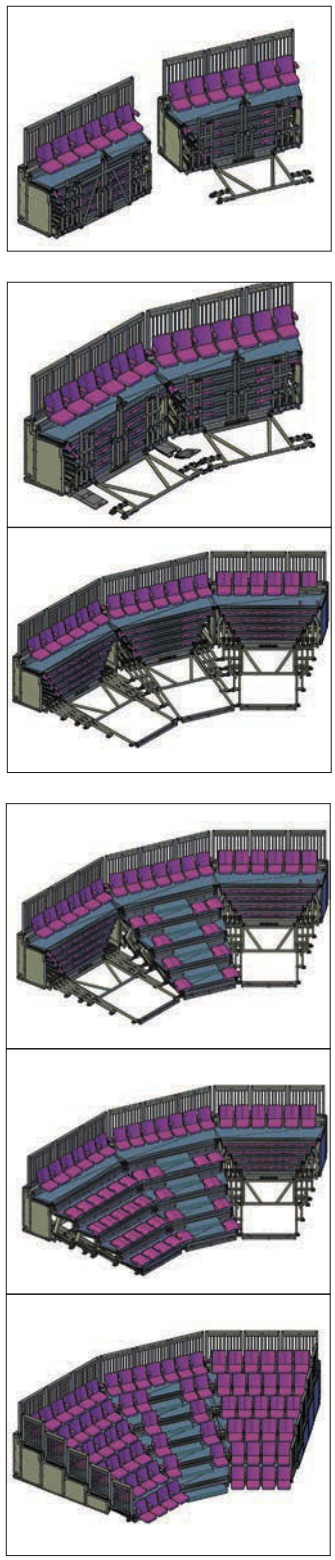
Creating the design was the challenge presented to seating and stage structure specialists Steeldeck. In terms of scale, it was quite a different project compared to the company's recent success with an enormous curved retractable seating system for the new SSE Hydro Arena in Glasgow, Scotland.

Nonetheless, the company's approach was the same: to identify and solve as many problems as possible prior to construction, then to build the final system to its usual high standard, established over the years with its well proven, industry-standard Steeldeck modular staging system and most recently demonstrated on projects for the new SF Jazz Concert Hall in San Francisco, at Repton School in Derbyshire, UK, and at Colorado State University.

Keeping up appearances

One issue identified early was that the seating units must not damage the venue's precious floor, ruling out traditional castors for movement. Instead an air skate system was used. Pockets at the front of each unit receive the skates with their three airpads driven via an external air compressor. "Turn the valves on and the thing just floats," explains Walsh. "It's easy for two people to move each two metric ton unit, free from friction, and it's incredible to watch these massive units glide into place then land in position." Once landed, a hinged set of rails folds down from the front face of the retracted unit, creating a self-contained track onto which the seating is extended by a pull-cord.

"The particular challenge with these wedge-shaped units was getting them to line up to each other," recalls Steeldeck's MD, Philip Parsons. "There is only one pair of air skates, which means you can only move one unit at a time, and when you land a unit it may not drop quite vertically. Our designer, Nigel Parker, came up with the solution, providing a way of linking the back of the unit being moved to the adjacent one, so that the fronts line themselves up as the unit settles."



Left: **A schematic storyboard of the seating system configuration at Stratford ArtsHouse. Turnaround can be achieved less than two hours**

Once the seating tiers are extended, each tier also links to its neighbor, providing a reassuring level of stability and solidity. "I have always detested retractable seating for its flimsy, lightweight construction – the creaks and movement underfoot often cheapen the whole experience of going to a show," explains Favell. "But Steeldeck has successfully delivered retractable units that are indiscernible from permanent seating in an auditorium."

Walsh agrees: "That we now have seating that is fixed to the retractables exudes a sense of comfort, security and well-being to the theater's customers, and the back row being a full 3ft higher than with the old system has considerably improved the sightlines. Add in the fact that the seats have arms, and are upholstered – it's like being in a proper theater. The public have definitely noticed, and this will surely help those who hire the hall to achieve better box office."

Crucially, two technicians can now achieve a full turnaround of all 10 units in less than two hours, enabling the hall to be used in different setups for different events during the course of a single day.

Both consultant and manager are pleased with the quality of the new seating system, which is now christened C-Pack and comes with an international patent filed on the design. "Steeldeck has created a system that is robust and reliable, with a life expectancy of many, many years," Favell notes, while Walsh adds that "it is built to public railway standards – a lot of steel! But it's certainly not going to wobble and give people palpitations. I cannot praise too highly the work that Giles and Steeldeck did; they've given us a very good professional standard theater within a very adaptable space."

As ever with Steeldeck, the challenges met during the project meant that lessons were learned along the way. "The lessons we learned will serve us well as we face the challenges of the future," says Parsons. "Because if you think there's nothing new left to be done with reconfigurable retractables, just watch this space." ■

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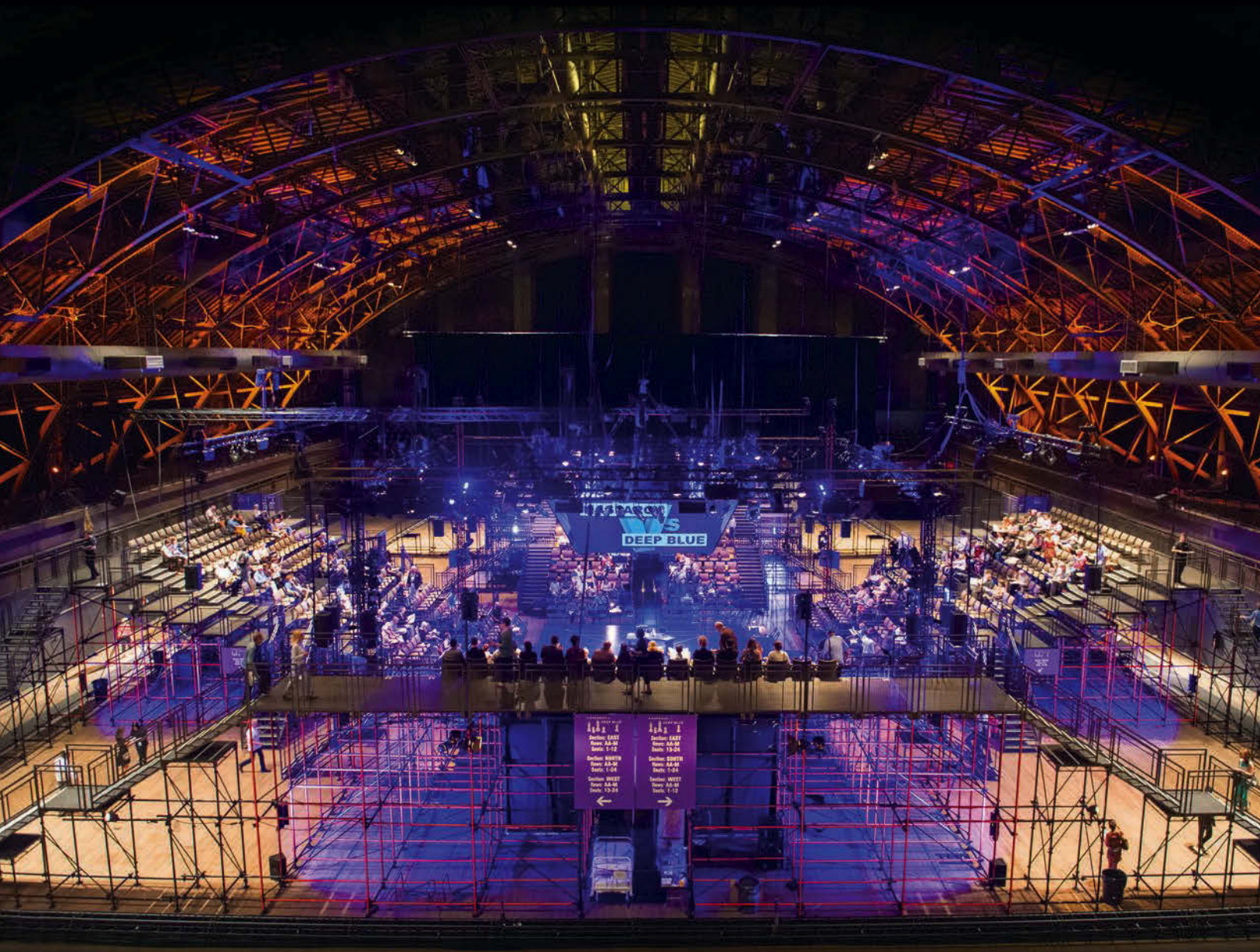

FROM A SINGLE PLATFORM TO A COMPLETE AUDITORIUM

A striking seating structure by Steeldeck New York at The Park Avenue Armory. Shown is the production of The Machine. Differing formats have housed acclaimed performances by the New York Philharmonic. Theatre consultant - Fisher Dachs.

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Photograph - Stephanie Berger

Stage against the machine

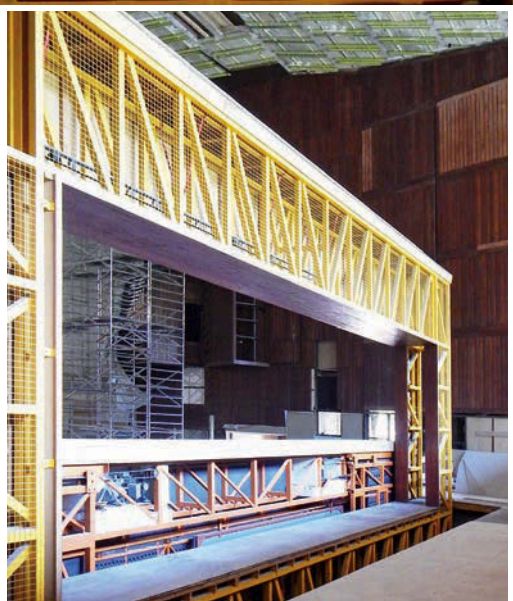
A project to update the complex stage machinery and control systems of an iconic concert hall presented an array of challenges

The contract to upgrade and greatly expand the stage machinery in the concert hall of the Gulbenkian Foundation in Lisbon, Portugal, was a technical challenge that had to be completed to a strict schedule and fulfill very special requirements. The space was rather restricted and particular care had to be taken not to disturb the substance of this listed building.

The Gulbenkian Foundation is one of Portugal's leading cultural institutions. This non-profit, private institution has been active in the fields of public welfare, the arts, education and science since 1956. The foundation's headquarters are in a park in Lisbon, where a 1,300-seat concert hall was built in 1969. The architecture is striking, with the back wall to the stage being made of glass and affording an unimpeded view of the surrounding park to complement the beauty of the musical performances. The hall's acoustics are regarded as the best in Portugal.

The picturesque location, unique architecture and wonderful acoustics quickly made the concert hall one of the most popular venues for music events, opera and dance, as well as for conferences and plenary meetings.

The technical facilities of this concert hall are unusual. The stage features an array of elevators, 10 of which are double-floor, with integrated



Above: **The Gulbenkian Foundation concert hall in Lisbon, Portugal**

Left: **Renovation of the understage machinery included replacement of the drive mechanisms and orchestra and transport elevators**

Photos: SBS/Márcia Lessa

secondary elevators that offer diverse staggered seating arrangements for the orchestra and choir. The public can be given a range of optical impressions, which can be designed to reflect the character of the music.

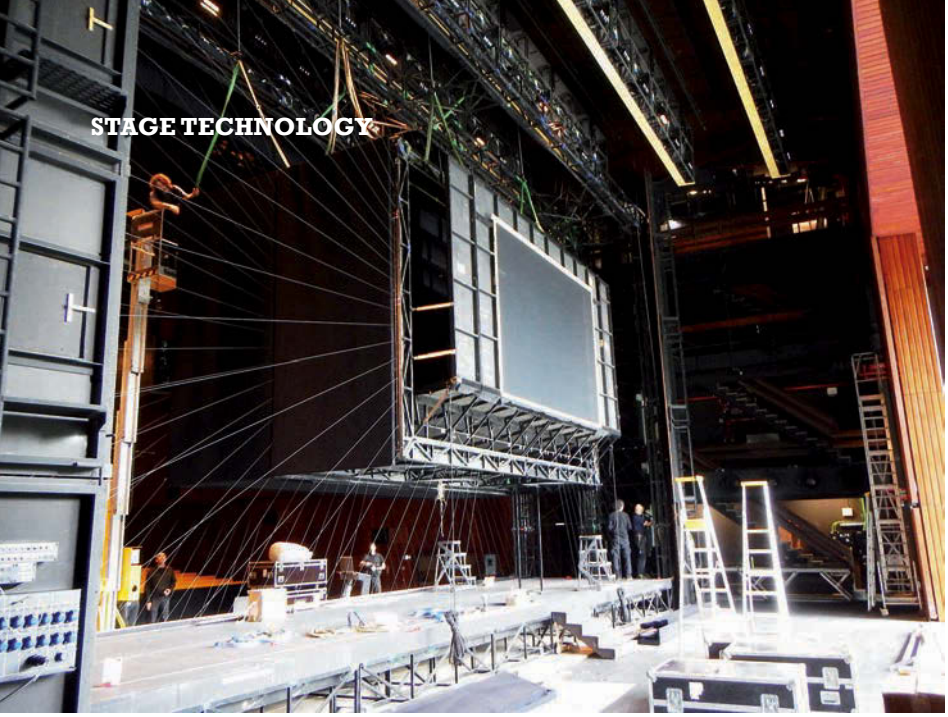
Time to modernize

In 2014, the Gulbenkian Foundation made the important decision to launch a comprehensive program to renovate and modernize the concert hall. The aim was to create a state-of-the-art venue featuring the most advanced stage technologies. The project was entrusted to Portuguese architect Teresa Nunes da Ponte, who contracted out the planning of all the technical installations to Arup – engineering consultants with an impressive list of references including the Sony Center in Berlin's Potsdamer Platz.

"The entire stage equipment had reached the end of its life," says Sam Wise, who was placed in charge of technical systems by Arup. A thorough upgrading and expansion was necessary to meet current and future requirements. The old elevators were moved by rope and counterweight. Only one, slow, lifting platform was available for transportation from the understage area to the stage. In general the machinery did not meet current European safety guidelines.

This modernization project encompassed the complete renovation and upgrading of the auditorium and all technical systems. One particular focus was to renew the understage machinery. It was necessary to greatly improve its efficiency in order to increase the versatility of the stage and ensure the speedy transformation of stage elements. The renovation of the understage machinery included the complete replacement of the drive mechanisms, the replacement of the orchestra and transport elevators, as well as the addition of a new elevator to the front of stage. The orchestra elevator above the transport platform is vital for logistics in the concert hall. All large construction units are transported via the understage area. This area also provides access for the musicians and actors. Finally, the double-floor elevators were upgraded with integrated backscreens in order to offer even greater flexibility.

The main challenge was to design a drive system for the elevator geometry that could fit



Above: **19 fly bars and 10 extension hoists, each with a payload of 500kg, were installed in the overstage machinery, along with six canopy winches with a load capacity of 1,600kg each, 17 chain hoists with a mobile control desk, two curtains, 22 acoustic curtains and 10 flaps in the loft floor**

into the rather narrow available space. Alongside this renovation of the understage, new state-of-the-art sound and video systems were to be installed in the concert hall.

The upgrading of the previously rather primitive overstage machinery posed various challenges. It was necessary to find a way to mount 35 winches and 42 cable reelers in two very narrow spaces so that none of the numerous openings in the loft floor were blocked, allowing free passage of the 17 chain hoists. These hoists can be placed over all areas of the stage by means of a track-and-trolley system. The lack of space entailed a constant process of adjustment and optimization during the project-planning phase. It was vital, of course, that all these measures should not affect the unique acoustics of this famous concert hall.

Strategic partnership

For this demanding work in the field of stage technologies, Arup scoured the world for a partner with tried-and-tested skills and experience in the renovation and upgrading of understage machinery. SBS Bühnentechnik was one of the candidates. This Dresden-based German company had just delivered the complete stage machinery for the House of Music in Denmark's fourth largest city, Aalborg, a project that involved comparable problems regarding the understage machinery – stage elevators with rigid chain drives for a perfect staggering of the orchestra. Simultaneously SBS Bühnentechnik proved its credentials – as a reliable partner who always delivers on time – at the State Theater of Saarbrücken, a project that was also realized under extremely difficult construction conditions.

As part of the international tender, representatives from Arup and the Gulbenkian Foundation visited the company's headquarters in Dresden. This also gave SBS the opportunity to propose some practical solutions. The technical tender required the competing firms to present a detailed concept regarding implementation as well as an overview of how they intended to ensure close collaboration between all project partners. SBS's wealth of skills and experience, as well as a competitive bid, proved convincing, and the company was awarded the contract.

The team from SBS fitted the concert hall with all requisite stage machinery and control systems. Nineteen fly bars and 10 extension hoists, each with a payload of 500kg, were installed in the overstage machinery. They were complemented by six canopy winches with a load capacity of 1,600kg each, 17 chain hoists with a mobile control desk, two curtains, 22 acoustic curtains and 10 flaps in the loft floor for lighting purposes, accessible via a safety net.

The complete stage machinery of 55 axes is computer controlled by COSTACOwin. Operators can make use of one Scout Eagle, one Scout Milan, one Scout Hawk, one dedicated desk for backscreens and the PA system, as well as four Scout Merlin mobile desks.

Work in the concert hall began in August 2013 with the removal of the old equipment, after which the new stage machinery was installed over the following five months. This concluded with the start-up of the new COSTACOwin computer control system. The machinery was officially handed over on February 1, 2014, and the successful renovation was celebrated at an opening concert attended by the Portuguese president.

Ian Knowles, associate director at Arup, was impressed by the achievement of SBS Bühnentechnik. Patrons are scarcely aware of any changes, despite the massive undertaking. The complex state-of-the-art equipment has been seamlessly integrated into the listed building. The concert hall is now modern, comfortable, of the highest technical standard and fully in line with European safety guidelines. And all this while preserving the hall's trademark acoustics. ■

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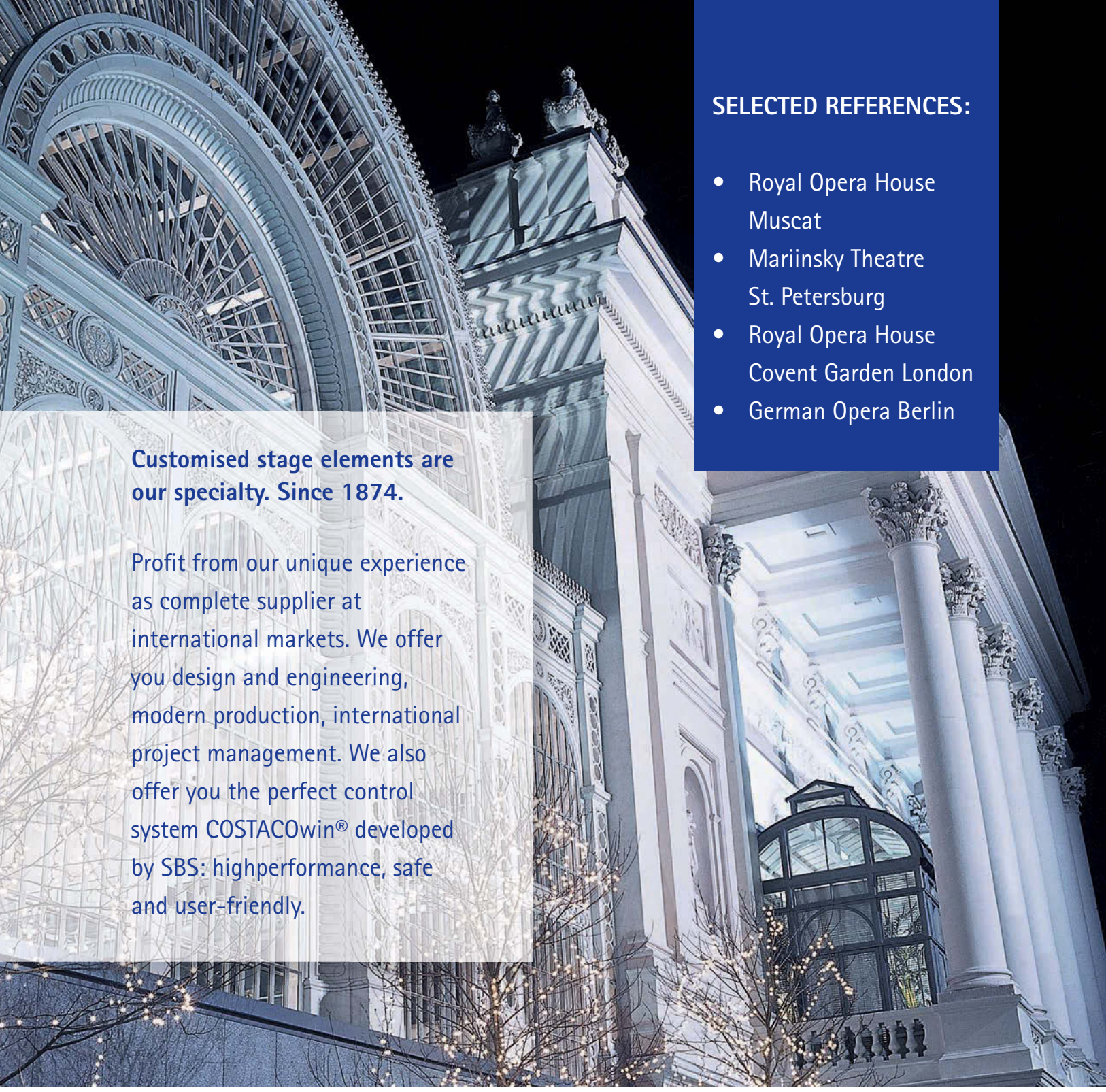

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- Royal Opera House Muscat
- Mariinsky Theatre St. Petersburg
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Far East movement

An audacious investment program by the Taiwanese government seeks to give the country's performing arts industry a boost

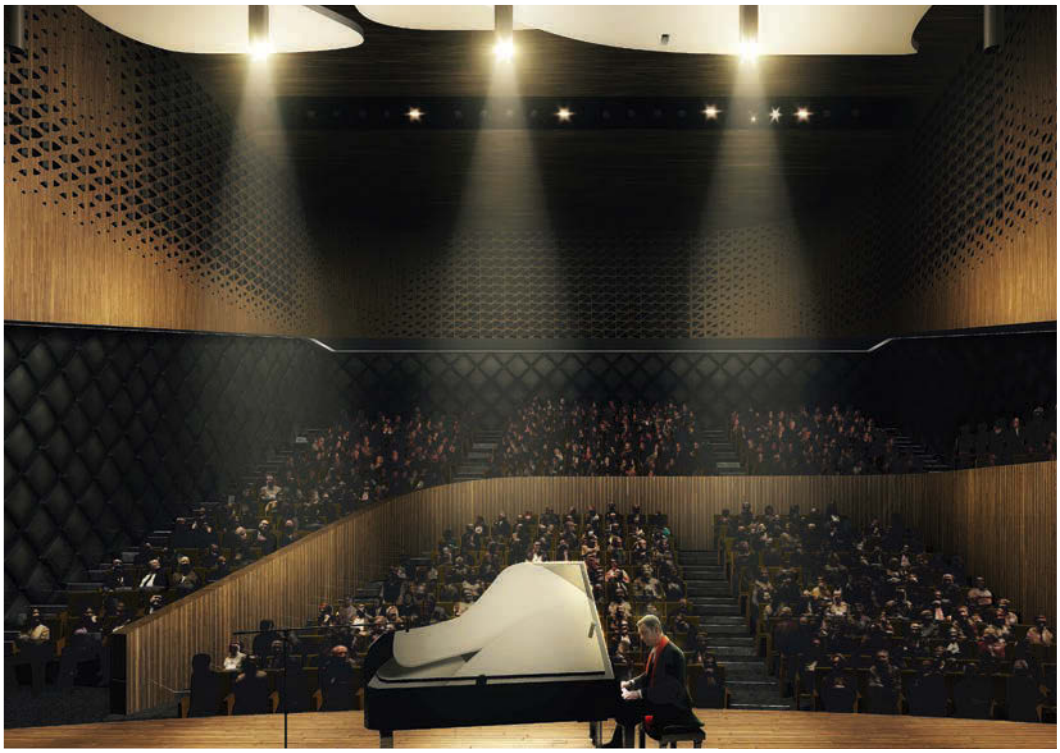
The Lyric Theater at the Wei-Wu Ying Center for the Arts

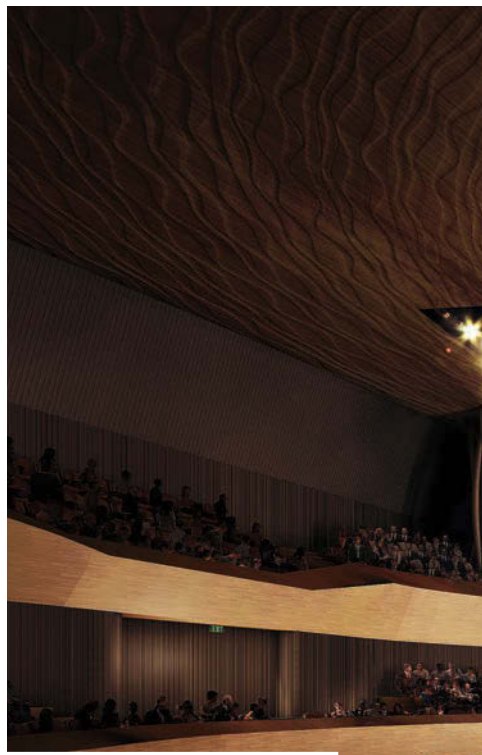
While European countries are cutting down on the amount of money they spend on cultural projects, the Taiwanese government is investing approximately US$1.34bn on promoting the culture of Taiwan. Within five to 10 years, Taiwan will build new performing art centers across the country, with the aim of raising the profile of cities other than Taipei. All buildings have high-quality architecture, include state-of-the-art stage equipment, and look set to become new landmarks. Examples of these venues include the Taichung Metropolitan Opera House, by Toyo Ito & Associates Architects and Domino Architects & Associates; the Taipei Performing Arts Center, by Rem Koolhaas, David Gianotten, Ole Scheeren/the Office for Metropolitan Architecture (OMA) and Artech Architects; and the Wei-Wu Ying Center for the Arts in Kaohsiung by Francine Houben/Mecanoo and Archasia Design Group.

The government has also decided to invest money in the renovation of existing cultural buildings. All these investments will have enormous influence on the development of performing arts in Taiwan. The future promises to see new creative talents emerge from Taiwan, with the nation's cultural strategy setting an example for other countries in the world.

Modern arts

Kaohsiung, a city in the south of the country with a population of 2.7 million, is not only the largest harbor in Taiwan, but also one of the largest harbors in the world. The new Wei-Wu Ying Center for the Arts of Taiwan is situated on the site of a former military complex. In 2003, the government decided to transform the military compound into a public space, with a park and arts center – symbolizing the transformation from harbor city to a modern, cultural hub. The building comprises a concert hall, lyric theater, playhouse, recital hall and large outdoor seating area (ampitheater). It's one of the largest theaters in Asia – not least when considering the performing arts space within a single building. The outdoor venue is integrated into the building, with the audience sitting on the roof within a seating arrangement where the roof touches the ground.





Top: **Recital hall**

Bottom left: **Playhouse and thrust stage**

Bottom right: **Playhouse and proscenium stage**

Main: **Concert hall**

Opposite: **Wei-Wu Ying Center for the Arts is built on the site of a former military complex**

Mecanoo's design of the Wei-Wu Ying Center for the Arts was unanimously selected because of the building's strength in expression, the integration of the complex within the park, efficient logistical planning, advanced theater design and facilities, and the building design's response to the subtropical climate of the city of Kaohsiung. The existing centuries-old banyan trees found at the location were an important source of inspiration for Mecanoo's building design. Theater consultant Theateradvies of the Netherlands was already involved in the competition phase and has worked closely with the architects to include not only an outstanding outer shell of a building, but also state-of-the-art stage machinery and optimal performance spaces for the artists.

World-class facilities

With a total of 6,000 seats (a 2,000-seat concert hall, 2,250-seat opera house, 1,250-seat playhouse and 500-seat recital hall), 800m^2 (8,600ft^2) public library, 1,000m^2 (10,700ft^2) of rehearsal/education halls for music and dance, two conference halls with 100 and 200 seats respectively, stage building workshops and the most technologically advanced theater facilities, the new cultural complex will draw world-class performing artists and theater companies.

The Lyric Theater has five stage elevators with a travel distance of 19m (62ft), 10 stage wagons (16 x 3m), a wagon with a revolving stage, and upper machinery with approximately 100 hoists, which enables the venue to host all kinds of opera performances. The playhouse's orchestra

pit can be used in the traditional European way or for Chinese opera, where the orchestra is positioned at the side instead of in the middle.

The playhouse also offers the flexibility to create a classic type of proscenium theater or a thrust theater, and also has approximately 100 hoists in the upper machinery. The vineyard-style concert hall is equipped with 16 orchestra platforms and a 30-ton moveable canopy.

All of the stage machinery will be delivered and installed by Waagner-Biro Stage Systems together with local companies. Altogether, approximately 600 axes will be integrated into the Waagner-Biro CAT (computer aided theater) control system. ■

www.waagner-biro.com

Image: Kouzi Isita

ACOUSTICS
KAHLE ACOUSTICS

Grand designs

Combining aspects of different architectural styles presents acoustic challenges, which must be overcome through the innovative use of design and technology

Photo: Kahle Acoustics

Right: **The transparent metal mesh and its acoustic shelves are optimized in order to create the desired early reflection coverage in the Jinan concert hall**

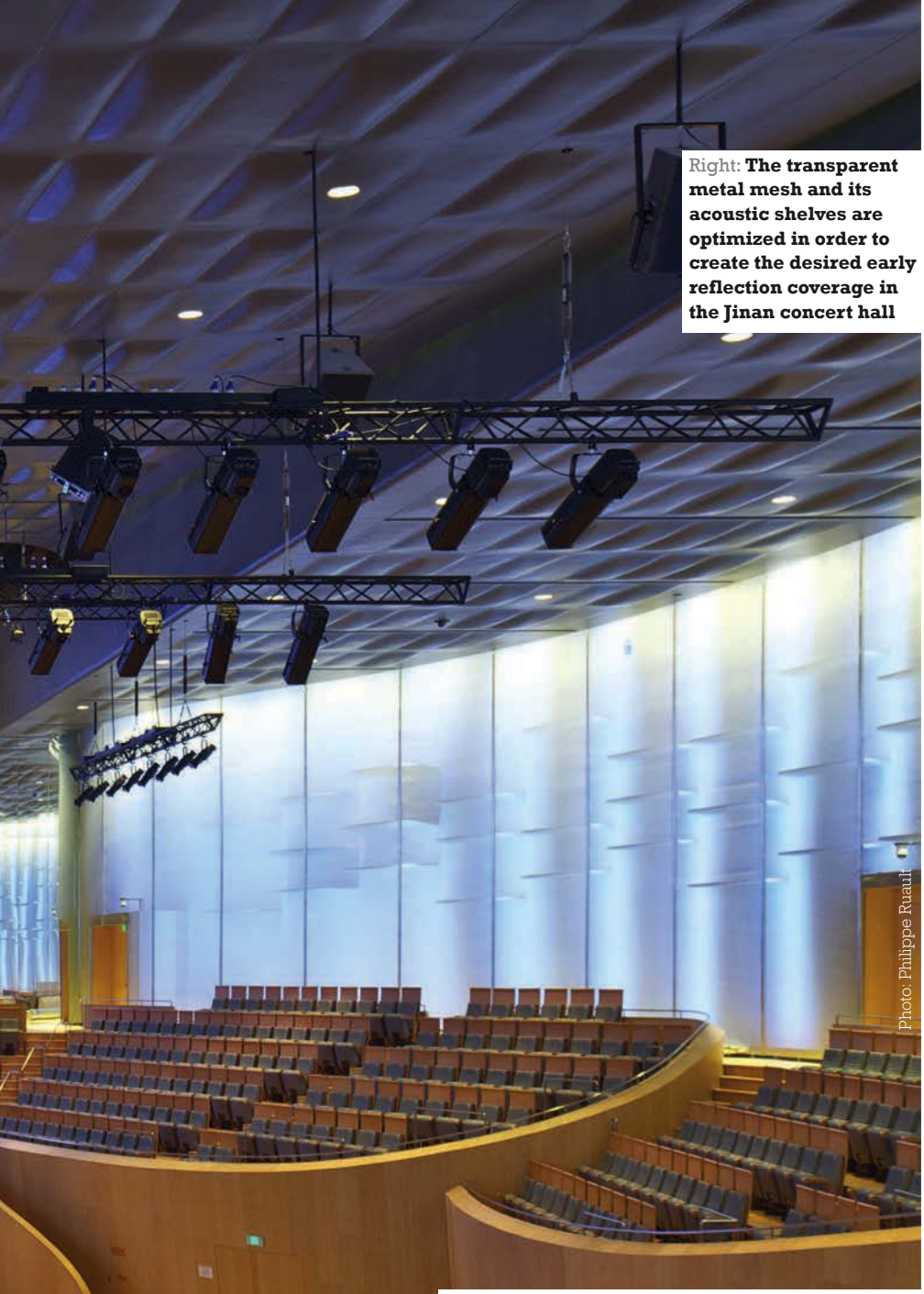


Photo: Philippe Ruault

Main: **The Jinan concert hall with its vineyard terraces, curved bamboo side walls and a ceiling shape inherited from the shoebox paradigm**

Since opening in October 2013, the Jinan Grand Theater has already established itself as one of the prime cultural arts centers in China. On a recent visit, the Chinese prime minister, Li Keqiang, even declared Jinan to be the second performing arts center in China, after Beijing.

Jinan is the buoyant capital of Shandong province, which is home to 100 million inhabitants. The Jinan Grand Theater is located on the future subway line between the historic city center and the new one currently emerging around the new high-speed Jinan West Railway Station, which connects the major cities of Beijing and Shanghai.

The iconic building, with its signature bubbles housing the main performance spaces, includes a 1,600-seat opera house, a 1,500-seat concert hall and a 500-seat multipurpose hall – as well as two impressive sky lobbies on top of the opera house and concert hall.

Updating vineyard style

For the 1,500-seat concert hall, it was clear from the outset that architect Paul Andreu was in favor of a surround typology with seats arranged in vineyard terraces around the stage, inserted in an oval plan. Over the past decade, a large number of vineyard halls have emerged around the world. They are unanimously praised for their spatial qualities, offering a high degree of intimacy and good visibility due to the audience enveloping the stage.

There has, however, been some discussion of the acoustic merits and shortcomings of the original vineyard architectural style when compared with shoebox halls with side balconies. It is true that the latter lend themselves more easily to providing early lateral reflections – essential for a rich spatial impression and good musical clarity – than vineyard halls. The acoustic concept for the Jinan concert hall was to take the original vineyard paradigm one step further by geometrically sculpting the hall envelope such that useful early reflections to the audience were promoted, while keeping harmful focusing reflections from the oval shape tightly under control. This was eventually achieved via a number of design ideas that emerged from the fruitful collaboration between the architect and Kahle Acoustics.

First, the particular ceiling shape, with its sloping central part and horizontal lateral parts, reintroduced some of the acoustic merits of the shoebox hall. The two linear notches created by the ceiling geometry create early lateral reflections to the parterre and the stage, as if they had come from the upper walls of a shoebox.

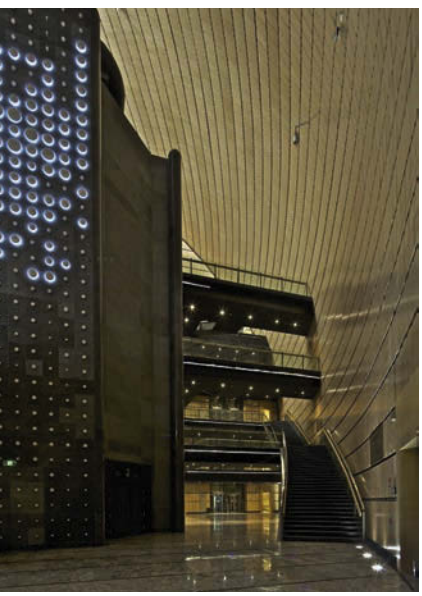
The curved bamboo sidewalls of the vineyard terraces were acoustically sculpted with great effort and care using dedicated 3D CAD software to optimize the early lateral reflections to the parterre and back to the musicians on stage. The acoustician's prior experience with curved bamboo walls on another project in China

Photos: Philippe Ruault

Above: **The opera hall has an asymmetrical parterre and balconies that act as a light source. The three elements of the ceiling canopy also support the early reflections**

Above (center): **The three roof shells of the Jinan Grand Theater span a force line to the three towers, creating a highly memorable icon effect standing as China's second performing arts center**

Below: **The foyer of the opera hall gives access to the venue's balconies and to the sky lobby at the top**



(the Wuxi Opera House, opened in 2012) came in handy, not least in convincing the local policy makers of the qualities of Chinese grown bamboo as a high-quality interior design material. The convex curved separations between the terraces lean forward, creating strong lateral reflections to most audience seats. To deal with disturbing focusing effects, the rear concave parts of the bamboo wall gradually lean backward in order to send those reflections upward, safely above the heads of the audience.

To further deal with the lack of early reflections in the lateral vineyard terraces, 126 acoustic shelf reflectors were integrated behind the acoustically and visually transparent metal mesh lining of the oval walls. All the shelves are linear, but in sections they are slightly angled for optimal acoustic coverage. In the lighting scheme chosen by Paul Andreu and his team, these shelf reflectors, in conjunction with the acoustically transparent metal mesh, can create a mesmerizing visual effect.

While it is anticipated that the concert hall will be used for many kinds of music, it was designed and optimized for unamplified symphonic music, surpassing the limitations of some prior vineyard concert halls and integrating acoustic characteristics normally attributed to shoebox concert halls, notably the combination of long reverberation time with high clarity and ample lateral reflections.

Free-form shoebox design

For the opera hall, after several design trials with standard theater shapes, an innovative and clear-cut design concept was finally adopted: two freely shaped balconies are suspended, floating within a shoebox envelope. On the proscenium end, the balconies connect to two enormous architectural columns, framing the view on either side of the proscenium opening. Other than their architectural function, the columns also serve as lighting positions and were acoustically designed to integrate some acoustic reflectors as well as the house loudspeakers.

In the opera hall, early lateral acoustic reflections are created by geometrically sculpting the balcony fronts, as well as down-stand reflectors inside the architectural columns. Further early reflections are provided by three canopy elements floating above the orchestra pit and by large zigzag-shaped reflectors in front of the lighting bridges integrated in the architectural ceiling.

The walls of the shoebox enclosure are clad in purpose-designed GRG-panels, creating acoustic diffusion while maintaining strong specular reflections. Paul Andreu and his team originally envisioned a subtle night-blue color, but after discussion with the Chinese client, a golden or a champagne color was finally agreed on for the opera house. The night-blue color is now featured in the third hall, the multipurpose theater – a welcome change from the world of black box theaters! The walls of the latter space were acoustically designed to create the required degree of lateral early reflections, while avoiding undesired flutter echoes.

The shared entrance hall of the building opens up into three dedicated foyers – one for each performance hall – located within the volume of the corresponding bubble. The foyers of the concert hall and the opera hall are voluminous, at 55,000m^3 (1,900,000ft^3) each. The finishes of the

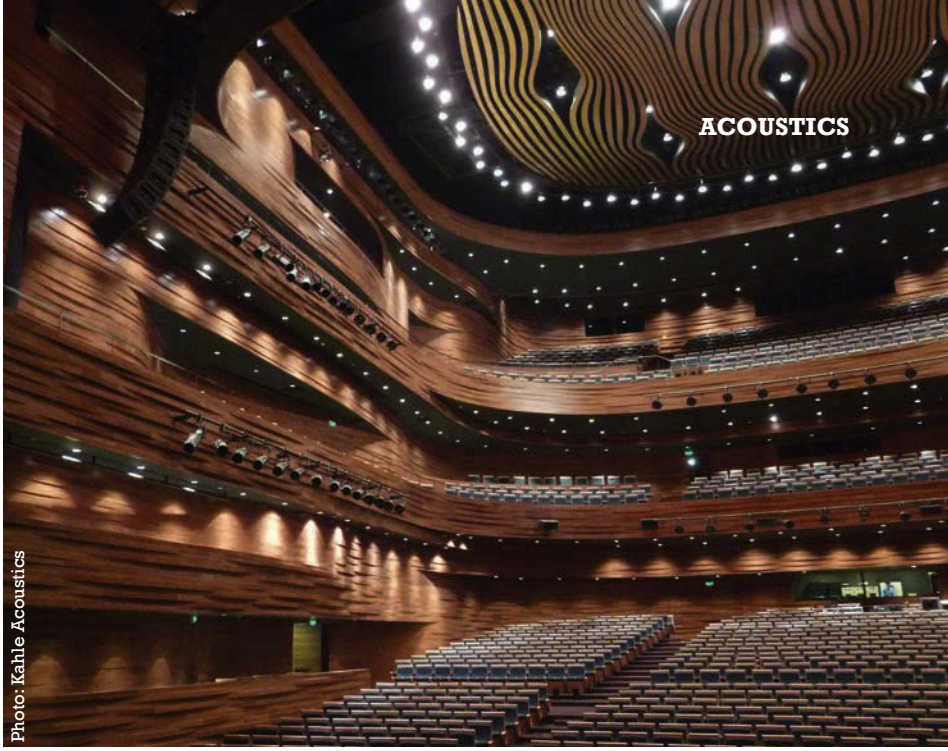


Photo: Kahle Acoustics

foyers were carefully designed and coordinated with the architect. They are lined with thousands of square meters of locally produced acoustic bamboo panels, granting good control of the reverberation to achieve comfortable occupied noise levels. In addition, the sky lobbies on top of the opera and concert halls can be used for music events, even though they are located within the same volume as the public foyers.

The result is a series of sumptuous foyers, with stunning artistic interventions and pleasant acoustic conditions. ■

Above: **A similar curved bamboo wall developed for the Wuxi Opera House has been employed by Kahle for the sidewalls of Jinan's vineyard terraces**

www.kahle.be

ACOUSTICS
L-ACOUSTICS

System upgrade

An innovative and contemporary sound system has dramatically enhanced the acoustic quality of the National Theatre's main auditorium

The Olivier Theatre

The National Theatre (NT), on London's South Bank, houses three theaters: the 1,100-seat Olivier Theatre, the largest of the three; the 890-seat Lyttelton Theatre; and The Shed, a temporary pop-up 225-seat theater in operation while the Cottesloe Theatre is renovated. (It will reopen as the Dorfman Theatre.) Named after its first director, Laurence Olivier, the Olivier Theatre is one of the most prestigious producing theaters in the world.

It is a unique space based on a Greek amphitheater design, with seating over a 120° slope in its fan-shaped auditorium. The idea is that while standing in any position on the stage, the whole house can be viewed using one's peripheral vision. Two main tiers of raked seats – flanked by raised side-banks – sweep down to the stage. In spite of its size, the Olivier has a concentrated intimacy; no seat is far from the actor's point of command.

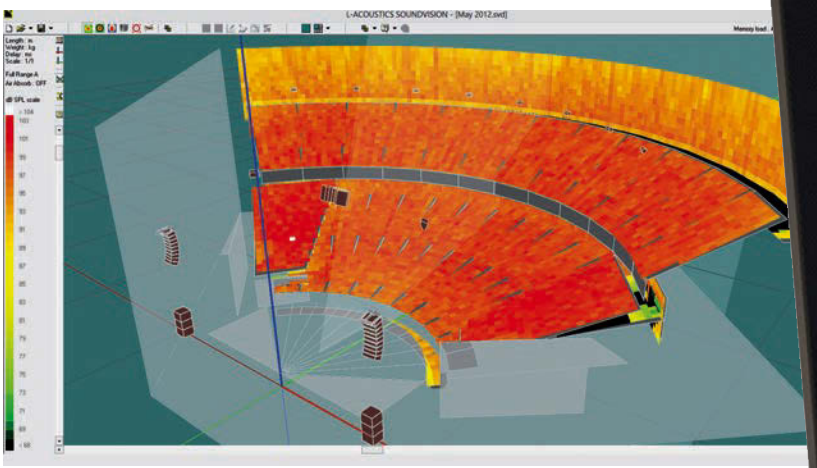
In a unique piece of stage engineering, the drum revolve is at the center of the stage. It is five stories high, contains several elevators and enables exciting changeovers such as towers or boats rising out of the stage, or objects suddenly disappearing from view.

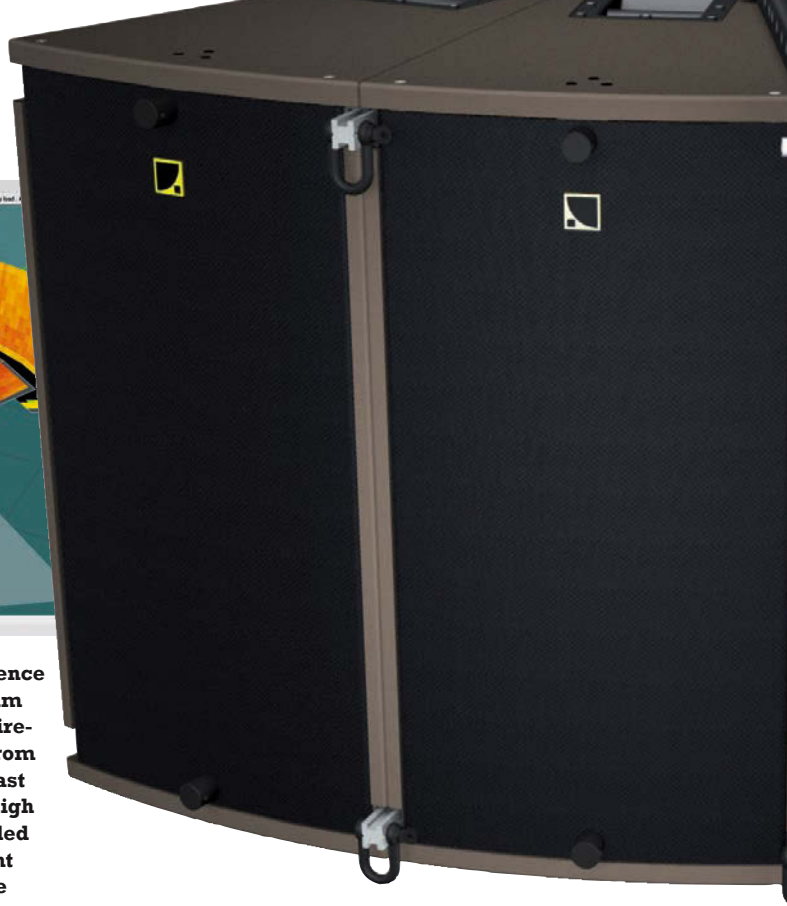
Revisiting sound

The existing sound system was an amalgamation of equipment bought from capital and show budgets over many years. This ad hoc approach meant the existing structure was comprised of many aging components, which over recent years had begun to fail to meet the artistic teams' needs. A common complaint was that the system was not capable of the high sound pressure levels (SPLs) required for certain dramatic effects, whether music, sound effects or voice. Another issue was the system's inability to distribute the sound evenly throughout the whole auditorium.

When the Olivier was in a position to upgrade its sound system in 2011, primary considerations included selecting a system flexible enough, powerful enough and of sufficiently high quality to be able to be reconfigured for each new production, as well as deliver the artistic vision of the many guest sound designers.

Ed Ferguson, sound manager at the Olivier Theatre, explains, "The way the system had





The fan-shaped audience geometry and medium throw coverage requirement of the Olivier from the first rows to the last upper rows and the high SPL requirement called for an Arcs II constant curvature line source

grown was very organic. A sound designer would often come in and say, 'Oh, I need something to fix that hole' and we'd stick up a speaker and it would stay there for 12 years.

"We started looking to price a new speaker system. At the same time our analog desk was coming to the end of its useful life and had been superseded by digital technology. It was a great opportunity for us to consider renewing the whole system. After all, we are not just a producing house but also a repertory theater – we can do two or three shows in the rep, and need to be able to change over from one show to another in a matter of hours. We needed a flexible system."

The theater decided to replace the speaker system and the speaker management system as a whole, addressing first the vocal system and the band system (or the main system), followed by the surround system and the on-stage speakers.

Key objectives

In autumn 2011, three established audio manufacturers were chosen to put forward their design proposals and to demo on-site at the theater. Both line source array and point source options were investigated. The system needed to offer maximum flexibility to deal with all aspects of the theater's needs.

Functionally, it had to be capable of voice reproduction for non-musical and musical theater, as well as stereo music and special effects. Requirements included intelligibility, high SPL and coverage for voice reproduction; excellent stereo imaging and dynamic range for music; homogeneous frequency response for musicals and plays; adequate low-end reinforcement; and the capacity to be quickly reconfigured.

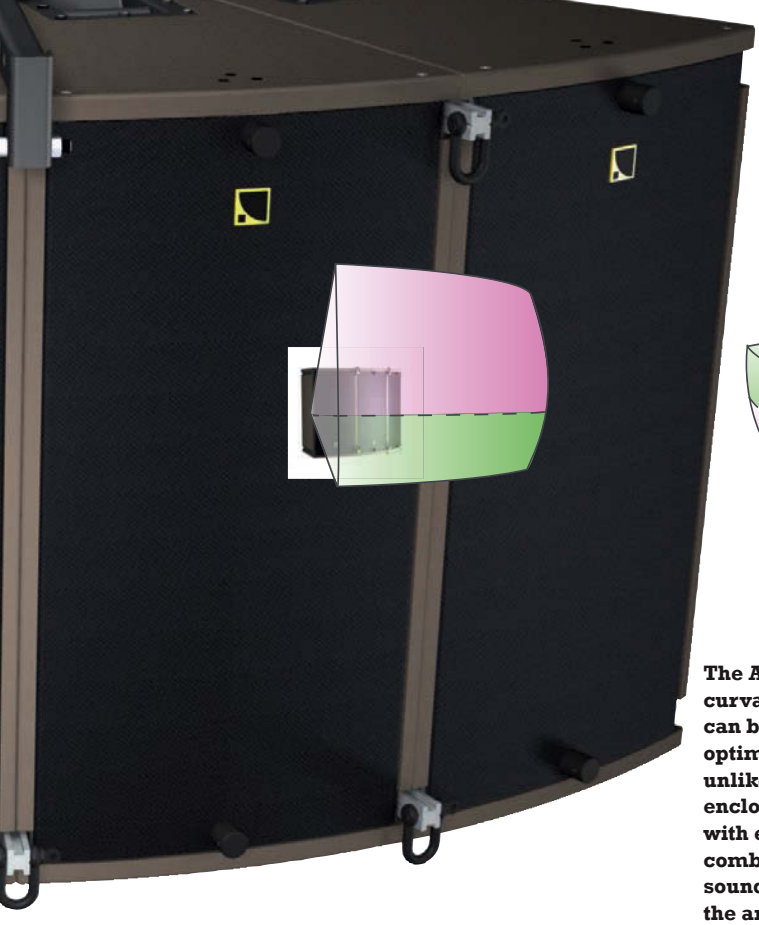
The NT also wished to ensure that companies with long-term prospects would provide its investment. Whichever system was chosen was going to be in the theater for a long time, so it was important that it was perfect. Ferguson says, "It was a big criterion to ensure that whoever we were going with would not only be relevant now but would still be relevant in 10 to 15 years."

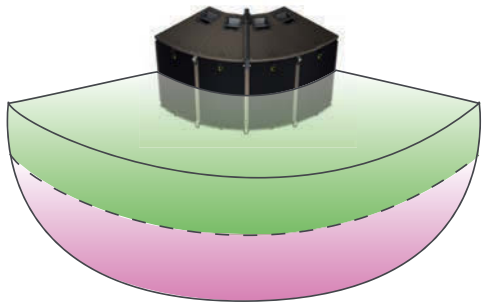
Sound design proposal

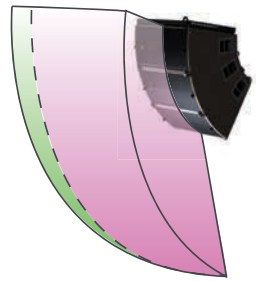
It was decided that a central cluster for vocal reproduction would be deployed. A single and central point source ensures high intelligibility by the audience. The fan-shaped audience geometry and the medium throw coverage requirement from the first rows to the last upper rows and the high SPL requirement called for an Arcs II constant curvature line source.

The Arcs II central cluster consists of an array of six Arcs II enclosures deployed horizontally. The array generates 135° (6 x 22.5°) of horizontal coverage and 60° in the vertical plane. The array is flown above the proscenium arch, 30ft above the stage, thus contributing to a discreet integration and an even SPL across the auditorium by reducing the distance ratio between the front and the back of the audience.

A few additional fills were also needed. L-Acoustics' application engineer, Chris Vass, explains: "It was initially noticed on the SoundVision model and confirmed later in the tests that the Arcs II weren't quite getting around to the horizontal extremities of the raised stalls – a challenge in the venue – so it was decided to look into a fill box there. 12XTi outfills were







The Arcs II constant curvature line source can be arrayed with an optimal acoustic coupling, unlike classic trapezoidal enclosures, which interfere with each other and produce comb filtering degrading sound quality outside of the array axis

added to the design to cover this space. This also helped with the imaging of the system out to the seats at the extremities of each side of the audience, as you are almost looking side-on to the stage. This 12XTi helped draw focus back to the upstage area. We also added a row of 8XTi delays to the circle to cover beyond the Arcs II."

L-Acoustics' design proposal featured a variable curvature line source deployed in a left/right configuration. A Kara modular line source fulfilled the need to maximize the stereo imaging, offer a constant tonal balance and a high and even SPL. The principle of a modular line source is to offer a full-range active line source system into a compact, lightweight enclosure and its complementary subwoofer.

These modular combinations of L-Acoustics line sources (such as Kiva or Kara) covering the high frequency/medium frequency region and their complementary subwoofers (SB15m, or SB18, respectively) deliver an acoustic performance comparable to a larger system, but with added flexibility in terms of physical configuration between top cabinets and their LF extensions. Whenever possible, subwoofers are typically flown closely and coupled to the Kara elements for the best coherence. Otherwise, subwoofers are ground stacked.

At the Olivier, the Kara L/R clusters are flown on either side of the proscenium arch at 24ft above the stage. Each cluster comprises nine enclosures and its LF resources are reinforced by three ground-stacked SB18 subwoofers extending the coverage down to 32Hz. The Kara's 110° horizontal directivity maximizes the central overlap zone between L/R clusters coverage. This allows the sound designers to create a stereo image from incoming sources, offering the audience an impressive stereo experience of both music and effects.

Demonstrating system capabilities

L-Acoustics scheduled a day with the Olivier sound crew in order to familiarize them with the design, recommended kit, calibration, system configurability and capabilities. Giving the crew hands-on experience with the system meant that the team had an idea of how the system would work in practice. Chris Vass took the sound crew through the SoundVision plot and the LA Network Manager design. The same method was used to tune the systems. All that was needed was a little time alignment between the sources, and a couple of gentle filters in the NWM that could be popped in if the need arose. Vass did eight to 10 measurements just to confirm what was being heard. The NT crew was part of this process as well, looking in on the measurements as they were taken. Within about 20 to 30 minutes of the system being up it was handed over to the NT team to play with independently.

The official NT report concluded that the L-Acoustics system would be the ideal choice to replace the vocal and music system in the Olivier Theatre. With the diverse range of live theater that the Olivier produces and the need to cater for the requests of the world-class sound designers who work there, L-Acoustics designed a flexible system that can cover every eventuality and allows the venue to host multiple productions on a weekly basis. ■

www.l-acoustics.com

Wuxi Grand Theatre's horseshoe-shaped opera hall seats 1,700 and uses more than 15,000 bamboo blocks to augment its acoustics

Photos: Jussi Tiainen

Natural selection

Advances in bamboo production methods enabled European acousticians to enhance the audio qualities of China's Wuxi Grand Theatre's main auditorium in a contemporary manner

Wuxi in China is at the heart of the country's economic development of its industrial areas. Known for its textile industries, the city has a population of seven million, and is still growing. To maintain the appeal of Wuxi and its surrounding areas, therefore, a broad range of services and activities must be made available, among them the arts and entertainment. Enter the Wuxi Grand Theatre.

Architecture has always been an important ingredient of the aesthetic-heavy Chinese culture. The country's public buildings, opera houses and palaces are visually impressive in a multitude of ways – not only in size – while the areas that surround such structures are always thoroughly thought-out. Following an international competition, the architectural design of the 77,000m^2 (828,000ft^2) Wuxi Grand Theatre – the city's number one cultural complex, located on a man-made peninsula on the shores of Wu-Li Lake – was awarded to Pekka Salminen's PES-Architects. The Finnish firm's concept is a massive yet attractive design that includes a large traditional opera house and a modern multifunctional shoebox theater.

Not just PES, but the entire conceptual design team came from Finland. After the conceptual design phase, the Finnish team supervised the local design team to make sure that their views and experience were utilized until the very end of the project.

Upon completion in May 2012, the complex received rave reviews for its architectural style. Many related its visual impact to that of the Jørn Utzon-designed Sydney Opera House, not least because of its similar waterside location. Even though the theater actually bears very little resemblance to Utzon's masterpiece, the comparison must be taken as a compliment. The spectacular butterfly-shaped building, surrounded by a meticulously composed visual environment, is an oasis of art and culture in the newly developed Tai-Hu New City and industrial park area.

Hidden innovations

It is not only the architecture that is state-of-the-art, though. The most advanced technology can literally be found hiding behind the building's walls. And performance spaces aside, the most visually and technologically interesting aspect of the Wuxi Grand Theatre is its use of advanced exterior lighting. The building's steel-based butterfly wings are covered with perforated aluminum panels through which thousands of LEDs can change

the color of the walls, according to the mood required. The 50m (164ft)-tall lighting columns create a forest of light around the building and under its wings.

Sustainable technologies and building materials are used throughout the building to make Wuxi Grand Theatre more environmentally friendly. This was a crucial starting point of the design process in order for the building to help lower the pollution levels associated with industrial China.

The uncompromising need for functional theater spaces that are technically and acoustically perfect was another determining factor of the design process. Akukon of Finland and Belgium's Kahle Acoustics headed up the acoustical design of the complex. Akukon, with its vast experience in versatile acoustics and functionality of multipurpose spaces, was also responsible for the project's conceptual theater consultancy, while Kahle worked mainly on the extremely demanding acoustical requirements of the opera hall.

The main opera hall is a traditional horseshoe-shaped tiered auditorium with 1,700 seats. The acoustics can be adapted so that the stage can also be used for concerts and conferences. The stage machinery makes the stage area extremely versatile and large side- and rear-stage areas allow for full-scale stage wagon movements.

A unique aspect of the opera hall is its use of bamboo. Though a very traditional material, advances in bamboo construction methods have in this case enabled it to be used for the opera hall's main wall covering. As such, 15,000 individually shaped bamboo bricks form the shapes needed to create, from an acoustics perspective, a traditional yet very modern environment.

Above left: **A flat floor space can be achieved inside the 700-seat Comprehensive Performance Hall thanks to its retractable seating system**

Above right: **The roof's perforated aluminum panels are lit up by thousands of color-changing LEDs to help create different atmospheres**

East meets west

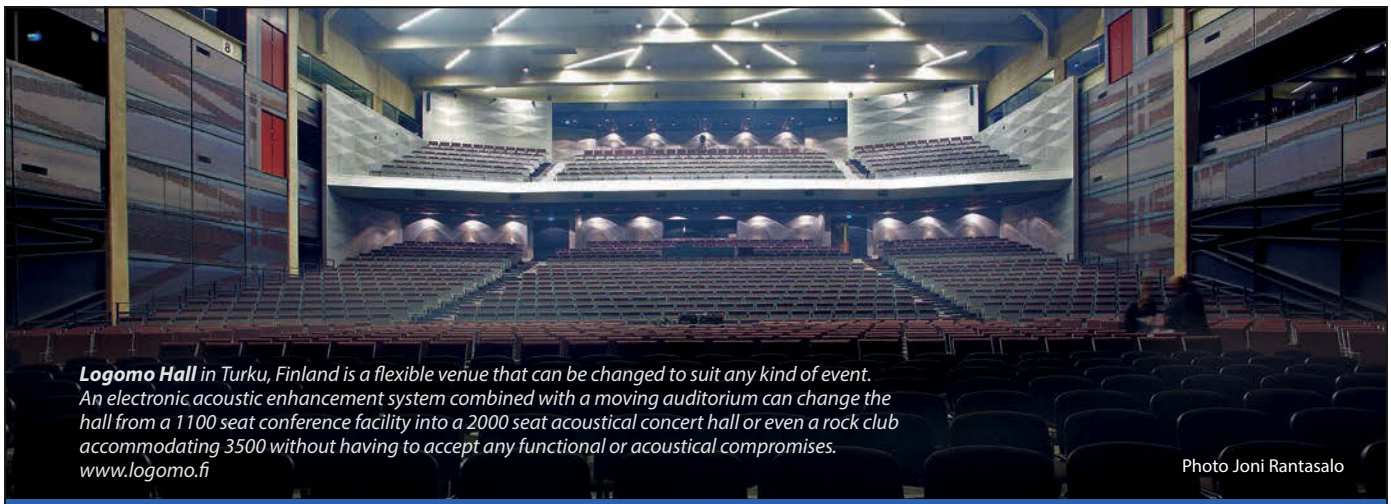
Though opera and acoustical music are emphasized in the main hall's design, the venue's diverse programming requirements have not been forgotten. Both Western and Chinese opera performances, symphonies and light entertainment can be staged, meeting the needs of a variety of shows and audiences.

The wide range of performances put on at the theater means that the demands placed on the stage and the immediate areas around it are constantly changing. Functionality was therefore a crucial element of the design. Getting the logistics right, in regards to goods and people, was also vital to ensuring the versatility of the theater spaces. Having almost all stage-related facilities on the same levels not only enables faster setups, but means that the massive load-in elevators can bring the goods to the stage quickly and safely, making the load-in process as straightforward as possible.

The Comprehensive Performance Hall, a versatile 700-seat black box type room, hosts chamber concerts, amplified music, theater, banquets and special events, such as fashion and car shows. Retractable seating provides an optional flat floor space with functional routing between the different spaces as well as in and out of the building. Again, the logistical consideration of both people and goods was a major factor of the room's functionality to ensure that moving between spaces is easy. Besides being a traditional – though exceptionally large – black box, the stage mechanics, lighting, audio and visual systems enable the room to become a full-scale theater space whenever needed. A tensioned wire grid ceiling makes it quick and safe to change the shape and focus of the theater. All corners and directions are covered equally.

The Wuxi Grand Theatre has become the landmark its community needed. A true gem of modern architecture infused with Chinese traditions, it works as a collective and easy-to-approach living room for its users, retaining the most important aspect of all: its functionality. ■

www.akukon.fi



Logomo Hall *in Turku, Finland is a flexible venue that can be changed to suit any kind of event. An electronic acoustic enhancement system combined with a moving auditorium can change the hall from a 1100 seat conference facility into a 2000 seat acoustical concert hall or even a rock club accommodating 3500 without having to accept any functional or acoustical compromises.*
www.logomo.fi

Photo Joni Rantasalo

Akukon is a leading consultancy in acoustics, noise control, AV design and performance space design across Northern Europe and the Baltic countries.
At Your disposal are over 30 designers and consultants based in Finland and Estonia.
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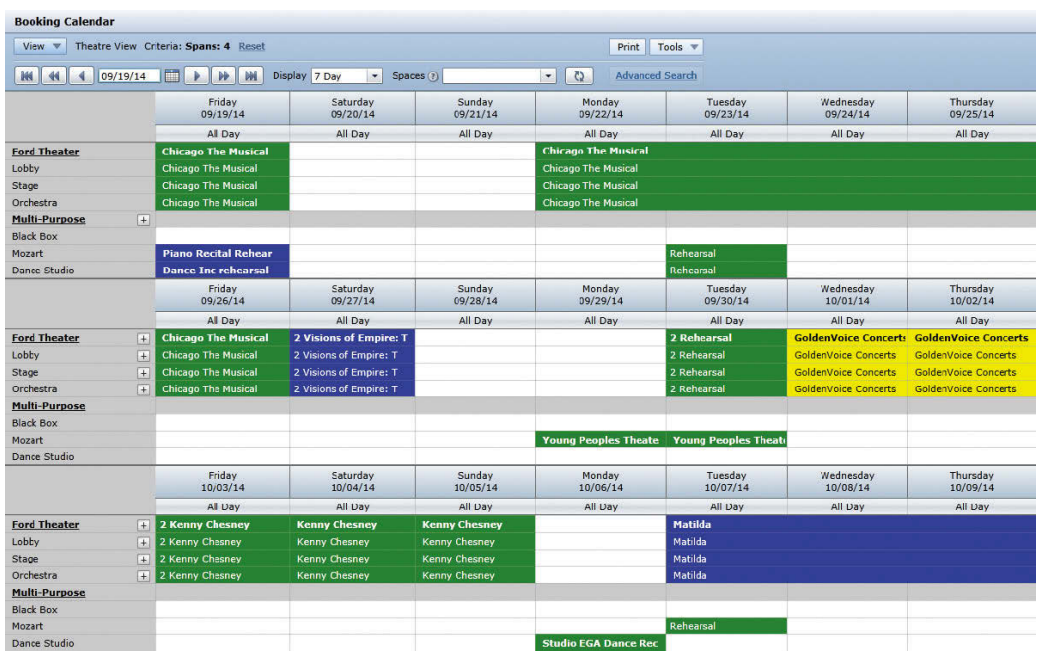
All bases covered

An all-encompassing event management system is streamlining the operational efficiency of backroom staff at entertainment venues of all sizes around the world

During the recent economic downturn, audiences had fewer disposable dollars to spend on entertainment. This realization caused owners and operators of performing arts centers and stadia of all sizes to look for new ways to stabilize their revenues through the inclusion of non-traditional events to their schedules. For large venues, this foray into new markets necessitated the purchase of a different breed of event management software that increases staff efficiency by consolidating customer and event information into a single database. For smaller venues, these enterprise-wide software solutions were often out of reach, causing them to rely on piecemeal solutions – for instance a combination of Outlook calendars, spreadsheets, event booking, and event registration systems.

Over that very same timeframe, international company Ungerboeck Software took on a rewrite of its booking and event management software to offer clients additional freedom and functionality through a cloud-based solution. The benefits include access to the software anywhere, any time and on any device, giving staff the freedom to get out from behind their desks and spend more time with clients to help deliver a higher

Venues can maximize facility utilization and improve staff productivity using a tailored, centralized booking calendar



Using Ungerboeck software, Arts Center Melbourne has made many productivity gains in its organization and financial reporting process

quality of customer service. In addition, cloud-based software allows Ungerboeck to offer a new Software as a Service (SaaS) pricing model, which mitigates investment and operational risks. This expansion into SaaS opens the doors to higher quality event booking and event management software for venues of any size.

The power of three

For many organizations, Ungerboeck's software can replace three or more systems, including booking, customer relationship management (CRM), event planning and coordination, and financials. This means that performing arts venues, such as Arts Centre Melbourne (ACM), in Australia, can put all customer and event data into a single database, so that the staff can access the most recent information in real time. With five performance venues and more than 25 other indoor and outdoor spaces to track, ACM has improved its productivity and reporting and is operating more efficiently as a result. As ACM uses an integrated system, there is only one set of data to pull from, allowing for more accurate reporting, improved forecasting and strategic decision making.

The Hult Center, a performing arts venue in Eugene, Oregon, USA, recently replaced a custom-built event management system, paper booking calendar, and series of spreadsheets, with Ungerboeck's software. "One of the challenges we had with our previous system was that all the information was housed with me," says Theresa Sizemore, sales and booking manager for Hult. "This meant that my staff had to come to my office and look at the black book on my desk if they needed to see what was going on. If they had to go into a meeting, they had to come borrow the big black book and if there was more than one meeting at a time, that caused problems." When looking for a new system, Sizemore says she wanted something that would allow her staff to find the information they needed in real time and on their own computers.

"Ungerboeck allows everyone who is a user of the software to be in the system and see what I am seeing," Sizemore adds. "They can add what they need to add, access documents, and if they have a question, they can look at the script to see any notes that have been added, all without having to come to my desk." This has freed Sizemore to manage other tasks. "I can spend

Above: **Arts Centre Melbourne has used Ungerboeck software as the central repository for all performance information, including both financial and non-financial, since 2009. This has increased consistency across the organization and made reporting simpler and more accurate**

Below: **The Hult Center for the Performing Arts, in Eugene, Oregon, USA, has moved away from the 'big black book' to deliver better results to its city, promoters and patrons**

more time in sales and booking, rather than trying to pass out information to people because it is all in the system."

As Ungerboeck Software evolved from a self-hosted, server-based system, to a cloud-based solution, company leaders took a proactive approach to creating a product for small-to-midsize venues that previously couldn't afford the system. "In years past, due to the nature of an enterprise solution, our software was out of reach for some venues," Ungerboeck Software CEO Krister Ungerboeck explains. "But our belief that every venue deserves a world-class booking calendar, compelled us to create three editions of our software, picking the features most needed, based on industry best practices."

User-friendly approach

Ungerboeck Software's Venues Community Edition is designed for venues with 10 or fewer users. It offers a booking and events calendar, accounts and contacts, and events list, with additional options available. "When it comes to filling an event calendar, turning an opportunity into a booked event often relies on the ability to communicate space availability at a moment's notice," adds Ungerboeck general manager, Europe, Middle East and Africa, Thorsten Kolbinger. "The Venues Community Edition offers the ability to tie customer and event details together through CRM capabilities and help venues more effectively manage relationships."

With a streamlined onboarding system, the Venues Community Edition gets venues up and running in a matter of days. The Holthus Convention Center in York, Nebraska, USA, which offers performing arts space and traditional convention center amenities, adopted the Venues Community Edition earlier this year. "Other providers told me the implementation and training of their software would take a couple of months," Holthus center director Terri Carlson says. "But with Ungerboeck, I was up and running after the first two-and-a-half-hour training session. It's that straightforward."

For venues with up to 30 users, the Flex Edition provides a powerful cloud-based venue management platform centered on CRM that is purpose-built for venues. "Our Flex Edition unites Ungerboeck's booking functionality with CRM that was made for the events industry; it can take you beyond reactively scheduling your space, to proactively filling it," Ungerboeck says. The Flex Edition is also web-based, but offers flexible options à la carte to fit the needs of the venue using it.

And for larger performing arts centers and stadia, Ungerboeck Software offers the Enterprise Edition, a fully loaded, end-to-end system that is available as a cloud-based or self-hosted product.

In addition to enabling Hult Center staff to work more efficiently, Sizemore says the software helps them earn repeat business. "When promoters come here and we're efficient, well prepared and we don't drop the ball, they want to come back. This software also helps us ensure everything is seamless for our patrons." With three editions available, Ungerboeck Software hopes to deliver these kinds of results to a wider variety of venues, large and small, worldwide. ■

www.ungerboeck.com

Think you can't afford Ungerboeck Software? Think again.

It's our belief that every venue, no matter what its size, deserves a world-class booking calendar. Introducing Ungerboeck Software for Venues, now affordably priced for small and midsize performing art centers and stadia. It's pre-configured based on industry best practices. It's web-based eliminating the need for complex onsite IT management. And it's easy to learn and use, reducing training time and costs. Best of all, it's so much more than just a booking calendar.

Learn more at **ungerboeck.com**

About Ungerboeck Software

Ungerboeck's venue and event management software solution is utilized by more than 40,000 users worldwide, including stadiums, arenas, convention and conference centers, theaters and performing arts centers. Thanks to its modularity and flexibility, Ungerboeck Software can easily be configured to meet your individual needs. As industry experts, we're happy to share our knowledge and help you find the right solution for your organization.

USI Ungerboeck Software
INTERNATIONAL

Shaping the future

As venues adapt to the evolving requirements of audiences, artists, programmers and funders, the type of arts space required in the future is anything but set in stone

Earlier this year, the 2014 International Theatre Engineering and Architecture Conference saw and heard much debate among the world's leading practitioners regarding the type of theater space that might be needed by the international arts community in the future – found spaces or new buildings. Anne Minors Performance Consultants (AMPC) believes there is a place for both, though the space has to be appropriate and relevant to the aspirations of the end user.

Europe possesses many old buildings and spaces that inspire theatrical interpretation through their material qualities or quirkiness, while many other countries have more open spaces and fewer theaters, so clients tend to desire new theater buildings. Both situations have led to a broad range of current projects in AMPC's portfolio.

Following the economic downturn of 2008, theaters and institutions in England have had the foresight, imagination and confidence to embark on highly innovative renovation programs. The challenge for designers is how to maximize the impact of their clients' aspirations within the available budget.

Opposite: **The Zorlu Performance Arts Center in Istanbul satisfies cultural and commercial desires**

Below: **The New Theatre Royal Portsmouth's revamp combines new buildings and found spaces**

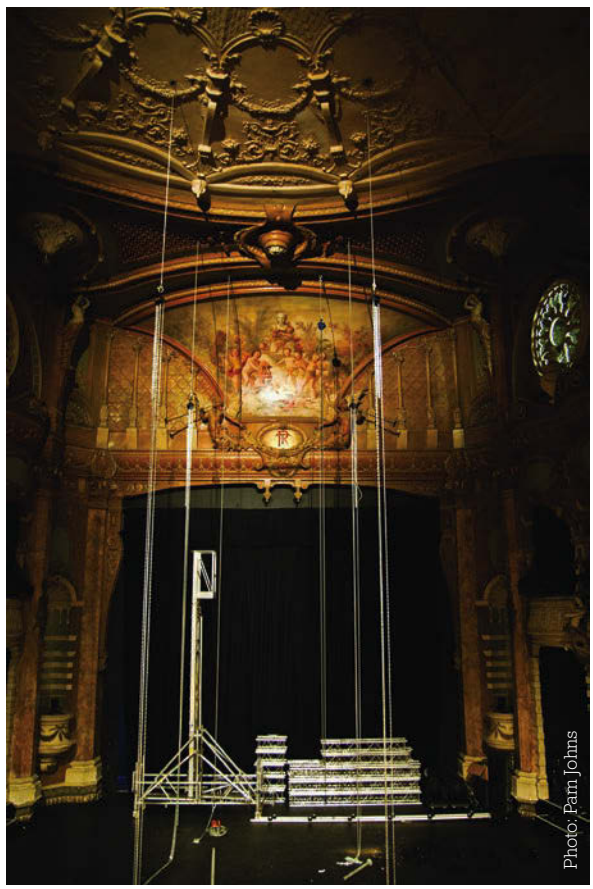


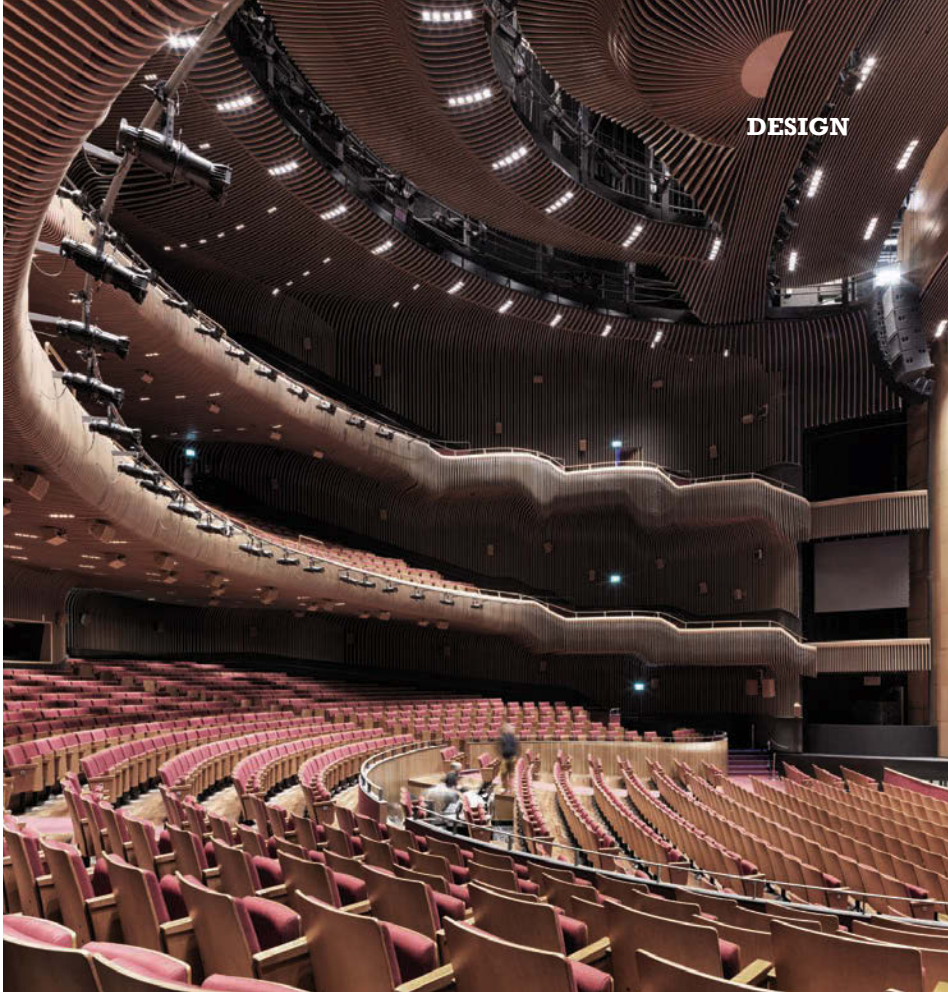
Photo: Pam Johns

Diversity the key

For example, the New Theatre Royal Portsmouth (NTRP) had to decide how best to build and equip a fly tower onto the existing auditorium to recreate the original relationship between audience and stage. The renovation is part of a joint project between the theater and the University of Portsmouth, which will also see a new Penoyre & Prasad-designed studio and education space built by the university on land provided by the NTRP. This project mixes new buildings and found spaces and will realize a vision bigger than any single party involved could achieve. The venue will open in 2015.

With John McAslan + Partners, AMPC has been tasked with creating unity in a 1,000-seat Friends Meeting House that also transforms into an education space for 300 people and an exhibition space. AMPC is linking the balcony and stalls into one rake under an inspirational new roof that admits daylight from above. By introducing physical flexibility for enlarging the central flat floor area, and a flexible technical infrastructure, the space will become adaptable for both the Friends Meeting House and its user partners.

At the crossroads of east and west, Istanbul's Zorlu Performance Arts Center is a mixed development comprising a shopping mall, cultural center and, later this year, a luxury



hotel and apartments. Seven months after opening, programming of the 2,300-seat main theater and 730-seat drama theater, which is operated by Nederlander, has had a positive effect on the success of the adjacent shopping and restaurant areas. Programming opportunities for additional pop-up performances within the overall development are keeping people on site for longer – something many clients strive for. As such, the main auditorium and its activities act as a catalyst for the evolution of a modern arts and commerce district. The addition of a state-of-the-art recording studio and five outdoor stages by Nederlander, together with Istanbul's first two new modern theaters, designed by AMPC and Sound Space Design in collaboration with Tabanlioglu and Emre Arolat Architects, have been greatly welcomed by the city's arts lovers. ■

www.ampcstudio.com

Noise control

Sound-absorbing curtains and variable acoustic membranes are key to achieving the correct reverberation times for venues that host a wide variety of cultural events

Over the past few years, the acoustic requirements of theaters, opera houses, multipurpose halls and community centers have changed dramatically. Today's venues require a more specific set of elements that are unique to that particular space.

The Pérez Art Museum Miami in Florida, designed by Herzog & de Meuron, is an outstanding example of a venue that required a bespoke acoustic treatment. More than 7,500ft^2 of multilayer curtains, which move on Gerriets' Joker 95 track system, enhance the room's acoustics by selecting one of seven preset configurations that have a specific operational and acoustic function. Additionally, the acoustic curtains can create a temporary room-within-a-room configuration that physically and acoustically isolates the temporary room from the larger auditorium.

The acoustic approach should be considered when designing the overall architectural scheme of a space, with items such as volume, surface texture and items within the room playing important roles. Too long a reverberation time results in a distorted or inaccurate sonic perception, while a very short reverberation time often sounds rather dull or muffled. If a classical symphony is being performed, a slightly longer reverberation time will enhance the scale of the orchestra's sound. However, if there is a rock band performing using a large PA system, a longer reverberation time can be counterproductive.

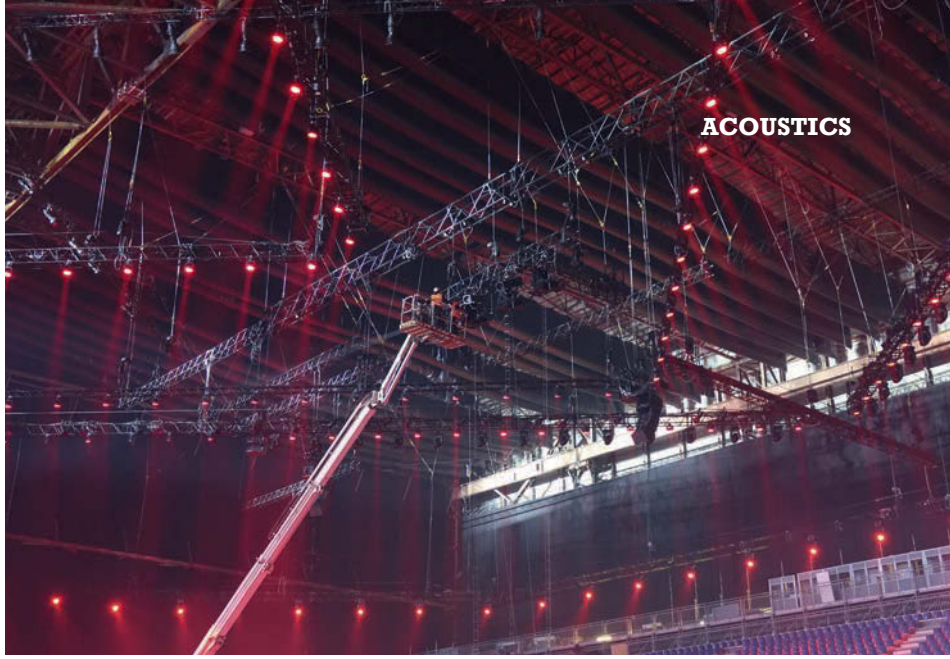
The following general rules apply: the larger the room volume, the longer the reverberation time; and the more absorption that is present (curtains, carpets, people, etc), the shorter the reverberation time.

Curtains can help to adjust the acoustics of a hall substantially. These solutions are effective in shortening the reverberation time primarily in the mid- to high frequencies. A recently completed project is the House of Music, in Aalborg, Denmark. Via a large Gerriets Trumpf 95 motorized track system moving 10,700ft^2 of highly absorbent curtains, the reverberation time can easily be adjusted, or tuned, to the appropriate level for a particular event.

Below: **Two Gerriets seven-layer sound curtains visually and acoustically partition five indoor tennis courts from one another at the Caja Magica in Madrid**

Flexibility as standard

To achieve a low reverberation time in the bass frequencies for pop and rock music, another method that does not use curtains is necessary. Often, resonators or membrane absorbers, which are not flexible or adjustable, are used. The new AqFlex absorbers, developed by Niels W Adelman-Larsen of Flex Acoustics, and manufactured and distributed by Gerriets, combine the effectiveness of membrane absorbers with a high level of flexibility. Filled with air, the airtight, ultra-thin and lightweight AqFlex membranes absorb sound according to the membrane absorption principle. A recent project that employed the product was the 2014 Eurovision Song Contest in Copenhagen, Denmark, where roughly 86,000ft^2 of AqFlex was



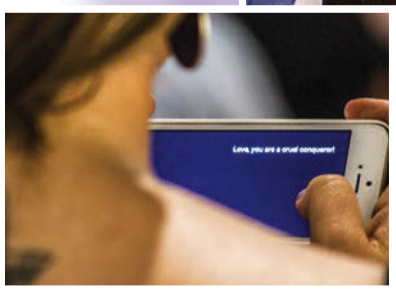
installed to lower the reverberation time of the venue from 13 seconds to 4 seconds in the bass frequencies. This made a tremendous difference to the acoustic quality of the room.

Sound-absorbing curtains do not only allow for the option of flexible reverberation time, they can also isolate a room temporarily. The Caja Magica (Magic Box) in Madrid, Spain, is a good example of this. Designed to be the most modern tennis venue in the world, by leading French architect Dominique Perrault, the curtains lower reverberation time and acoustically isolate five indoor tennis courts. Two Gerriets seven-layer sound curtains, with 12in of separation, visually and acoustically partition the tennis courts from one another. Each sound curtain measures 2,700ft² and weighs nearly 1 ton. These curtains are deployed on the Joker 95 track systems and lower on a mechanism to meet the floor, further enhancing their sound-isolating properties.

Above: **86,000ft² of AqFlex sound absorbers was installed at the 2014 Eurovision Song Contest in order to lower the reverberation time of the venue's bass frequencies from 13 seconds to 4 seconds**

Flexible acoustics can enhance a venue's appeal enormously, whether for a concert hall, museum, sports facility or large multipurpose arena, and enable acoustic consultants, architects and facility managers to choose from a variety of different acoustic options in order to create a much more pleasant listening experience for the audience. ■

www.gerriets.com



On sight

Able to translate foreign language libretti in the user's peripheral vision, Google Glass is revolutionizing the way opera spectators experience live performances in site-specific venues

Above: **Translations of foreign-language performances such as Pygmalion can be made on smartphones with web-based titles or within Google Glass**

Opera might be one of the more divisive types of performance art, but through the collective effort of three forward-thinking companies, more people – especially technology-driven younger audiences – will be able to engage with and enjoy the spectacle, drama, intrigue and nuances of opera performances in non-traditional settings. On Site Opera, Wolf Trap Opera and Figaro Systems are partnering to pioneer Google Glass and personal mobile devices for groundbreaking libretto captioning technology.

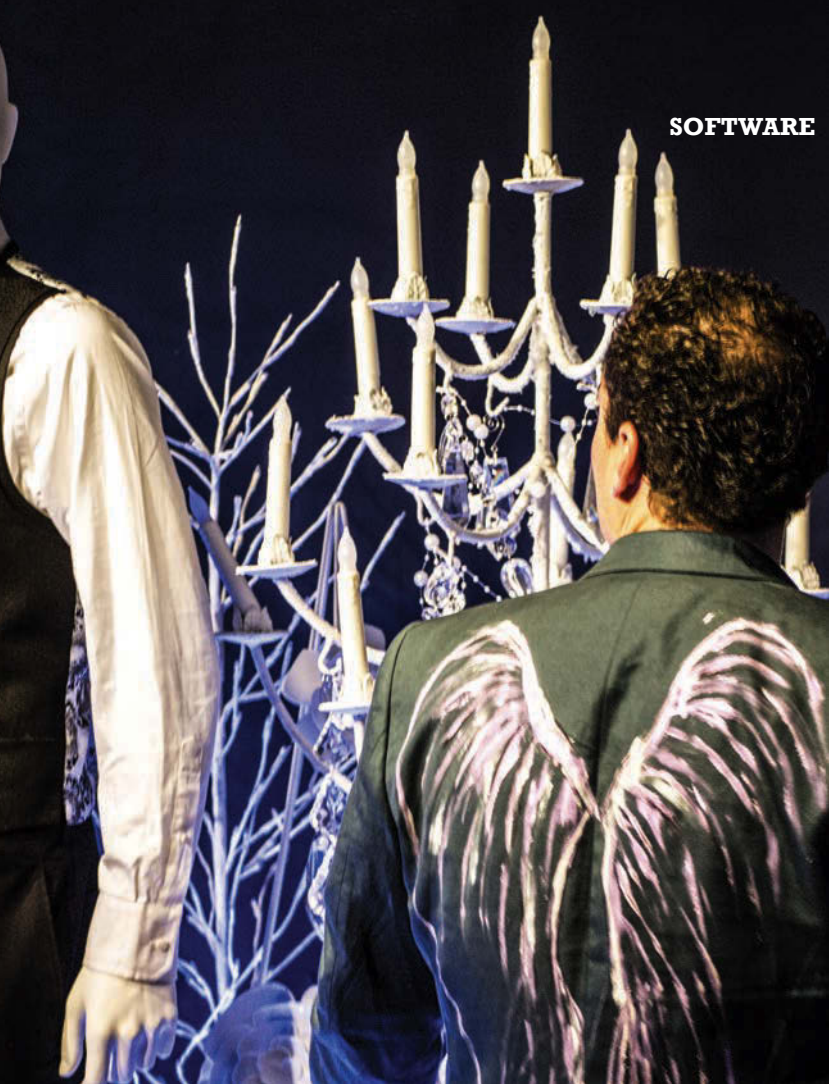
According to On Site Opera founder and director Eric Einhorn, this solution provided an answer to a question: When producing a foreign language production, where should the subtitles be placed considering that the action occurs throughout the entire space? This question was answered when a new production of Rameau's one-act opera *Pygmalion* at the Lifestyle-Trimco Showroom in Manhattan, New York, set the course for the partnership with Figaro Systems and the Explorer program at Google Glass.

"Figaro offers a smartphone system for web-based titles, however we went with the Glass option as it gives the user translations right there in their peripheral vision while they follow the action wherever it may happen in the venue," says Einhorn.

The June 19 performance sold out to Google Glass participants in a mere 60 minutes once the invitation was extended to the meet-up group, who attested to the vigorous enthusiasm expressed for both On Site Opera's productions and the potential of smart devices. "We believe that the operatic application of Google Glass will lead the way for an unprecedented wave of technology-driven audience engagement, and we're thrilled to partner with Figaro Systems to make this a reality," furthers Einhorn.

The next step

From the small, movable feasts of On Site Opera, Kim Whitman, director at Wolf Trap Opera, provided the second step in the testing process during a performance of *Carmen* in a 7,000-seat amphitheater. "At the July 25 production, we used the lawn area, which accommodates about 3,000 people comprised of a younger, more relaxed group. Figaro Systems set up a wireless array so that audience members could open up a special



Photos: MichaelYeshion

web page on their mobile devices to view the MobiTxt libretto system."

The company is comprised of emerging professionals in their 20s and 30s – from singers to technical staff – so this cutting-edge experiment has been widely embraced. Rather than hard sets, the production boasts a 60in-wide video screen projecting virtual scenic elements, with the National Symphony Orchestra right on stage with the performers. "It's a big experience," says Kim, "and the technology fits right in with this 21st century audience."

With applications for traditional theaters and on-site spaces both indoors and out, Figaro Systems is providing the connectivity and universal interface to data via an unlimited number of channels. "For *Pygmalion* we also streamed the performance live via the internet, enabling viewers as far away as Australia and Europe to watch the live performance with captions," says Geoff Webb, president of Figaro Systems. Performances complete with captions are now available on any smartphone device, anywhere in the world. ■

www.figarosystems.com

Safety first

Key to any performance, stage brakes with fail-safe, contactless release monitoring guarantee maximum functional and operational reliability

Safety brakes for theater, film and stage equipment are subject to strict technical requirements. They have to hold suspended loads reliably and must brake movement safely in the event of emergency stop or power failure – to protect both people and materials. An indispensable factor in safety brakes complying with standards DIN EN 81 and BGV C1 is an integrated function-monitoring device. This release monitoring prevents unpermitted operating conditions such as running the motor against a closed brake. Mayr Power Transmission, a leading manufacturer of elevator, stage and vertical axes brakes, offers an unique and innovative alternative to tried-and-tested release monitoring with microswitches. A contactless system with inductive proximity switch registers the operating conditions of the brake and allows the motor to start up only after release. This system guarantees maximum functional and operational reliability.

Photo: Mayr

Above: **The contactless release monitoring with inductive proximity switch** (left) **and the release monitoring with microswitch** (right) **have the same installation dimensions and are interchangeable**
Below: **In the stage drives of the Theatre and Philharmonic Essen, stage brakes with Mayr's contactless release monitoring guarantee top operational reliability**

Photo: Philharmonic Essen/Frank Vinken

Improving reliability

"We can't afford for our stage drives to prove unreliable during a performance," explains Harald Heinen of Theatre and Philharmonic Essen. "Mayr Power Transmission has made a decisive contribution toward the improvement of operational reliability with its contactless release-monitoring devices for stage brakes. This monitoring system functions absolutely perfectly. When it comes to reliability, we make no compromises."

As there are no mechanical parts involved, the release monitoring with proximity switch is wear-free. The lifetime is independent of the switching frequency. The system is magnetic field-resistant and works absolutely reliably. As there are no moveable parts and the electronics are completely encapsulated, it is also resistant to impact and vibration.

Other advantages of the inductive proximity switch are the high switching point repetitive accuracy, the low hysteresis, and the low temperature drift. The switching bolt for the proximity switch is installed at the factory and is, in contrast to the release-monitoring system with microswitch, not adjustable. Application errors through adjustment of the switching point can therefore be ruled out.

It is possible to design the contactless release monitoring with proximity switch optionally as a NO or NC contact. With the NC contact function, the high signal is generated if the brake is switched when de-energized. Here, the armature disk drops and the brake closes. Initiator cable breakage is recognized when the brake is closed. With the NO contact function, the high signal is generated if the brake is energized and the armature disk releases the rotor. The brake is released. Only on generation of the high signal is the motor enabled to start up. This reliably prevents the motor starting up against a closed brake. The control recognizes cable breakage when the brake is open. The contactless release monitoring can be integrated into various construction-type series of the tried-and-tested ROBA-stop-safety brakes by Mayr. ■

www.mayr.com

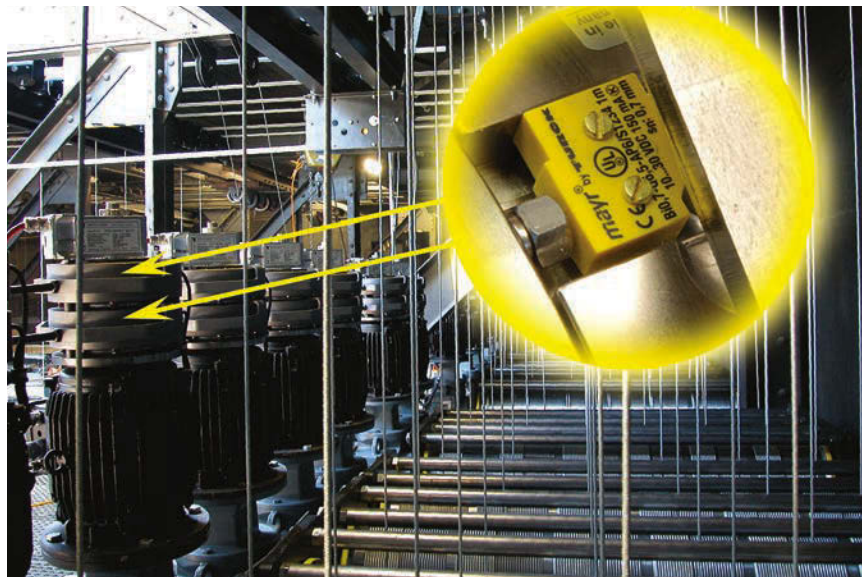


Photo: Mayr

Above: **With Mayr's ROBA-stop-silenzio low-noise stage brake, both brake circuits come equipped with the fully integratable contactless release monitoring**

Back to school

Outfitting a music and drama school's facilities with the latest lighting, audio and video systems required flexibility, planning and customizable solutions

Milton Court, Guildhall School of Music and Drama's state-of-the-art facility opposite its premises on Silk Street, London, is part of a multimillion-pound development by Heron International. It houses a 608-seat, world-class concert hall, a 227-seat theater, a studio theater, a television studio and three rehearsal rooms.

Stage Electrics has supplied, installed and commissioned all of the lighting, audio and video systems venue-wide, including dimmer racks, data distribution, paging and show relays, custom-manufactured stage management desks, facility panels, lighting bars, raceways and loose equipment.

Guildhall School wanted to update and expand its site to ensure it continued to offer its students incomparable training in exceptional state-of-the-art facilities. "The project has been at least 10 years in planning, during which time we thought through every aspect of each venue to ensure our specifications would future-proof it for the next 25 years," says Guildhall's head of theatre technology, Steve Huttly.

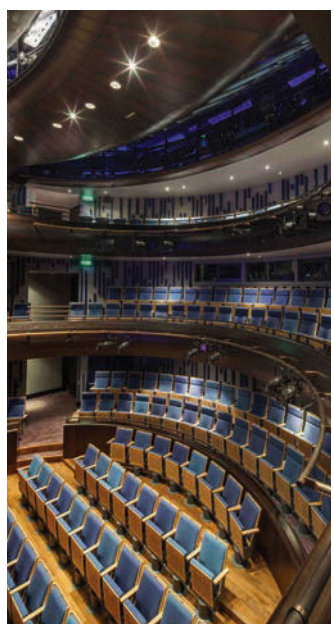
The project has not been without its challenges – the physical challenge of cramming so much into a tight space was a major consideration. "Theatre Projects has encouraged a collaborative design process that has been rewarding for those involved," says Stage Electrics' technical project manager, Nick Broad, who was responsible for delivering the program. "It led us to contribute a number of bespoke solutions to meet challenges as they arose."

A collaborative project

A high degree of collaboration between Stage Electrics and the other contractors was required to produce this visually stunning and technologically advanced project.

Photos: Morley von Sternberg

Above: **Milton Court Concert Hall;** Below: **Milton Court Theatre;** Opposite: **Milton Court Studio Theatre**



"The project was highly complex, comprising more than 40 separate packages, and so a very high level of coordination was needed between the design team, the main contractor and all the various subcontractors," says Clive Russell, director of strategic projects at Guildhall School of Music and Drama. "Stage Electrics worked collaboratively and proactively with everyone, adapting the program and schedules as required to suit the needs of the project."

Stage Electrics custom-designed facilities panels for sound, communications, production lighting and AV, along with company switches and power distribution units, which carry single-phase and three-phase power.

Rehearsal, performance and house lighting can all be controlled directly from each venue's lighting console (an ETC Gio in the studio and theater; a GrandMA 2 Light in the concert hall) or from a Stage Electrics customized panel with ETC touchscreen interface, which can be configured and programmed for all levels of technical ability.

Quality of acoustics takes precedence in the concert hall, which will be used regularly by the

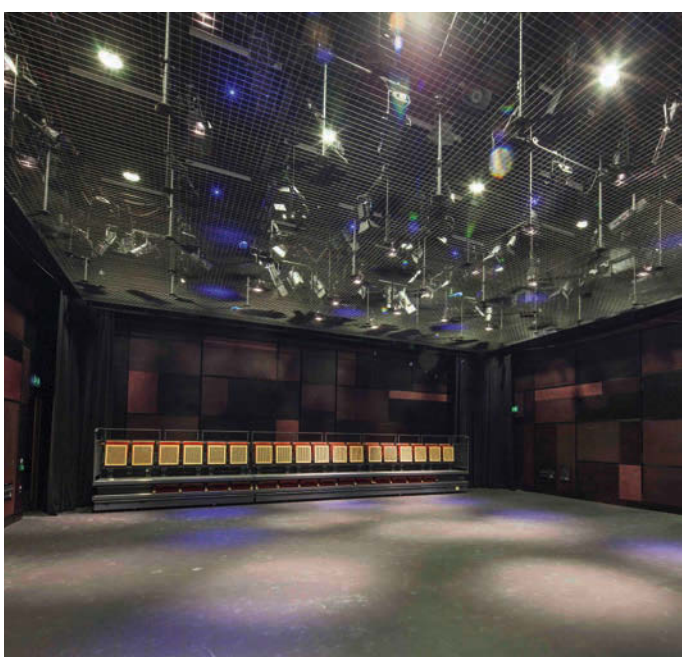
Guildhall School, The Barbican Centre and the BBC for recording purposes. Stage Electrics fitted dimmers that eliminate filament noise and carried out acoustic testing on all lighting equipment. Purpose-built control racks and facilities panels incorporate connectors for BBC cameras and lead to a designated OB-truck parking position outside with data and camera links, all of which were installed by Stage Electrics.

Stage Electrics' bespoke concert manager and stage manager desks, designed in consultation with stage management tutors, have been tailored specifically for each venue, in terms of dimension as well as function, with features that include dimmable white and blue lights, tactile, user-friendly buttons, and AMX control of lighting and cameras.

"Stage Electrics was on-site for two years with our site manager, David Squire, controlling day-to-day requirements and working closely with Theatre Projects' project manager, John Riddell," says Broad. "We have been able to react quickly to changing requirements and advancing technology to ensure the school received the most recent, highest specified equipment available. It has been a highly technical program and we have enjoyed the challenges and creativity it brought to us."

"The high specifications of Milton Court enable us to reflect best practice, inject flexibility and longevity, and offer students the best facilities and equipment available," says Huttly. "Stage Electrics did precisely what Theatre Projects requested – and did it well." ■

www.stage-electrics.co.uk



Musical connections

Delivering bespoke acoustics through innovative techniques enables performing arts acousticians to exceed client expectations

Below: **SSD installed mock-up SoundSails at St Peter's church for the BBC's Symphony series filming of the Hallé Orchestra**

Every orchestra, opera and theater company has its own unique creative approach, informed by its aims, values and history. To achieve the best connection to their specific artistic and operational goals, Sound Space Design (SSD) involves its clients deeply in the design process. In recent projects, SSD has developed new technologies and driven the use of immersive demonstrations and mock-ups to facilitate this collaboration and circumvent alienating technical discussion.

Refining stage acoustics

For the recently completed renovation of Orchestra Hall, Minneapolis, by KPMB Architects, SSD's remit was to improve musical communication on stage while retaining the much-loved audience sound. Early on, SSD made detailed 3D acoustical measurements to calibrate the acoustical computer model of the hall. To give the musicians an opportunity to hear and feel the improvements, and collaboratively hone the finer details before committing to construction, SSD guided a series of full-scale mock-ups, constructed on the orchestra's home stage and tested during rehearsals and performances. Adjustments were made day by day, following feedback from the musicians committee, informal discussions during breaks and via questionnaires. After a period of months using the mock-ups, the orchestra knew it was buying a design that provided the greatest acoustical improvement for the budget. Opening reviews confirm that the legendary audience sound is intact, and the musicians can hear themselves and each other better to continue the ascent of the Minnesota Orchestra under Maestro Osmo Vänskä.

Conversion feasibility

For the Hallé Orchestra, SSD led a collaborative process to test the feasibility of converting St Peter's, a protected 19th century church in Manchester, UK, into a permanent rehearsal venue. After early rehearsals established that the untreated church was too reverberant, SSD and Anne Minors Performance Consultants developed lightweight fabric reflectors to increase acoustical clarity and improve musical communication across the space. The SoundSails – developed initially for SSD's Garsington Opera project – were suspended in a manner that required no structural anchors, and received their debut at a filming for the BBC's Symphony series. Feedback from conductor Mark Elder and the musicians resulted in refinements for the final design and excellent reviews since opening.

Virtual reality

In designing Hong Kong's first dedicated venue to Xiqu (Chinese opera), guidance from

practitioners has been extremely important. During tests of pit configurations, SSD made anechoic recordings of Xiqu instruments and singers for auralizations of the acoustical computer model. SSD created a virtual mock-up with a custom graphical interface so that the practitioners could mix the virtual sound from loudspeaker arrays with the modeled natural sound from the pit and stage to gain an intuitive understanding of the room acoustics. Control of flexible acoustics elements in the model showed their value for broadening the range of acoustical excellence. Comments on acoustical subtleties such as brightness of sound have steered detailed design of materials and textures.

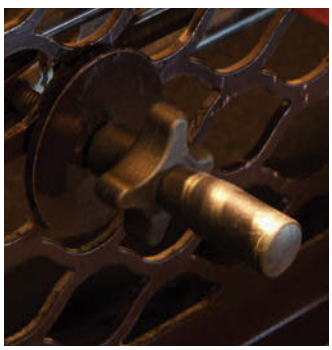
Above: **SSD refined the stage acoustics at Orchestra Hall, Minneapolis, through rigorous mock-up testing of balcony front extensions and invisible changes to the 'acoustic cubes'**

By fostering client involvement during design, SSD builds confidence for the team. Advances in client participation are paralleled with new techniques to carry out acoustical testing directly in the architectural computer model. Ultimately, it is the performers and audiences who benefit from such rigorous design, enjoying venues that provide excellent value for money and closely support the company's creative ambitions. ■

www.soundspacedesign.co.uk

Back to the future

The redevelopment of a historic theater required a seating solution that used modern technology, yet retained the look, style and character of the original venue



Above: **A mesh-style wrap that acts as a riser board enables various layout configurations**

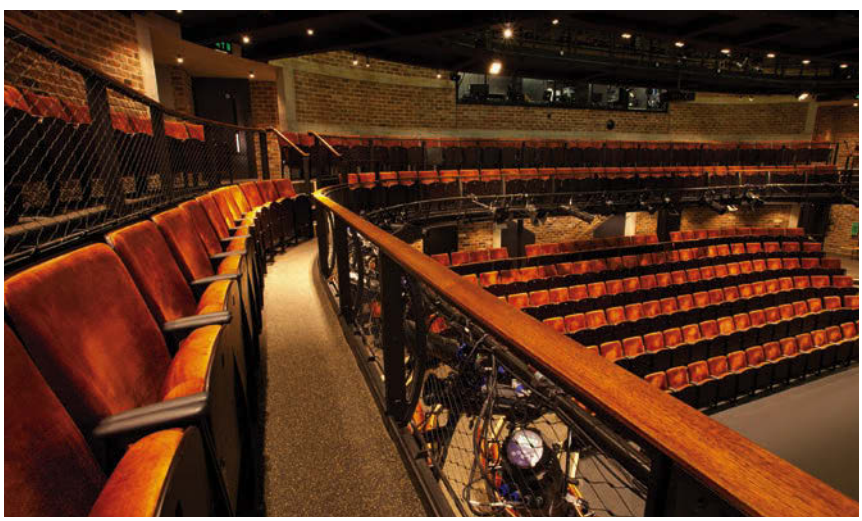
Right: **The color of the seating fabric matches the bare brickwork of the interior walls**

Below: **The upholstered seats feature leather-covered arms for enhanced durability**

As a family business dedicated to supplying superior quality seats and effective follow-up services, Kirwin & Simpson has been providing first-class seating for the entertainment industry since 1945, and has grown into one of the UK's leading suppliers. The company now supports almost all of the commercial theaters in London's West End and a wide selection of cinemas, theaters and concert halls nationwide.

One of the company's recent projects, the Everyman Theatre in Liverpool, was a publicly funded project that had to demonstrate value for money at every stage and satisfy an unusually large number of diverse requirements.

The Everyman Theatre was founded in 1964, but was based in a building that dated from 1837. In July 2011, the theater closed for a complete rebuild. The redevelopment cost of £28m (US$46m) was mostly publicly funded.



The new Everyman, designed by architect Haworth Tompkins and consultant Charcoalblue, was to include a new 450-seat theater with the ability to fully support the Everyman's diverse program of work for youth and community groups, as well as being a conventional entertainment venue. An important part of the new installation was seating, which would be as flexible as possible, and adaptable to a multitude of configurations.

History repeating

The project brief was to retain the look, style and character of the venue's original seating, but to bring it up to modern standards of comfort and build, offering the flexibility and versatility required to meet a wide range of new and exacting requirements.

The color of the fabric, for instance, was critical to complementing the warm glow of the bare brickwork walls, and needed to be similar to the original seating. An unusual decision was to upholster the seats so the velour pile was upside down, giving an instant lived-in look, which has proved very successful.

The Everyman Theatre is a very busy place, and as such requires maximum durability from the seating, so Kirwin & Simpson decided to use a solid ply outer back – easy and practical to maintain and adapt, and in keeping with the previous style.

The seats retain a traditional style, with solid lip edges to reduce wear and Probax engineered the seat foam for extra comfort. The arms are leather-covered for durability (as these are a key wear point when seats are moved) with new metal work profiles with a retro styling similar to the original castings.

Requiring the ability to change the layout quickly and easily, the entire auditorium has been designed and built to use two types of special fixings for maximum versatility – direct-to-floor and direct-to-deck systems – as well as incorporating a mesh-style wrap to act as a riser board. The chairs conform to a uniform size and footprint, which makes them fully interchangeable. Even the specially designed high chairs in the back row can be easily moved and re-fixed using a special floor fixing system by Kirwin & Simpson.

"The Everyman seat is a result of close collaboration between client, architect, theater consultant and manufacturer," says Gavin Green, senior partner at Charcoalblue. "The design and installation has been a great success and the theater is delighted with the flexibility and comfort of the seat. It looks great as well!" ■

www.kirwin-simpson.com

Comfort zone

An ergonomic foam-based seating technology is providing a host of benefits for the users of static seating applications

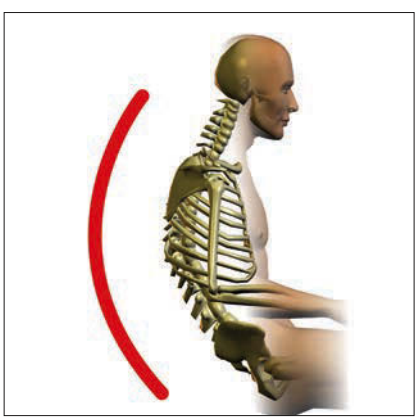
Right: **Cinema chains such as Odeon/UCI are opting for the ProBax dual foaming system**

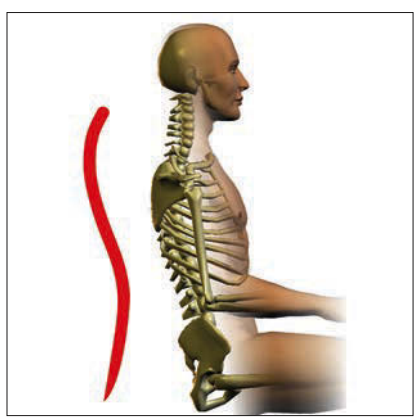
Below: **ProBax counteracts the unnatural C shape that conventional seats place on the spine, in favor of a healthier S shape spinal curvature that provides many physiological benefits**

It's 94 so far and growing fast. That's the number of venues worldwide that use ProBax, according to Ian Moore, CEO of NuBax, the company behind the product. ProBax evolved from pediatric medicine. Working with children with musculoskeletal problems who all had trouble sitting, NuBax set about challenging the way seats are produced, trying to find a solution to an age-old problem – the uncomfortable chair.

The result was ProBax, a dual foaming system incorporated inside seat cushions. Inserts are placed within seat bases leading to dramatically improved posture and greater comfort levels. "It isn't just comfort," says Moore. "We are able to show other physiological benefits such as improved blood flow and lung function, higher concentration levels and reduced muscle fatigue."

ProBax counteracts the tendency for the pelvis to rotate backward when sitting. With the pelvic position corrected, the seat user automatically adopts a more upright, natural posture. Conventional seats place the spine in an unnatural C shape. By helping the body maintain a healthier S shape spinal curvature, ProBax reduces slouching, fidgeting and movement; reduces neck and back pain; greatly increases seat comfort ratings; increases blood and oxygen flow; and increases the perception of space between seats.





ProBax works with any foam seat – new or refurbished – without altering its appearance. One practical feature is that established seat makers make them under license. "Many of the world's leading seat makers and refurbishers hold ProBax licenses," says Moore. "All any venue has to do is ask its current supplier for a ProBax prototype to test. We design one and, if they like it, their chosen manufacturer makes it, installs it and invoices it."

Cross-industry appeal

In 2012, ProBax entered auditorium seating as the UK's Ambassador Theatre Group (ATG) installed ProBax seats in its Fortune Theatre. "The dramatic increase in comfort was worth it for our customers," says David Blyth, property director at ATG. The company has subsequently installed these seats at all of its venues. ProBax can be found in theaters in London's West End, across Europe and Asia, and from Broadway to the West Coast of America. In 2013, the Metropolitan Opera House in New York City began installing ProBax seats as part of its four-year refurbishment program.

Independent cinemas, as well as leading chains including Odeon/UCI in Europe, Golden Village Cinemas in Asia, and others across North and South America, are opting for ProBax seats via their current suppliers. Education establishments, sporting arenas and corporate training centers such as IBM's London facility

are also choosing ProBax where improved concentration levels are an added bonus.

In transport, notable users of ProBax include Lotus Cars, Bombardier Business Jets and the US Federal Aviation Administration. Other lines for the award-winning concept include office and task seating, banquet and convention chairs, healthcare products and even music stools. And 2011 saw breakthroughs in the US conference market and ProBax convention seats are now found in locations worldwide.

By reducing fidgeting and movement, the durable life of ProBax cushions is increased by up to 25%. Also, the seat user gets a greater feeling of space in a ProBax seat. "We welcome inquiries from all auditorium owners and seat makers. If your building has seats in it and you want to enhance the comfort levels and concentration of your audience, we can help," concludes Moore. ■

www.nubax.com

The art of science

An unorthodox approach to acoustic design problems has resulted in innovative solutions for two very different venues

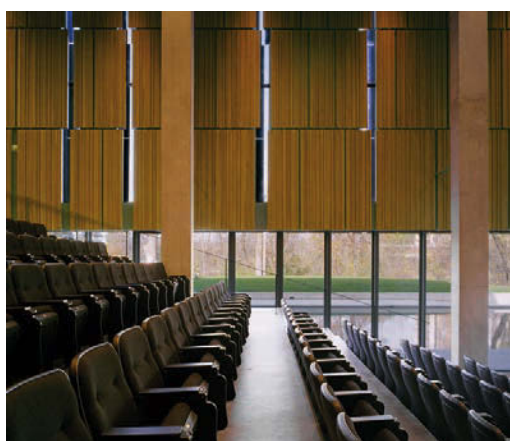
Opposite: **The Royal Music Conservatory's concert hall in Toronto is now perfectly quiet, thanks to the building being isolated on large rubber pads**

Below: **Speakers installed and hidden inside chair backs at the Perimeter Institute for Theoretical Physics' Lazaridis Hall means the room can cater for both lectures and recitals**

In early 2014 John O'Keefe, principal of Toronto-based acoustics, noise and vibration engineering company Aercoustics, represented Canada at a European Acoustics Association symposium, in Berlin, Germany. One of his roles was to participate in a panel discussion to judge and award funding to a selection of research projects, each dedicated to innovation in acoustics and to honing the technologies that support acoustic design decisions.

This funding will not only benefit hallmark architectural projects, however. "Like so much of acoustics, there is a trickle-down effect," says O'Keefe. "It gets figured out for concert halls first and can then be applied elsewhere. From a complex concert hall to a modest lecture theater, we're using good science to find solid solutions."

In 2007, this scientific approach was put to the test when Aercoustics teamed with KPMB Architects to solve a problem beneath Toronto's Royal Music Conservatory (RCM). A subway line had been inserted deep beneath the property, representing a noise source that threatened both the studios and the concert hall. Aercoustics was made responsible for noise and vibration control of the RCM addition, the Telus Centre for Performance and Learning. The goal was to build a perfectly quiet N1 concert hall, and the solution was to isolate the building on large rubber pads. The concert hall and the large rehearsal room both bear on rubber while the less sensitive parts of the building are on grade.



In addition, while the lobby staircase was deemed structurally safe, it was in fact much too lively, with sufficient motion to scare the owners. A custom-tuned mass damper (TMD) was attached to the structure by springs and the mass/spring system was tuned to the problematic vibration to provide effective mitigation. Verification measurements proved that the TMD solved the problem and alleviated all concerns. Following Aercoustics and KPMB's efforts, RCM's teaching facilities and concert space opened in 2008 and 2009, respectively. The rooms are now quiet and not a trace of subway noise can be heard.

Musical minds

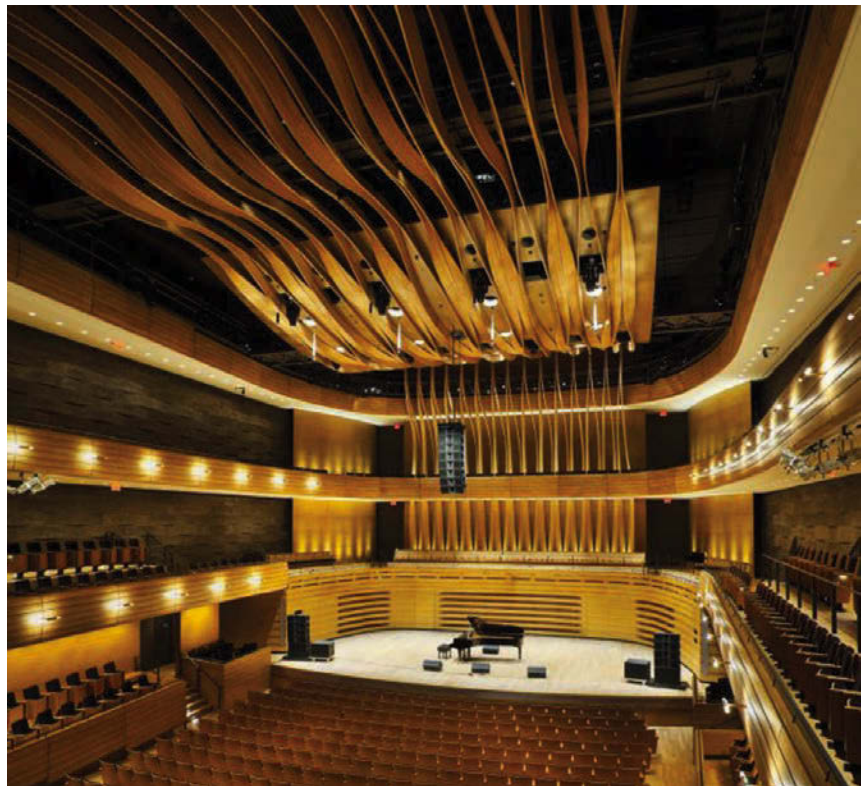
The Perimeter Institute for Theoretical Physics is a research center in Waterloo, Ontario, Canada, that aims to recruit top scientists and innovators by providing a world-class performance space. The logic is that optimally experienced, classical music appeals to both scientific and mathematical minds.

Aercoustics was hired by Perimeter Institute's design architect, Saucier + Perrotte, to address an acoustic dilemma in the 210-seat Mike

Lazaridis Hall. The space was to act as a lecture hall during the day and recital hall in the evening – two functions that require very different acoustic treatment. The typical solution for a multipurpose room is to include adjustable acoustic banners, but the architect did not want them to interrupt the design. The acoustics team instead optimized the space for musical performance, and installed speakers, which were hidden in the chair backs, for amplified speech.

As a result, the audience could, and continues to, experience the lush, full sounds of classical music while also being able to enjoy conversational tones from conductors and lecturers from the speakers installed in every second chair. This intimate environment would not have been possible without the opportunity to explore atypical acoustic design solutions. ■

www.aercoustics.com



BACKSTAGE
JOHN THORNTON

Q&A

Lucy Noble, head of programming and education at the Royal Albert Hall, reveals how the grand old venue continues to adapt

How did you arrive at your current post? I was a student at the Royal College of Music and a steward at the Royal Albert Hall [RAH] while studying, then I went on to do programming at Sadler's Wells and worked as a tour manager for IMG Artists. I started at the RAH as lettings manager in 2001, and have now worked my way up through various positions to become head of programming and education. My team and I are responsible for who performs on our stage – around 395 performances a year – and for all our non-auditorium programming, which totals around 450 events each year. Alongside that, I work our education and outreach program into the artistic calendar, engaging with around 100,000 participants a year.

Have the changes to subsidized arts funding affected the RAH? We receive no subsidy and have never received Arts Council funding, so we continue to operate in the same way as ever. We are commercially successful and are always looking to increase our revenue streams so we can support the work we do as a charity for our public benefit and education work, as well as to maintain the building. We are part of the Tri-borough Music Hub, which is responsible for the strategic music lesson planning in 150 schools in our local area. The Hub has been, and will be, affected by government cuts, and we will actively support the organization as much as we can to find new areas of income.

How has the venue been adapted to enable greater programming flexibility? The creation of the loading bay and the accommodation of dressing rooms, offices and extra storage under the Queen Elizabeth II Diamond Jubilee steps allows us to host larger shows, enables quicker load-ins, and permits simultaneous activity upstairs and downstairs, making it a smoother, safer process. We have introduced technical capability around the building, purchased portable equipment and begun providing in-house kit for promoters to hire – such as lighting and PA – which saves massively on time and crew. In addition, smarter staffing rosters and an increased headcount mean we can operate as a 24-hour building. We have also invested in redeveloping and refurbishing our front-of-house and backstage areas, creating a secondary performance space – the Elgar Room – as well as our café bar, Berry Bros and Rudd No. 3 Bar, Verdi – Italian Kitchen restaurant, and new crew catering, dressing rooms and heating systems, making it a more attractive venue for promoters, audiences and artists alike.

Is new technology changing what's programmed? We offer in-house lighting design and own a very large selection of modern lights that we hire out to incoming productions – the RAH has invested money to keep this stock up to date so we can continue to reduce load-in times and offer a unique service to our customers. Sound By Design is our PA partner and has a permanently installed system in the RAH that is hired out to productions that want to use it. Without making these changes, we wouldn't be able to host our *Cirque du Soleil* show, and they have also ensured the success of our film-with-live-orchestra events, which will soon include *The Godfather*, *Titanic* and a celebration of the music of composer Danny Elfman. ■

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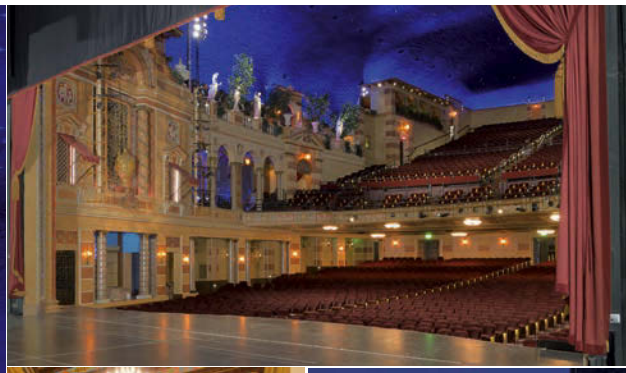

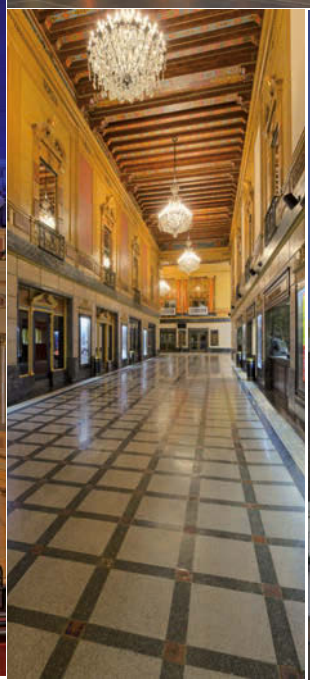

"Take a minute and just take a deep breath and look up and just take in for a second where you are and what you're seeing, because ... this is **the most beautiful theatre in the United States of America**"

Mayor Mitch Landrieu, Mayor of New Orleans, Louisiana
September 27, 2013 Ribbon Cutting Ceremony

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