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Annual 2016

Cultural revolution

Why China and its neighbors are spending big on spectacular new venues

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foreword

Given that this is my first foreword as editor of *Auditoria*, it is apt that the theme of change runs throughout this issue. In our cover story, starting on page 6, we look at a number of impressive new cultural venues in and around China – a part of the world not previously synonymous with world-famous auditoria, but one that is making some serious moves in terms of establishing a new cultural powerhouse.

On page 26 we examine Canada's new National Music Centre, a remarkable venue that is intended not only to showcase a huge variety of sounds and musical influences, but also to change the very nature of the visitor experience – the building itself has been designed as an instrument to be played. And in Mons, the European Capital of Culture for 2015, the Mons International Congress Xperience is a modern, state-of-the-art venue that anchors a scheme to change the relationship between Mons' old town and its nascent digital and tech industry. Elsewhere you can read about a host of new projects that have been (and in some cases still are) taking place around the globe, showcasing products and technologies with the potential to rejuvenate, renovate, update and reconfigure venues we know and love, as well as define new locations that we have yet to experience.

Someone about to embark on a fundamental change is Michael Taormina, MD of the Cobb Energy Performing Arts Centre in Atlanta. When I sat down with him to talk about his decision to retire from a business he has worked in for over four decades, it wasn't long before the conversation turned to the changes he has witnessed during his illustrious career.

I have always imagined the endless proliferation of cell phones and seemingly omnipresent social media access to be at odds with the kind of direct engagement demanded by a live performance but, as Taormina told me during a fascinating interview (highlights of which you'll find on page 120), it has the potential to be a staggeringly positive force.

What is absolutely vital is how the industry chooses to handle the coming together of these two apparently disparate spheres. Because while the sight of a sea of smartphones or tablets held aloft during a gig or Broadway show can be massively frustrating to some (myself included), social media and the devices that make it so all-encompassing can also do incredible things when it comes to sharing and promoting the excitement and inclusivity that live performance can stimulate. Taormina even told me about performances he has been a part of where the use of social media was actively encouraged. Growth and development, it seems, result from embracing and engaging with change, rather than resisting it.

Matt Ross, Editor

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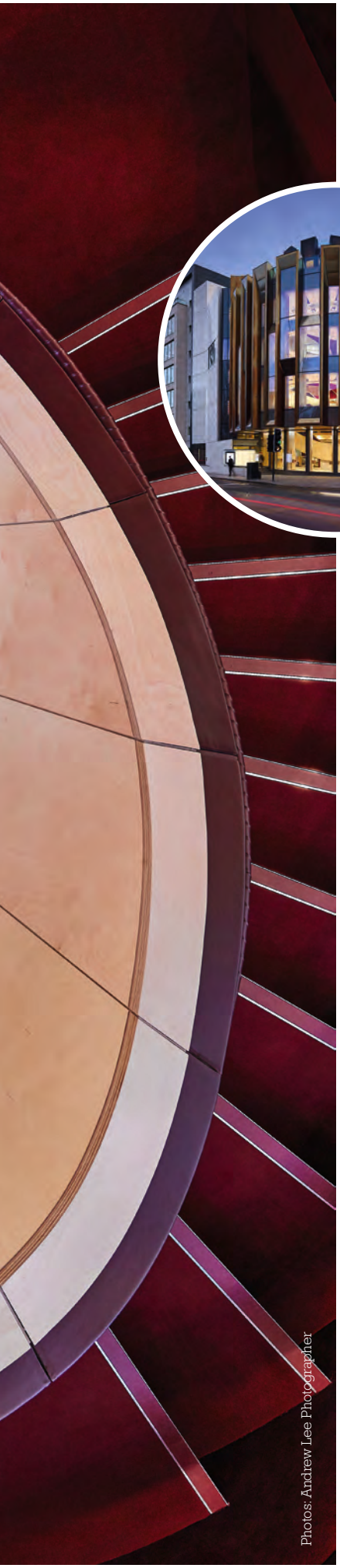

Photos: Andrew Lee Photographer

Auditoria loves...

...the Scottish Opera at Glasgow's Theatre Royal – a dramatic blend of heritage and modern design from Page\Park Architects

The new foyer to Scottish Opera at Glasgow's Theatre Royal presented an exciting opportunity to mold the audience's journey from 'street to seat' – escorting theatergoers from the venue's new corner entrance, through an open, welcoming foyer, to their seats. And the striking design also enabled architects Page\Park to enhance the visitor experience through the provision of new box office, café and bar facilities, while also maximizing access to bring the venue in line with modern legislation.

The Theatre Royal's brand new corner entrance (made possible by the demolition of the former Café Royal building) harks back to Victorian Glasgow, while the internal layout strives for an intuitive wayfinding experience – the architects wanted to democratize the theater experience to reflect modern society.

As a result, the new foyer design centers around a single staircase that interacts with all levels of the building. The column-free interior cantilevers toward the free-standing center, and the gilded palette and elliptical forms of the architecture recall curved balcony fronts and utilize contemporary materials, while the venue's category A-listed auditorium provides design cues for the new foyer.

The new extension boasts two 17-person lifts, new toilet facilities, as well as an escape staircase. The new box office and café at stalls level are paired with bar facilities on the upper levels. On these upper levels, the core of the building is designed to be repetitive, to make the venue easy to navigate, and to breed familiarity for regular visitors to the theater.

Reacting to the different scales of the adjacent buildings – those on either side of the new corner foyer – the design is cut back at balcony level, creating an external roof terrace that offers panoramic views of Glasgow.

The building's dramatic appearance is intended to foreshadow the audience experience, drawing on the Victorian theater's past, but providing the kind of access demanded in a modern venue. Patrons are guided, as the architects intended, from the street-level entry, through an intuitive and atmospheric interior, to the theater itself. ■

CHINESE CULTURAL HUB

BY RICHARD N WILLIAMS

Orient express

China is embarking on a number of new cultural developments with budgets as grand as their visions – and the surrounding region is following suit. But what's driving this explosion of investment in cultural venues?

When asked to name the location of the world's great auditoria, not a lot of people would think of China. But that's an assumption that could be about to change. A number of large-scale developments are currently being built across the region, and they all have something in common: they're big, bold and innovative.

The new Han Show Theatre in Wuhan is a prime example. The theater has been purposefully built to house former Cirque du Soleil director Franco Dragone's The Han Show – a water and aerial spectacular that celebrates local Han culture and is one of Dragone's grandest visions yet.

However, the theater itself is equally as impressive. Designed by the late British architect Mark Fisher and his team at Stufish, the Han Show Theatre resembles a traditional Chinese paper lantern.

"The initial request from the client was that they wanted it to be distinctly Chinese rather than international in appearance," says project architect Jenny Melville. "And something about the red lantern just seemed right. The client loved it immediately."

The client, Chinese developer Dalian Wanda Group, reportedly spent US$450m on the new theater – and it certainly shows.

Measuring 233ft high and 361ft in diameter, eight intersecting tubular steel rings form the cylindrical building, while cable nets wind around the entire structure and support more than 18,000 concave red aluminum disks.

"Each disc contains an LED light," explains Melville. "They emit a red glow, which lights up the entire area and looks amazing as it reflects off the nearby Dong Hu Lake."

However, it is inside where the ambitious nature of the theater really becomes apparent, as Jean Marcouiller, Dragone's architecture and design manager, explains: "The primary concept was to get the audience to believe that it was a traditional theater stage, and then reveal the other aspect of the show."

Marcouiller says that, at a key point during the performance, the theater's 2,000 seats move – some sideways, with others rising up and pivoting – revealing a 13,120ft^2 basin filled with 10 million liters of water.

CHINESE CULTURAL HUB

At the movies

The Han Show Theatre is only a part of Wuhan's new cultural development. Just under a mile away, at the other end of Wuhan's Central Cultural District, sits another building commissioned by Dalian Wanda Group – the equally impressive Wanda Movie Park, also designed by Mark Fisher and his team at Stufish.

Billed as the world's first indoor theme park, the Wanda Movie Park has also been designed and constructed with traditional Han symbolism in mind.

"We spent a good week investigating the history and culture of Wuhan and came up with the Wuhan bell theme, a traditional symbol of Han culture," explains Maciej Woroniecki, architect and design team leader for the project at Stufish.

The reportedly US$690m building, which occupies an 820ft-long site at one end of the Schu He River promenade, is surrounded by a façade formed into the shape of 24 bells. Each bell is constructed out of gold aluminum panels that wrap around the 197ft-tall structure.

Above left: **The atrium of the striking Wanda Movie Park**

Above: **The venue's façade is formed in the shape of 24 bells**

Below: **The building uses LED strip lights situated between the gold aluminum panels**

"Between each panel sits an LED strip light, essentially turning the entire building into a giant LED screen that shows animations and film," explains Woroniecki.

The inside of the venue is just as impressive. The 861,000ft² Movie Park contains 5D cinema screens, restaurants, retail outlets, as well as six major theme park attractions, featuring special effects by Industrial Light & Magic (the industry-leading visual effects company founded by *Star Wars* creator George Lucas) and Pixomondo (the effects company working on HBO's *Game of Thrones*), and based around Chinese cinema.

Cultural China

Taking four years from concept to opening, both the Wanda Movie Park and Han Show Theatre would be difficult enough projects in any part of the world, but building in China threw up some specific challenges.

"We were expected to use local people and materials as much as possible, which is fair enough," remembers Melville. "But many of them had never done this type of work before

Photos (this page): Stufish

MOVING THE AUDIENCE

The Han Show Theatre has the largest indoor mobile audience seating in the world, with all 2,000 seats moving during the show to reveal the pool and turn the proscenium arrangement into a theater-in-the-round. The theater has 68 VIP seats, 1,102 regular seats, and 830 variable-geometry seats. The rows of seats rotate and move horizontally and vertically during the show, controlled by Siemens' SIMOTION D435 motion controllers and driven by hydraulic cylinders.

The upper tier seating descends 19.7ft during the show to lower tier level, while the lower tier seating pivots and swings open, revealing the 32.8ft-deep performance pool beneath. The whole process takes just 50 seconds.

"It's just phenomenal," says Stufish's Melville. "It's as if the theater itself is as much a part of the production as the performers. When I first heard about it, I knew it would be challenging, but never expected just how much," she continues. "It is certainly the most challenging project I've ever worked on, and probably the most challenging I'll ever work on."

CAPTURING THE SOUND

Of the numerous challenges posed by an audacious project such as the Han Show Theatre, getting the acoustics right was among the most difficult, especially as the theater transforms midway and the audience moves position.

"Having a transformative space in which the seating moves can affect the acoustics in a dramatic way," says Mark Holden, acoustician at Connecticut-based acoustic consultant Jaffe Holden.

Holden adds that the moving seating was not the only challenge. The Han Show Theatre is unusually tall for an auditorium, as well as being cylindrical, both of which affect the acoustics. The water also proved problematic, as Holden explains: "The water is heated to ensure that the performers stay warm, but this results in changing temperatures that causes different gradients of sound."

Sophisticated acoustic computer models were used to predict exactly how the sound emerging from the theater's 359 speakers reacted under all of these conditions, and were fundamental in creating a solution.

"We found the only way to create the right uniform environment was to use an array of acoustic panels in grids of nine – three sound diffusive and six sound absorbent – in a sort of tic-tac-toe pattern," says Holden. "It was very complicated, certainly the most difficult thing we've ever done."

The Han Show Theatre was built to house Franco Dragone's The Han Show. Photo: Tomasz Rossa

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and some of the technology had never been done there either. It was certainly challenging."

The venue's local environment also proved to be a problematic factor.

"Wuhan is one of the most polluted cities in the world, which creates a serious problem for maintenance, especially for a building this size," remembers Woroniecki.

The solution was to coat both the Movie Park and the Han Show Theatre in fluorocarbon paint that lets the cladding self-clean as it rains.

Both venues have been designed and built with local people in mind and are not specifically aimed at international visitors, so what's driving this desire for grand cultural buildings?

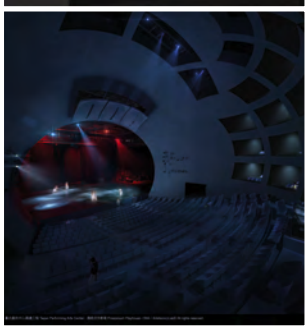
"There is a voracious appetite for cultural buildings in China at the moment," says Stufish CEO Ray Winkler, who has seen a steady increase in enquiries from the region in the past few years.

"It's the rise of the middle classes," he says. "There are more than 350 million middle-class people in China; they have disposable income and the Chinese government has understood that this is a market that needs to be satisfied."

Meeting this need has meant that the Chinese government has made it a prerequisite for all developers to include some cultural centers in future major redevelopments.

Market stability

Nor is China the only place that has this desire for cultural buildings. Across the South China Sea in Taiwan, President Ma Ying-jeou said recently, "Large-scale constructions can make a city grow bigger, but arts and culture can make a city become greater."



Top: **The Taipei Performing Arts Center combines three auditoria in a single building**

Above, from top: **The venue's Super Theatre configuration; the 800-seater Proscenium Playhouse; the new center's 1,500-seat Grand Theatre**

With this in mind, Taiwan's Department of Cultural Affairs commissioned a trio of new auditoria in the north of Taipei. Put out to competition, the chosen architect, OMA (Office for Metropolitan Architecture), incorporated all three auditoria into one building – the Taipei Performing Arts Center (TPAC).

"The three theaters plug into a central cube, which consolidates the stages, backstage areas and support spaces into a single and efficient whole," explains Inge Goudsmit, OMA associate and project architect for the TPAC.

The auditoria – a 1,500-seat Grand Theatre, 800-seat Multiform Theatre, and 800-seat Proscenium Playhouse – function independently yet share backstage space and mechanical facilities, while the Grand and Multiform Theatres can combine to form a Super Theatre.

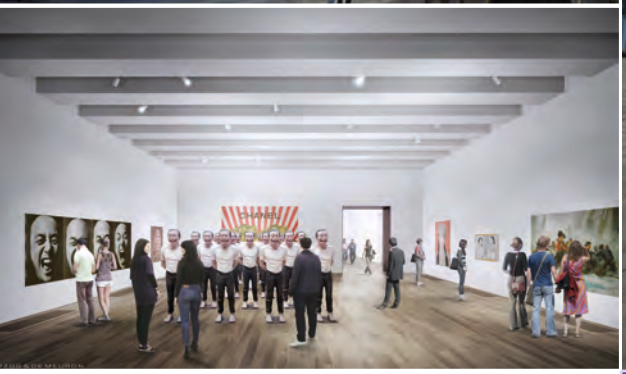
"The three auditoria that protrude from the central cube are all striking in their own way," suggests Goudsmit, who says that the US$173m building is scheduled for completion in May 2016.

Perhaps the most striking element of the TPAC is the sphere at the east side of the building – an iconic feature that came about through functionality, rather than aesthetics.

"It's a semi-circular auditorium," says Chas Pope, associate director of design at Arup, which is responsible for the design of the theater's structural, mechanical, electrical and plumbing engineering. "The structure is a double shell, enclosing the audience around the Proscenium Playhouse, so it is as much about functionality as it is an architectural statement."

For Arup, which is also responsible for fire engineering at the TPAC, one of the big

Photos (this page): OMA



Renderings of the West Kowloon Cultural District, expected to open in 2019. All photos: Herzog & de Meuron

challenges of a building of this nature is Taipei's earthquake risk.

"We are right on the Pacific Ring of Fire," says Pope. "It's an important building so it requires good seismic performance."

The theater, Pope explains, is the first building in Taiwan to use a seismic base isolation concept, using friction-pendulum bearings – steel plates in the foundations that are stiff and strong under vertical loads, but enable the building to shift horizontally to absorb seismic forces.

And these projects aren't alone. Dalian Wanda Group is planning six more cultural projects in China, and a bold new development has begun in West Kowloon in Hong Kong (see *West side story*, right), putting China and the region at the forefront of modern cultural development. ■

Author

Richard N Williams is a UK-based freelance journalist and author who contributes to a number of industry and technology magazines

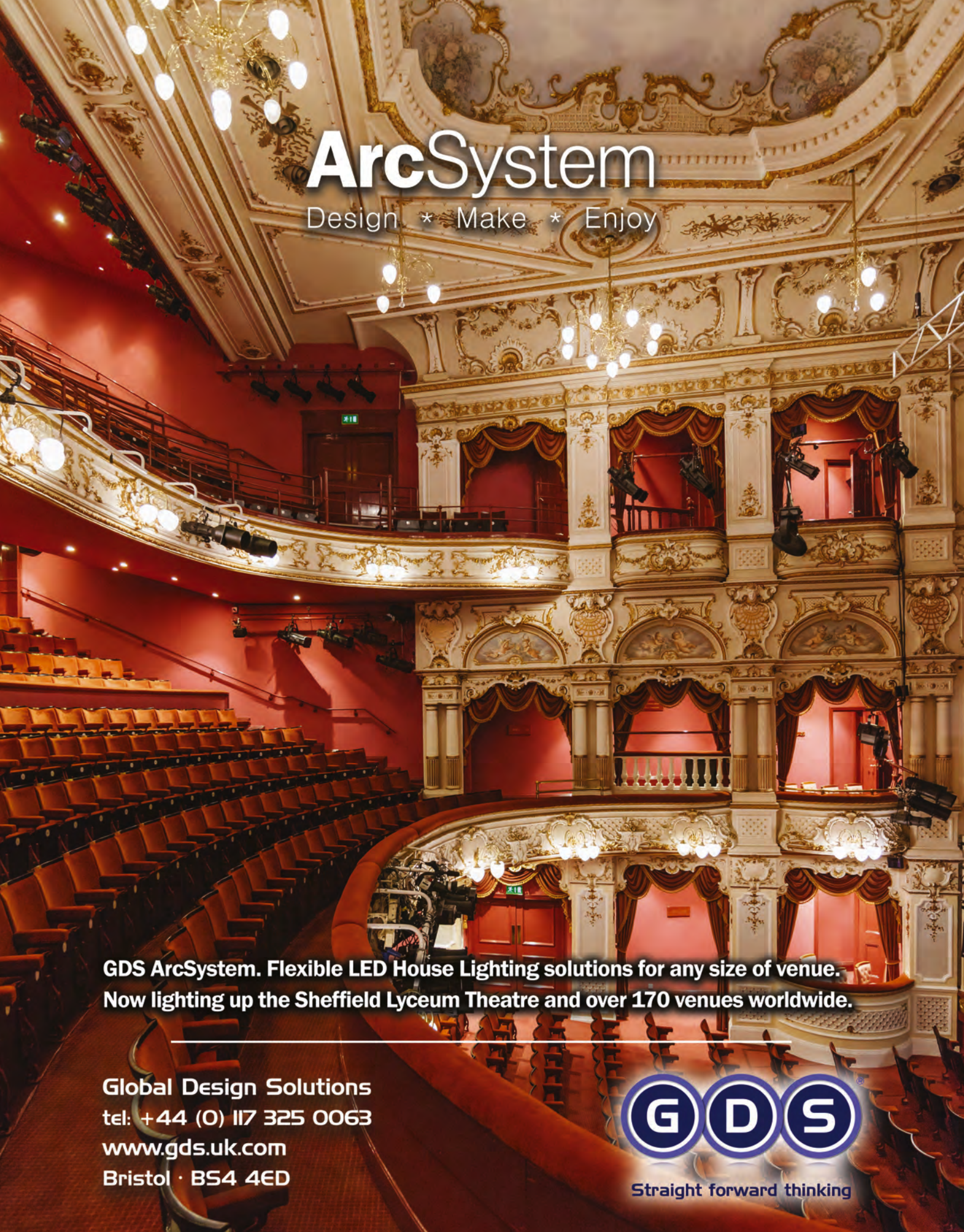
WEST SIDE STORY

The West Kowloon Cultural District (WKCD) in Hong Kong is being developed into one of the world's largest cultural quarters.

Set in 56.8 acres of public open space, and on reclaimed land at the heart of Hong Kong's waterfront, WKCD will feature a number of cultural centers: the Xiqu Center will be a world-class arts venue dedicated to promoting the rich heritage of xiqu, the primary genre of indigenous Chinese theater; M+ will be a museum focusing on 20th and 21st century art, design, architecture and moving images, designed by Swiss architectural firm Herzog & de Meuron (responsible for London's Tate Modern); the Arts Pavilion will be an exhibition and event space for artists, designers and organizations to stage small-scale exhibitions; and the Lyric Theatre will be a world-class facility for dance performances, including ballet, contemporary and Chinese dance forms.

"There is a growing local appetite for the arts and the Authority has started to make good on its pledge to create for Hong Kong a world-class arts and cultural district," explains Michael Lynch, the outgoing CEO of Hong Kong's West Kowloon Cultural District Authority.

"In the west you find such places are a part of a city's DNA, such as London's Southbank Centre, for example, or the Centre Georges Pompidou in Paris. Asia has fallen behind in this regard, which is why our project is so greatly anticipated," adds Lynch, who says that the district is expected to be open to the public in 2019.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MONS INTERNATIONAL CONGRESS XPERIENCE

BY GIOVANNA DUNMALL

A new congress venue not only celebrates Mons' tenure as European Capital of Culture, but will also link the medieval old city with newer developments

Hufton+Crow

Conference call

Mons is a city known to some for its pretty cobbled medieval historic center, and to others (older Britons in particular) as the place where the first and last British soldiers to die on the battlefield in World War I were killed. When the small but dynamic southern Belgian town was selected as European Capital of Culture for 2015, it commissioned a series of cultural buildings and events spaces that, it hoped, would put it on the international map for good. A new conference center by New York-based architect Daniel Libeskind was one such landmark project – as well as a key element in a wider masterplan to connect the old town with a new residential area under development to the northwest of the city center, and an existing and burgeoning digital and tech cluster beyond that.

A new city center

The 134,500ft² MICX, or Mons International Congress Xperience, opened in January 2015 and has a 1,600-person capacity. It can host a variety of events (not just conferences) in its large dramatic double-height lobby (referred to as the forum), three auditoria (of 500, 200 and 100 seats respectively) and multipurpose event hall. The conference center is also equipped with offices, meeting rooms, an underground car park, a restaurant and a large roof terrace. As Libeskind explains, "It's a machine that has to be used every day and accommodate thousands of people every year." But it was also vital that the building contribute to the urban environment and be visually attractive.

"These sorts of big buildings are usually very closed. In general, they are big massive volumes," says Libeskind. To avoid this fate, the architects – who teamed up with local company H2a Architecte & Associés on the ground – worked hard to make the building as open, welcoming and daylight-filled as possible. They created a circular form with overlapping curvilinear walls of champagne-hued anodized aluminum and tactile slats of Robinia wood at ground level, and generous glazing and crescent-shaped skylights throughout.

The Mons International Congress Xperience opened its doors in January 2015

The conference center's striking interior includes a geometric central staircase formed from two interlocking asymmetrical structures

An ascending processional route through the building leads up a sculptural geometric central staircase, made of two interlocking asymmetrical structures, to the upper floors of the center. Outside, another grand curving ramp acts as a continuation of the public square below and leads to a panoramic terrace located just under the building's angular and projecting 36ft-high cantilevered prow. Up there, visitors are met with a series of vistas, some framed by clever apertures, of the historic city and its famous 17th century belfry. Less inspiring is the major building site that is the city's future train station, which lies at the feet of the conference center. Designed by Spanish architect Santiago Calatrava, this particular project is mired in endless technical and bureaucratic delays, controversies and an ever-spiraling budget. The latest reports say it will be ready in 2018.

"The client wanted a statement building," says venue manager Henry Goffin of the new conference center, "with added architectural value." Although it is one of Libeskind's more modest creations, the building's canted ribbon walls and endlessly contrasting geometries are dizzying but engaging. There is a humility and humanity to the structure with its lack of an identifiable back-end and various access points. "We tried to incorporate the back into the building and leave as much of its perimeter open to offices, events and public spaces," explains Libeskind. The river that lies between the building and the new neighborhood beyond, he continues, was another element "that we didn't want to turn our backs on". Even the car park has been designed to have the entrance on one side and the exit on the other. "We didn't want one central parking entrance and exit," says project architect Johan van Lierop, "as that creates a big opening and ends up looking like the building is missing a tooth."

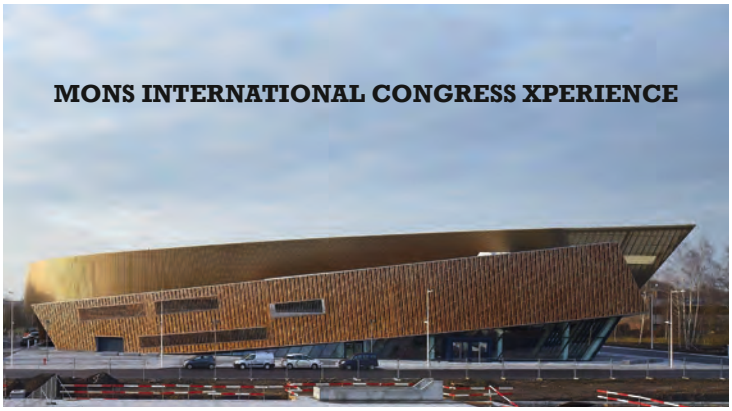
Much has been done, too, to keep the new building's dramatic double-prow profile clean, uncluttered and streamlined. Inside, the venue's zigzagging recessed lighting and cuts or gaps in the ceilings and walls have been designed to create a 'rhythm' but also as a tool to hide away HVAC systems and optical sensors, and to ensure the correct lighting balance wasn't impeded by having too many devices on the ceiling. "That makes things very ugly," explains van Lierop.

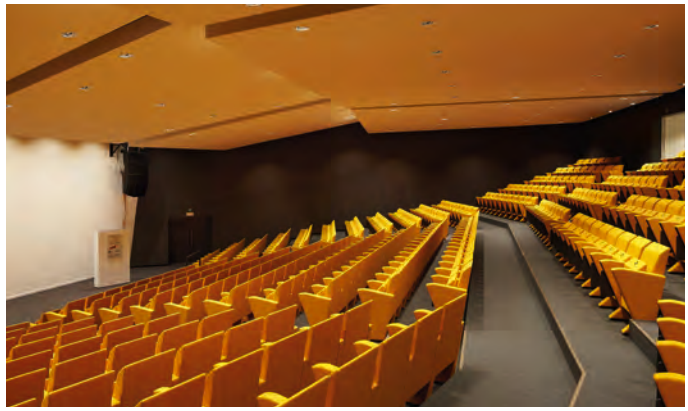
Exterior concerns

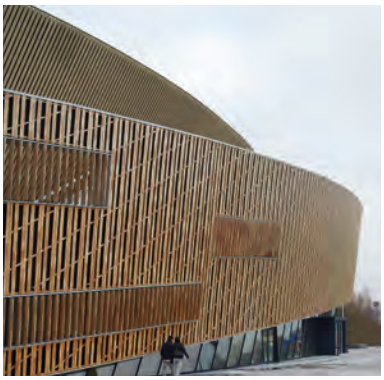
Outside the building, it's the same story. The mechanical equipment on the roof is hidden from sight. "This was an important design goal for us," explains van Lierop. "We designed the curved ribbon walls and roofscapes so that the equipment is always covered, not just from a nearby pedestrian view, but also when arriving by train from the station or when viewed from the old city."

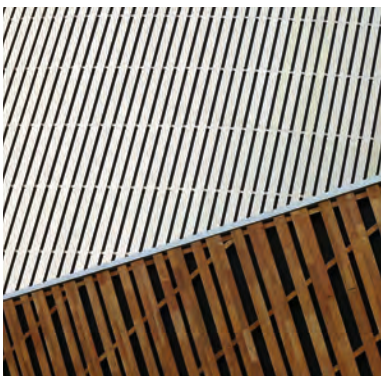
Many detractors tend to criticize so-called 'starchitects' for not considering context enough (or even at all) in their highly expressionistic global creations. The Mons conference center is undeniably a Libeskind, but the locale is referenced in various subtle (and, indeed, less subtle) ways. "For one thing, the tip of the building is aligned with the belfry," points out Libeskind. The local wood cladding of the lower walls of the building – which will turn a silvery gray as it fades – echoes the trees of a nearby park. Around the complex, a public plaza with benches has been created out of a polished, light-gray concrete traversed by bands of a rich blue Belgian stone from the Hainaut province – of which Mons is the capital. These blue stone bands continue inside the building on the floors and ceilings and, together with the intersecting recessed lighting tracks, create angular balustrades, ceilings and slanting walls, a remarkably unifying pattern of colliding lines and planes.

Hufton+Crow









Clockwise from top left: **The venue's exterior mechanical equipment is hidden from sight; the center boasts three auditoria; the new building can host a variety of events; the exterior of the building uses materials that reflect its location; the wooden cladding will fade to a silvery gray. Photos: Hufton+Crow**

The relatively modest (and fixed) budget of €27m (US$30m), the accelerated timeline (two-and-a-half years from groundbreaking to opening), and the site's compact footprint, all represented significant challenges, admit the project's architects. Especially when the curved geometry of the building's ribbon walls proved to be too complex to achieve with prefabricated planar concrete panels. "We designed a modest building with simple materials, but didn't want to compromise on the architecture," explains Libeskind. The team opted instead for an innovative technique of cast-in-place concrete to achieve the building's desired curves.

Green design

The building has achieved a Valideo 'distinction' certification (the local equivalent of LEED Gold) by integrating a host of sustainability features – such as passive shading, airtightness and a high level of insulation – into its design. Every room has been equipped with motion sensors to control lighting and air-handling systems (a feature that significantly reduces the unnecessary use of energy) and all lighting fixtures are low-energy LED, even in the auditoria and event spaces. There's a geothermal heating system, a green roof above the forum (for water retention and to reduce demand on the heating and cooling systems) and 1,720ft² of photovoltaic solar cells. "The lighting inside and outside can be controlled via a central computer," adds Goffin. And, remarkably, the acoustics of the auditoria have been calibrated with the aid of wood paneling so that, even in the largest auditorium, no microphones are required. Last but certainly not least, the building is equipped with audible wayfinding for visually impaired visitors, says van Lierop. "Sensors tell them where they are in the building."

The new MICX has only been open for a few months and is located in an area that remains very much a work in progress. Recently, a new four-star, 126-room hotel (with three restaurants) opened next door, but it will only be when the surrounding trees grow and a pedestrian bridge (which will link the center with the Calatrava station and old town beyond, and is expected in 2016) is completed that the building will start to take on its desired role as a new center of gravity for the city.

Critics of the European cultural capital event say it is a waste of money, and involves a litany of delays and let-downs. It is extremely unlikely, however, that Libeskind's conference center, or the five new museums and music venues that Mons has inaugurated in 2015 so far, would have happened without the impetus (and injection of EU/regional funding) of the event. When asked if the moniker is much more than a gimmick, Libeskind's response is clear and succinct. "It brings a sudden focus and mobilizes people to realize they are not a small provincial town, but that they have history – they have possibilities." ■

Author

Giovanna Dunmall is a London-based freelance journalist specializing in architecture, design and the arts. She writes for publications in the UK, North America, China and Australia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THE SMART FINANCIAL CENTRE AT SUGAR LAND

BY SIMON DUFF

Form function

Designed with an innovative internal structure that offers flexibility, the Smart Financial Centre at Sugar Land aims to bridge the gap between large arenas and small theater venues

The city of Sugar Land is an award-winning community 20 miles southwest of Houston, Texas, and has a population of approximately 83,000. In December 2014, work began on a new performance venue – the Smart Financial Centre at Sugar Land (SFC) – which is located on 38.5 acres of city property, and is designed to host a wide range of performances, including music and comedy artists, children's and family entertainment, theatrically staged productions, and a variety of cultural and performing arts attractions.

With an approximate indoor seating capacity of 6,430, the venue has been designed for flexibility, essentially creating several venues in one building. Through the use of innovative moveable walls, the SFC will literally expand and contract to create intimate settings for approximately 3,200 people, or cater to larger shows for over 6,400. The venue will feature comfortable, spacious theater seating with cup holders, luxury suites, corporate hospitality areas, quality finishes and convenient parking.

Flexible room design

Convertibility is one of the most compelling features of the SFC. The house contains movable sidewalls and deployable screens at the rear of the hall; these can be positioned in any of four setup modes, depending on the performance or event to be presented.

"The design intention for the space is that, within any room configuration, the audience perceives the space as an integral whole with definitive boundaries," explains Gary Martinez, president and CEO of building architects Martinez + Johnson. "Thus, a theatrical event occurs within a 'room' of 3,200 seats, and the audience isn't sitting in a half-empty hall.

The venue is conceived as the next-generation prototype for multiuse halls. While in the past this has generally implied

that all presentation modes will be compromised in some fashion, the SFC has been designed to be fully functional in many modes. The acoustic and theatrical facilities are designed to serve the various configurations of the hall. The greatest challenge involved the creation of multiple design modes for these different room configurations to adapt all service systems and circulation patterns to the venue, particularly as some areas are cut off when the hall is reduced from its maximum capacity to smaller configurations."

To accommodate this reproportioned theater room, the venue's proscenium incorporates adjustable side panels, which close the sightline from a 'concert' opening of 80ft to a 'theater' presentation of 55ft. Furthermore, the upper portion of the balcony can be closed off with motorized fabric panels, which creates a seamless back wall and ceiling to the room. A flat section at the front of the room's seating area is fitted with infill floor panels, and can be used to establish a proper pit if one is required for a given show or presentation.

Operationally, Martinez is keen to stress his belief that SFC represents the next step for performance venues that bridge the gap between large arenas, suitable for popular music concerts, and smaller theatrical venues for touring live entertainment. "Providing the capacity for such widely varying forms of artistic presentations, the SFC represents an economical solution for municipalities and regional interests which find the expense of constructing multiple performance venues to be unattainable."

As to the main architectural influences, one designer that Martinez often cites is Japanese self-taught architect Tadao Ando. "The expressiveness of his formal compositions informs the primary design motifs of the SFC, particularly the bowl of the audience chamber, which floats over the main lobby. Solid masonry buttresses on either side of the glass wall create a strong connection between the building and the site. These basic elements, composed in a

FLEXIBILITY IN FUNCTION

Having the equivalent of four different halls within one center enables a wide range of entertainment to be presented. The ability to shape the hall into various-sized rooms informed the basic concept for the shape of the SFC. Starting with a wide, fan-shaped space, a mini-arena for musical performances, Schuler Shook Theatre Planners and Martinez + Johnson studied a number of variations for the seating configurations, with differing areas for orchestra, club, and standing-room-only areas.

The intention to insert a theatrically proportioned room into the larger hall led to the development of seating calipers extending from the balcony area down the sides of the hall to the orchestra floor.

These balcony arms, angling down to the floor, created a central space within the hall that serves as the theater proper. By deploying a set of motor-driven sidewalls to the sloping inner edges of the calipers, the theater space is formed.

"The design intention for the space is that, within any room configuration, the audience perceives the space as an integral whole with definitive boundaries"

Gary Martinez, president and CEO, Martinez + Johnson.

minimal fashion, establish a unique, compelling cultural center for Sugar Land."

Lighting and theater systems

The SFC features a full complement of theatrical rigging systems, both on stage and in front of the proscenium, which has been designed around the movable walls system. Performance lighting and the audio systems have been designed to accommodate touring and local artists. However, the systems are designed to allow larger shows to use the equipment with which they tour.

Schuler Shook is designing the architectural lighting for all of the public spaces, including the auditorium, lobby and VIP suites. The company, contracted by Martinez + Johnson, began the preliminary programming work in the spring of 2012. Schuler Shook's Michael DiBlasi is the partner in charge and leads the architectural lighting design team, with Michael Burgoyne as principal theater consultant and project manager. The SFC project is also supported by several Houston-based firms including Studio Red Architects, Collaborative Engineering Group, and Walter P Moore.

The multiple configurations made possible by the SFC's internal design mean that the venue is suitable for a wide variety of events – and helps counter many of the functional compromises required by other multipurpose venues

DiBlasi further explains the workflow regarding lighting and theater systems: "They evolve with the building design and become more detailed with each design phase. In schematic design we quantify the power and cooling needs for the lighting system, even if we don't know yet where the dimmer rooms will be

THE SMART FINANCIAL CENTRE AT SUGAR LAND

located. Structural and spatial requirements for the rigging system and orchestra pit lift are also defined in schematic design."

The architectural lighting is an integral part of the venue experience in both the lobby and house areas. Designed to create an inviting environment for patrons, the lighting accentuates architectural features and adds energy and excitement to both the pre- and the post-show experiences. The lobby will be a dramatic space with tall, glass curtain walls on the exterior and the curved underside of the balcony seating bowl sweeping up overhead. LED lighting and projections will enliven the bowl, which will be visible to patrons as they approach the building. Environmental and projection lighting on the curved façade of the seating bowl will enable the operators to create unique environments for all events at the venue. They also have the capacity to project large-scale lighting shows out into the public plaza along the main entrance façade of the SFC.

Architectural lighting and glass curtain walls in the lobby will create a dramatic environment that adds to the pre- and post-show experience

Wrightson, Johnson, Haddon & Williams (WJHW) are providing acoustics and noise control, audio, AV, CCTV and large format video, data cabling, security video monitoring and access control. Key WJHW personnel are Jason Mirise (acoustics) and Scott Bray (audio/AV). Fritz Schwentker, project manager, explains the key acoustic principles: "The acoustics of the room are designed to get out of the way of the sound system. The bulk of WJHW's acoustics-related work has actually been in mechanical noise control and room-to-room sound isolation. This work has been aided by having a very collaborative and inventive mechanical engineer on the team, and architects with solid experience in performing arts facility design."

With a site of over 400,000ft^2, a significant portion of the project's work has dealt with the preparation of the building area and the construction of foundations and underground facilities. Despite extremely wet conditions – including some of the worst flooding in the general Houston area since 2000 – the project's construction manager, Linbeck, successfully placed all the major utilities and below-grade systems necessary for the venue as of July 2015. Additionally, the fabrication of the large steel structural elements needed to carry the venue's seating bowl has been initiated and the steel erection commenced in late July. The expected completion of the project is autumn 2016. ■

ROOM ACOUSTICS

The acoustic criteria for the venue were set early in the design phase, with mid-high-frequency design reverberation times (RTs) set at approximately one second. The RTs are not expected to change much in the different room configurations, as the operable sidewalls are designed to be acoustically transparent (serving as a visual screen, but not an acoustic barrier); therefore, the acoustic treatment and volume of the room generally do not change as the operable sidewalls are moved. A spray-on cellulose insulation (K-13) is being used on the roof deck and upper wall areas to mitigate reverberation and potential sources of echo. L-Acoustics will be the PA of choice.

Author

Simon Duff is a music and building technology journalist and broadcaster

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SOUND SYSTEMS

NATIONAL MUSIC CENTRE

BY BRIAN LIBBY

Surround sounds

The National Music Centre of Canada's exhibition stage. Image: Haley Sharpe Design

When it opens in the spring of 2016, Calgary's new Studio Bell, home to the National Music Centre of Canada, will not only showcase the country's music, it will act as a means of playing it

When conversations first began between the National Music Centre (NMC) of Canada and its architects about how the organization's new US$132m facility in Calgary, Alberta (named Studio Bell after its primary sponsor) would celebrate the nation's diverse music with exhibit spaces, performance venues and educational facilities, inspiration came not from bricks-and-mortar arts museums, but instead from something far more temporary and ephemeral – the music festival.

"When you go to any great music festival – like Coachella in California, or Bumbershoot in Seattle – the listener can explore a range of programming," explains Andrew Mosker, president and CEO of the NMC. "Often, there is more than one stage with people playing at a given time. Within earshot you can hear other things while you're engaged with what's on the stage in front of you, leading to more exploration and discovery. We want people to explore music and do it by walking around and hearing different things at any given time. You visit this for a few minutes, then something else for a few minutes, and you can hear both of them happening simultaneously."

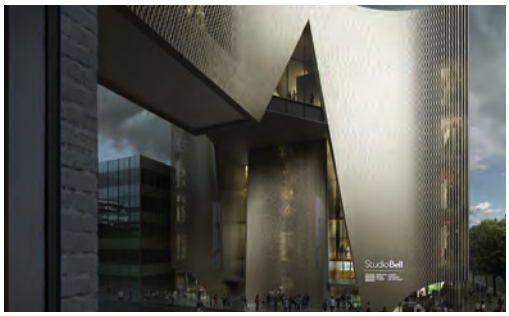
Upon its completion in spring 2016, the 160,000ft^2 Studio Bell will have five floors of exhibition space telling the story of music in Canada and showing off the NMC's collection of more than 2,000 rare instruments, artifacts, sound equipment and Canadian music memorabilia, which incorporates collections from the Canadian Music Hall of Fame and the Canadian Country Music Hall of Fame. There will also be space for traveling exhibitions, recording studios, education facilities, and artist-in-residence live-work spaces. Its centerpiece will be a 300-seat music venue.

The project spans two Calgary city blocks, which will be connected on upper floors with a large sky bridge with the capacity to double as an event space. The two-building facility, located in Calgary's burgeoning East Village and viewed as a catalyst for surrounding urban development, will wrap around the adjacent King Edward Hotel (a famed blues club established circa 1905) and will, as part of a historically accurate restoration, serve as an additional venue for the NMC.

Vessels and voids

To make Mosker's concept of a festival-like environment into a reality, the ensuing design by architect Brad Cloepfil and his company, Allied Works (located in Portland, Oregon, USA), creates a series of vessels, or individual architectural spaces within the overall building, in which visitors can see an exhibit and hear the accompanying music, but also feel drawn, through the open doors, to the succeeding space by the sounds they hear. "Each of the vessels gathers and contains the various programs, and the space in between is the void, the plaza," explains Allied Works principal Chelsea Grassinger. The vessels' curving walls soar upward, almost canyon-like, to reveal massive skylight-illuminated atriums above, creating a kind of outdoor-indoor hybrid space, where visitors can linger between the vessels in the atrium, stay for pop-up music performances, or keep following the sound of music through the open doorway into the next vessel's exhibit.

"You're not walking between galleries. You're drawn around the building by sound, by music," explains Jan Faulkner, a director at British firm Haley Sharpe Design, which provided exhibit design services. According to Faulkner, the idea at Studio Bell was also to make the exhibits change frequently. "We were trying to create flexible exhibit components that could be moved around the building, so it has an organic sense of growth and change. Even the graphics that we'd normally print onto hard, solid substrates were instead printed onto wallpaper-like surfaces that could come on and off the walls easily. We called it a magazine approach. The storylines will shift and grow to suit trends and events. A lot of the gallery exhibits at national museums last 10 years. Here they'll last a few months."



Faulkner says that the relative youth of the National Music Centre – which evolved from a modest collection of musical instruments on display at Calgary's Jack Singer Concert Hall in the 1980s into the non-profit Cantos Music Foundation organization and collection it is today, after a rebranding as the NMC in 2013 – allowed for a spirit of innovation. "The organization is a breath of fresh air in its attitude. It is looking to be different, but not for its own sake. If we went through the normal process, you'd get safe solutions. But the NMC is vibrant and progressive. It realizes that music changes and people's attitudes change."

RESTORING THE KING EDDY

Constructed between 1905 and 1910 as a working-class lodging with what became Calgary's oldest bar on its ground floor, the King Edward Hotel (more commonly known as the King Eddy) enjoyed a heyday in the 1970s and 1980s as a blues venue, but by 2004 had closed its doors for good. Purchased four years later by the Cantos Foundation (the forerunner of the National Music Centre), it will be incorporated into Studio Bell and serve as its secondary live music venue with nightly offerings.

First, though, the building had to be painstakingly deconstructed and rebuilt. "It was not in the best shape," explains CANA Construction project director Jason North. "There were a lot of challenges trying to figure out how to salvage the building. In the end, it was way too expensive to salvage and work around what was there. The King Eddy is actually a heritage building that's protected, but the city allowed us to reconstruct it because it would go back up."

The King Eddy also provides a stylistic contrast to the bold contemporary forms of the rest of the museum. "The idea is that it would retain as much of the original character and quality of the historic King Edward Hotel," explains Grassinger of Allied Works, "and take all those histories and re-imagine it, but not have a glossy modern remodel."

Main: An exterior view of Calgary's new Studio Bell and (inset) the entrance hall. Images: Mir

"You're not walking between galleries. You're drawn around the building by sound, by music"

Jan Faulkner, director, Haley Sharpe Design

Left: The Studio Bell lobby
Below: The new venue's performance hall. Images: Mir

Playing the building

The 300-seat performance space exemplifies Studio Bell's uniqueness. With the touch of a button, its walls slide away to open up the stage and its performers to the wider lobby below and the attendant public areas.

Opening up the performance venue to Studio Bell's public areas also helped reinforce a broader thematic idea about the building: that it could be played like a musical instrument, with the sound from the main stage or the adjacent exhibits hitting the soaring, terracotta-clad forms in a way that could amplify or mute competing and complementary sounds. "We really connected with Andrew Mosker on this concept of playing the building," says Grassinger. "Whether it's part architecture or part exhibit experience, visitors could interact with the building the way they do with a musical instrument.

"We worked with the acoustic consultant to make sure the interstitial space supports the notion of music throughout. We did a lot of modeling to understand how to treat the acoustics and to anticipate and modify how much absorption or not would occur as you move through that interstitial space. This was done to work out how best to maintain the auditory connectivity, although not so much that it disrupts the exhibits."

To seem like an instrument, the building couldn't just be curvy like a cello or a tuba. It had to feel hand-crafted, despite the modern architecture. That's why Studio Bell's cladding, both on the exterior and on the interior vessels, is made of about 200,000 terracotta tiles. Initially, the technique seemed to be cost-prohibitive, but builder CANA Construction found a way to mass-produce the tiles themselves while having them hand-glazed by Dutch pottery company Royal Tichelaar Makkum. "The alternatives were too homogenous to be acceptable," explains Jason North, CANA's project director on Studio Bell. "They wanted to have some variability in it – that sense of the human hand."

This idea of the building serving as a physical embodiment of the music and instruments that it holds "gets back to thinking about music in a way that's deeply powerful and even spiritual", says Mosker. "As a charitable organization devoted to music, you're trying to change people's lives and inspire people. The visitor experience is deeply important. We have an enviable medium in music that touches all civilizations. It's meant to reach deeply into populations of strangers and make them feel like they have a connection to music, and that we're a vehicle for them to experience it in an amplified way." ■

Credits

Groundbreaking: February 22, 2013
Opening: Spring 2016
Owner: National Music Centre
Cost: US$132m
Size: 160,000ft²
Architects: Allied Works Architecture/ Kasian Architecture
Construction: CANA Construction
Design consultancy: Haley Sharpe Design
Cladding glaze: Royal Tichelaar Makkum
Special features: 300-seat performance space, collections and performance galleries, restored music club, recording and broadcast studio, rehearsal spaces, café, education center

FUNDING THE DREAM

The National Music Center's Andrew Mosker (pictured) says that the organization has raised about US$98m of the project's total US$132m cost. But the NMC is equally focused on revenue streams that will allow its operational budget to be continually fulfilled. "From an operational standpoint, we have a lot to offer for revenue. We've got lots of spaces that can do that. And we've got a robust development team that cultivates new donors and brings them to the table from a philanthropic position," Mosker says. "Lots of people are excited about this project and will prioritize ensuring it is sustainable. That's the only way – it has to offer a truly great experience. And we are set up to do that."

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

BY SIMON TAIT

Feeling festive

Able to conjure and capture a spirit unlike any other in the arts scene, festival programs have played an important part in the history of some of the world's most iconic venues

On the eastern wall of London's Southbank Centre is a 108ft² notice heralding 'Festivals for the World'. Festivals occur here all year round, from Womad to Meltdown, and at the heart of the center is one of the UK's main concert venues – the Royal Festival Hall. It's the one remaining building from the 1951 Festival of Britain, the country's first national statement of faith in the future after World War II.

Over the past decade, the area surrounding the 2,500-seat hall has been rededicated to the spirit of 1951, with at least 15 festivals per year taking place on the site. "The purpose of these 21 acres is to celebrate human ingenuity and creativity," says its artistic director, Jude Kelly. "The Royal Festival Hall is at the heart of all that, now more than ever."

International celebration

London wasn't the only city that saw festivals as an expression of liberation from the oppression of war. Vienna's Festwochen (festival weeks) was also founded in 1951, and served as a very real demonstration of Austria's will to survive, even though the city was still occupied by four Allied nations. But, much like the Southbank Centre, the purposes of Festwochen have moved on over the past seven decades. Running for five weeks each year through May and June, the opera, theater, concerts, performance art and installations are an articulation of internationalism.

Most of Vienna's host of cultural buildings are involved, and every other year the majestic Wiener Konzerthaus, with its four auditoria, is a major Festwochen venue. It was born out of a 19th century spirit of festival and is enfolded into the Festwochen every other year with Musikfest. The 1890s plans for the Konzerthaus were for a traditional *musikverein* – concert hall – but they were abandoned in favor of a new idea that would appeal to a broader public, a *haus fur musikfest*, or music festival center, eventually opening in 1913. It was in the spirit of the Konzerthaus that Festwochen was conceived, rather than the other way around.

"The Wiener Konzerthaus represents a living, evolving tradition, colored by the spirits of its artists and the enthusiasm of its audiences," says Vienna-born Matthias Naske, the director of the Konzerthaus since 2013, but who grew up with Festwochen. "Traditionally, where the Konzerthaus hosts the Musikfest within the frame of Festwochen, the program of May and June is specifically diverse and rich." Audience numbers increase slowly but steadily year on year, but that growth is certainly most evident during Musikfest.

Main: **Vienna's Wiener Konzerthaus during Festwochen. Photo: Wiener Konzerthaus/Lukas Beck**
Left: **The venue first opened in 1913. Photo: Herbert Schwingenschlögl**

Above: **The Brighton Dome. Photo: Matthew Andrews**

Above center: **USA rock band The Flaming Lips perform at the 2013 Brighton Festival. Photo: Victor Frankowski**

Above right: **The Southbank Centre in August 2015**

Below right: **UK drum and bass performer Goldie with the Heritage Orchestra at the Royal Festival Hall for the 2014 Meltdown festival**

The institution is not-for-profit and privately run by the Wiener Konzerthaus Society with only 14% of its costs covered by public funding. It sells 500,000 tickets per season. Each Musikfest, Naske works closely with the Festwochen organizers to focus on matching contemporary music and opera with the more traditional. This year, a specially commissioned new orchestra piece by Olga Neuwirth, *Clocks Without Hands*, was juxtaposed with Mahler's *Das Lied von der Erde*. The venue, Naske goes on to explain, experiences "additional impulses and audiences" through the festival.

The post-war creation of Festwochen was a clear cultural policy and social strategy to set up awareness and interest beyond the limited aesthetics dictated by Nazi rule, he says. "The Wiener Festwochen is one of the long lasting fundamentals of the artistic season of Vienna and does contribute to the quality of the cultural life of the city."

Authority figure

Back in the UK, Brighton's suite of Dome venues and its festival are actually run by the same team, so integrated are they. The Brighton Festival began in 1967 when the city had such a wealth of lyric theaters that it was known as 'The West End by the Sea'. Since then, most have either closed or changed their purposes, but through it all has been The Dome and its smaller sisters, the Corn Exchange and The Studio, once owned and run by the local authority.

In 2002, Brighton's council came up with a scheme that has since become a blueprint for others, but was revolutionary at the time – instead of running the Dome complex it owned, the council would give the concert hall a long overdue remake, costing £22m (US$33.5m), and lease it to the festival, a charity, along with a revenue grant. "The driver was looking at the charitable purpose of our organization and seeing if it could be put to advantage," explains Andrew Comben, chief executive and artistic director of both the Brighton Festival and the Dome. "A charity can access sources of funding that non-charitable organizations can't, and with the festival expanding in its breadth and mission while the shrinkage in venues here in the 90s had been dramatic, we needed stability in a home – the Dome."

The Grade I listed Dome was built close to the Royal Pavilion at the beginning of the 19th century to be the Prince of Wales's stables and riding house, its design inspired by Delhi's Friday Mosque. In 1850, it was bought by the local authority from Queen Victoria and turned into a concert hall. The riding house became the Corn Exchange – electric lighting was installed in 1868. Both buildings were refurbished in the 1930s in Art Deco style, with the concert hall becoming the building it is today, with seating for between 1,400 and 1,800 depending on the configuration. The Corn Exchange, which had been a grain market and an ice rink, was turned into a theater and now seats 320. The third venue, the 300-seat Brighton Dome Studio Theatre (as it has been known since 2012), is on the site of a stables belonging to the Prince Regents' mistress, replaced in 1935 by a theater – formerly the Pavilion Theatre.

Future plans

The Dome complex has become the essential part of Brighton's three-week May festival, which attracts an audience of 400,000 a year (up from 150,000 in 2008), and in turn helps enthuse audiences to enjoy artistic programs running throughout the rest of the year. The two main features of his mission now, Comben explains,

are audience development and fundraising – the festival is far more capable of raising the kind of sponsorship and philanthropy than the Dome, and underpins the work taking place outside the festival. "The three weeks in May tend to be most experimental, and effectively test work on a very loyal and anticipatory audience that is of a different character to the year-round audience," Comben continues. The successful work, like Hofesh Shechter's dance pieces or Laurie Anderson's experimental performance, then comes back.

The quality of such commissioning also raises the international profile of both the Brighton Festival and the Dome, and that quality attracts the increasingly vital private funding. Comben oversees an annual turnover of £7.5m (US$11.4m), a third of which comes in the form of subsidies from Arts Council England and Brighton & Hove City Council. Those subsidies, it is widely accepted throughout the industry, will shrink in the future.

Comben, therefore, is planning another capital development, a £19m (US$28.9m) program to create new office space for both operations, storage space, and proper backstage facilities for artists. Work will start after the 2016 festival. "In the last six or seven years, we have been finding ways of operating with serious constraints and have had to be adaptable in programming and really careful with formats of work – it's hard at the moment to move from one to another quickly," he says. "It takes a lot of juggling, and for the future we need to be more flexible and streamlined to develop, and to provide facilities that international companies expect." ■

Author

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

LONDON CALLING

Costing the London County Council £2m (US$3m) to build, the Royal Festival Hall was opened by King George VI on May 3, 1951. It was designed by Leslie Martin with a revolutionary 'egg in the box' concept – meaning that, although a variety of activities could take place throughout the building, the sealed acoustics of the hall were preserved. In the 1960s, two more venues – the Queen Elizabeth Hall and the Purcell Rooms – were added along with the Hayward Gallery, creating the world's largest arts center as the Southbank.

The British Film Institute also became part of the group, and in 2007 the Royal Festival Hall reopened after a two-year closure and remake costing more than £200m (US$305m) that improved the acoustics, audience comfort, and circulation of the building. Commercial units were also created on the riverside, contributing an additional £3m (US$4.6m) to the center's annual income.

Ten years ago, when she became artistic director of the Southbank, Jude Kelly instituted a wholesale return to the festival spirit of 1951, this year ranging from the Festival of Love to the Winter Festival, London Literature Festival, and Unlimited – a celebration of the work of disabled artists. The Festival Hall is part of each of them, often hosting events within the concert hall, but always involving spaces elsewhere in the building, including the rather eccentric ground floor ballroom.

"To curate a 21-acre site like this isn't about walking across a space in order to get tickets to go inside," says Kelly. "It's about what we now have, millions of people sharing ideas and excitement. I've spent all my life learning about the absolute fundamental needs human beings have to make art, and I say people all understand that festival is about adventures, trying things out, informality, time used differently."

The 1,500-seat Grieghallen in Bergen, Norway

Updating history

The ability to combine the latest advances in technology and infrastructure with a sympathetic approach to venue character is vital to truly successful theater renovation

Eilif Stene

More than anything, renovating a theater demands sensitivity. Whether it is the historic restoration of a Vaudevillian movie palace or modernizing the theater equipment inside a contemporary building, each renovation requires a delicate balance between preserving the character of a given space and ensuring that the building has the technology and infrastructure to operate amid the demands of modern productions and the high expectations of modern audiences.

This is exactly the kind of challenge that Theatre Projects has met head-on hundreds of times during the international theater planning and design firm's 50+ year history, transforming numerous shuttered, outdated and forgotten relics into fashionable, modern and lively spaces.

Recently, Theatre Projects has renovated three facilities that were looking to improve audience comfort, technical infrastructure and accessibility – without cutting off the venues' revenue stream. Through careful planning and resourceful, efficient work, Theatre Projects developed phased renovation plans for the Altria Theater in Richmond, Virginia, USA; the Lyceum Theatre in Sheffield, UK; and the Grieghallen in Bergen, Norway, allowing the three venues to continue operating substantial production schedules as economically viable facilities.

All of the three venues were driven by a need to improve both audience experience and overall operations. Each called for a robust, yet sensitive building review to examine issues such as ease of access, comfort, circulation, ticketing systems and technical infrastructure, as well as heating, ventilation, air-conditioning, lighting systems, restrooms, catering and the day-to-day operations of the building.

"Such projects are not for the faint-hearted," says Mark Stroomer, head of design for Theatre Projects in London. "These days, theater consultants require an increasingly wide range of skills and knowledge to successfully take a renovation project from concept to realization."

First-hand experience as a theater practitioner is very helpful, Stroomer continues, but theater consultants also require a great deal more than that, such as the ability to evaluate seemingly conflicting perspectives and make the right decision: "Before we do anything, we establish a clear insight into how a venue functions from visitor, artistic and resident staff perspectives. We take into account the venue's mission and how that might change. Crucially, we evaluate the audience's experience in terms of their proximity to the stage and the quality of the sightlines. From this, we optimize the auditorium design, mindful of its original character."

Technical makeover

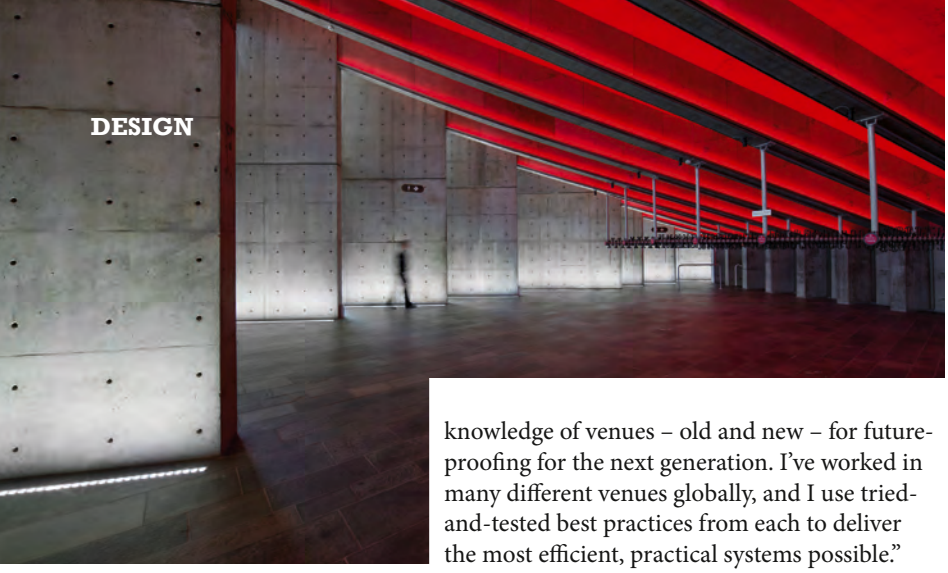
This was certainly true for the Grieghallen in Bergen, Norway, which was originally built and completed in 1978 and has since become the home of the Bergen Philharmonic Orchestra, the Bergen National Opera, and the International Festival. With 30 years of constant operation, the 1,500-seat concert hall, the smaller Peer Gynt-salen, and other support spaces required a complete technical renovation.

Martin Bailey, project manager for Theatre Projects, worked alongside the Grieghallen management to determine options to make a tangible operational impact and then assisted in raising government grants. Once these were secured, the selected architects – Per Christian Brynildsen and Terje Gundersen of Ratio and Rikke Sundt of Origo – joined the project.

"The renovation work was scheduled in stages because the building, which is entirely commercially run, could not afford to shut down for any significant period of time," Bailey says.

Remarkably, the main Griegsalen concert hall upgrade was completed during two periods of 14 weeks between June and October 2013 and June and October 2014, and the Peer Gynt-salen renovations and other public area improvements will be complete by 2016.

Bailey says that he takes a holistic view on venue design: "My approach to Grieghallen was to take the principles from touring theater and live music and apply them to the concert hall. I started by examining the spaces from a number of perspectives, taking into account the needs of the audience, the visiting companies, and resident management and staff. I then applied my



From top: **In addition to work on the Grieghallen's main concert hall, the renovation also included the smaller Peer Gynt-salen and supporting spaces. Photos: Helge Skodvin**

knowledge of venues – old and new – for future-proofing for the next generation. I've worked in many different venues globally, and I use tried-and-tested best practices from each to deliver the most efficient, practical systems possible."

Bailey and the team had a very clear aim – to maximize the venue's efficiency. "We enlarged the orchestra pit in the Griegsalen during 2013," he explains. "We also installed four automated lifts in the stage area so the venue can swiftly transform from a flat floor to a proscenium stage or concert hall configuration."

Bailey also looked at the logistics backstage and worked with Ratio and Origo to design a new route through the building for staff and performers. "Because the Grieghallen has been occupied by several different organizations, its evolution saw each group establish their own stage door entrances, each with little or no security," explains Bailey. "We worked alongside the architects to open up the backstage area, make a single, more secure stage door entry space, and improve the dressing room facilities and their location in relation to each performance space."

The second phase of the project saw renewal of the seating, a completely new power flying system, and installation and replacement of the lighting and sound infrastructure, including all loose equipment.

"The renewal project was divided into four summer periods to enable the building to run as normally as possible," says Rolf Skogstrand, director of events for Grieghallen. "Theatre Projects played a major part in pushing the project forward and contributed in a substantial way, ensuring that the project was within the time and budget required. Martin and his team continuously consulted with the various groups and staff that make use of the building throughout the process."

Turning back time

At approximately the same time, in the USA, the 180,000ft^2 Altria Theater was facing similar wear-and-tear issues alongside aging technical and operational systems.

Like Bailey, Theatre Projects' project manager Millie Dixon worked with the client to determine how the Altria could better accommodate touring groups and improve audience comfort. Dixon worked closely with Bruce Hermann and Rebecca Emanuel of Wilson Butler Architects to deliver the work in phases, allowing the theater to operate on as normal a schedule as possible.

Anton Grassl/Esto

"The Altria desperately needed to improve its facility in order to better accommodate touring companies and improve patron comfort, while still accommodating local groups," says Dixon.

The Altria's 3,500-seat auditorium has become the venue of choice in Virginia for touring Broadway shows and national touring companies. It also hosts a number of local productions and supports a very successful, often sold-out, speaker series.

Alongside improving the facilities, Theatre Projects was asked to examine how the building was managed and occupied, including considering the ticket management systems and the front-of-house amenities. All of this had to be achieved on a limited budget, and during a series of short shutdown periods.

"Although we had limited time and budget, we decided to approach the project from the opposite perspective and ask the client, 'If you had all the money and time in the world, what

would you do to this building to bring it up to spec?'" explains Dixon. "We took their answers, broke them up into separate project packages, ordered them by priority, and matched each package with others, taking into account the downtime and the funding available. This enabled us to be strategic and precise in what we could realistically achieve during each time slot and decide which elements of the project it made sense to do at the same time. We also laid some foundations for future packages."

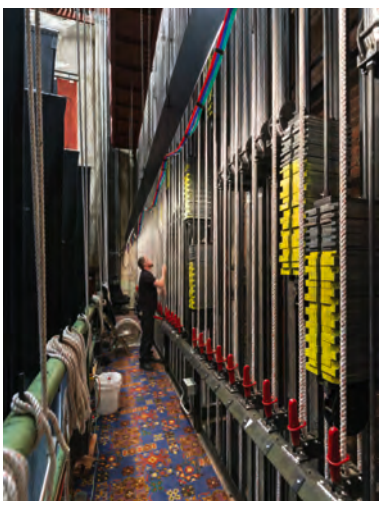
The work kicked off during the summer break of 2013 and started with the front-of-house spaces. "We reconfigured food service areas, improved front-of-house access, and accommodated as many accessibility upgrades as possible," Dixon says. "In the auditorium, we rearranged and refurbished many of the 3,610 seats, and we reshuffled them to improve sightlines. We also worked in some easily removable seats in the production area to accommodate technical rehearsals."

The second, longer 10-month phase saw the stage house gutted – replacing rigging, lighting, and sound systems, and installing improved cable management building-wide. "All 50 line sets were replaced with a new double purchase flying system," explains Dixon. "We also created new storage facilities backstage and built a more accommodating loading dock. The entire control and dimming system was replaced too."

Theatre Projects also added infrastructure in the roof above the ceiling dome to enable the venue to hang a front-of-house lighting truss if required, including a series of cleverly disguised rigging ports and lighting openings. "In the ornate dome itself, there are half-scalloped holes running around the bottom edge, which can also be opened up to accommodate individual lighting positions," Dixon adds.

Altria's production manager, Steve Sweet, was closely involved with the project from its inception. "We hit the ground running, following the stage house refurbishment and opened with a one-off concert, followed by the touring production of *The Book of Mormon* – a nine-truck show," he says. "Since then, we've done a further five Broadway shows, a number of huge corporate events, plus plenty of private events and music concerts."

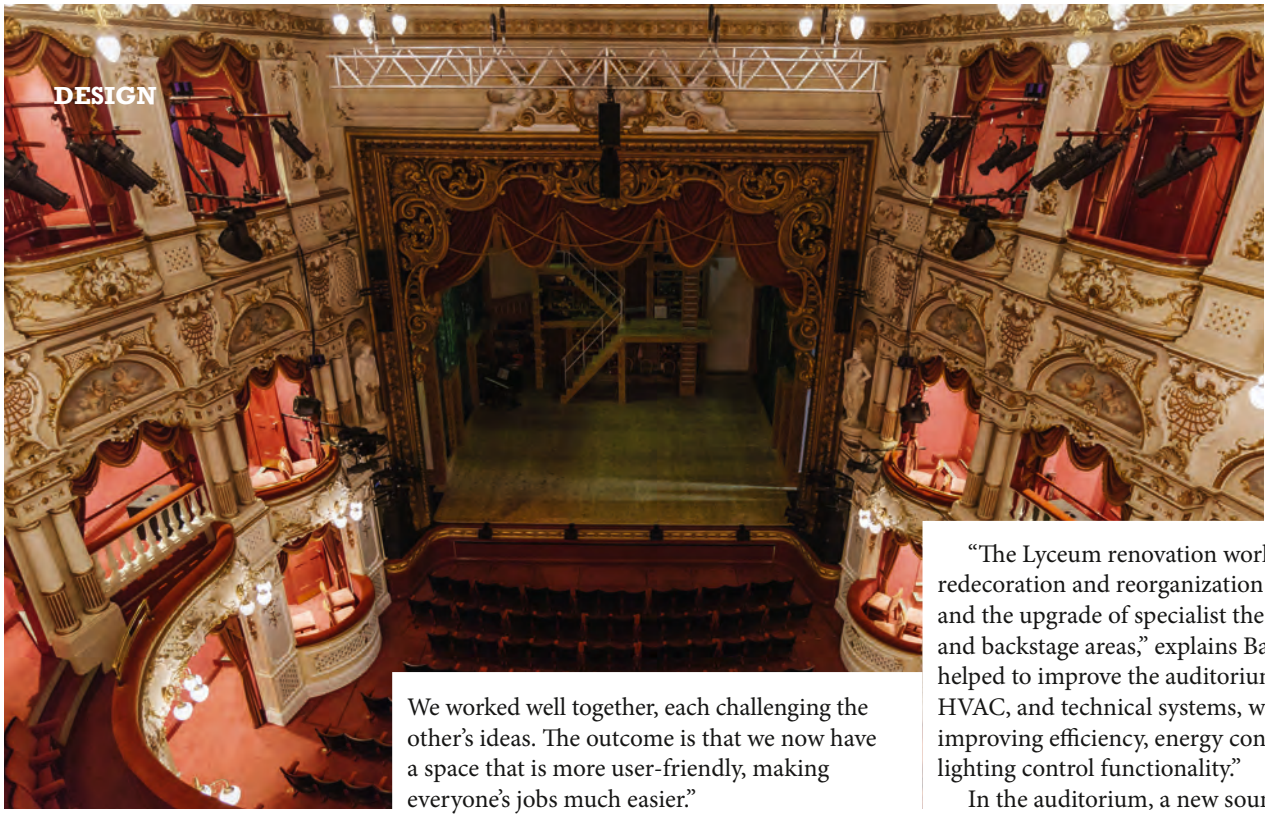
As Sweet goes on to explain, it was important for him to be hands on: "What's great is that Millie brought her passion for design to every aspect of the project. That was a big advantage.



Anton Grassl/Esto

Top: **The Altria Theater, which is located in Richmond, Virginia, is a popular venue for touring Broadway shows**

Above: **The second stage of the renovation required the gutting of the stage house and replacement of the equipment**



James Stewart Photography

Renovation of Sheffield Theatres' Lyceum Theatre included improving public areas, upgrading theater equipment and making improvements to lighting, HVAC and technical systems

We worked well together, each challenging the other's ideas. The outcome is that we now have a space that is more user-friendly, making everyone's jobs much easier."

Following the renovation project, the venue is already receiving excellent feedback from members of touring road crews. "Most touring visitors say the place got exactly what it needed and that it is much easier to integrate their technology with ours now," explains Sweet. "A major step forward on stage is the distributed power outlets. Before, I had just enough power to do whatever I needed, but it was all sited mid-stage left, which meant a lot of messy cabling. Having power switches distributed in the right places, at the right amperage, makes things a lot easier. We also have much improved work lighting and a lot more of it. This ensures that we can work faster and safer."

With regards to future-proofing, Dixon has ensured the potential for easy expansion of power and cabling to go along with any future development of the stage house. "We've strategically positioned fly floors and installed stage crossovers outside the stage house, so if the venue decides to raise the roof, all the current work can be left in place," she explains.

Old meets new

In another historic renovation, Bailey worked on the regeneration of Sheffield Theatres' Lyceum Theatre in the UK – a beautiful Edwardian building that has hosted many touring West End productions and operas, but was in urgent need of an upgrade.

Bailey oversaw an intensive eight-week refurbishment that focused on improving three main areas: audience experience, production capability and operational efficiency.

"The Lyceum renovation work included the redecoration and reorganization of public areas and the upgrade of specialist theater equipment and backstage areas," explains Bailey. "We also helped to improve the auditorium lighting, HVAC, and technical systems, with the aim of improving efficiency, energy consumption and lighting control functionality."

In the auditorium, a new sound system has been installed, house lighting has been converted to LED, a new HVAC system has been installed, and balcony seating has been refurbished. Foyers have been decorated, re-carpeted, and the ornate Edwardian plasterwork has been re-gilded. On the ground floor, five additional ladies' restrooms and improved family-friendly facilities have also been created.

Investing to save energy, the building's efficiency and financial sustainability have been considerably improved with the installation of 66 photovoltaic panels on the roof, enabling the theater to generate its own electricity.

Sheffield Theatres' chief executive Dan Bates says, "The theater has been beautifully restored and reinvigorated to create a more comfortable experience, allowing us to attract, create and tour more world-class productions, and ensuring our long-term sustainability thanks to a variety of energy-efficient systems."

For all these venues, Theatre Projects' focus has always been on the specific needs of the staff, users and audiences. "We take a holistic approach to all our projects, both as a building, and from an artistic and occupancy perspective," stresses Stroomer. "Each venue is unique and our priority is always to deliver refurbished venues that maximize the intimacy of the theater experience. We are all too aware that where finances are stretched – as they often are – it's crucial that we deliver what we promised on time and on budget. In all three of these cases, that is exactly what we have done." ■

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Market study

A new multifunctional theater, built into Hamburg's heritage-protected market hall, makes use of flexible stage technology

The city of Hamburg in northern Germany attracts more than two million musical visitors each year. Boasting a wide array of cultural venues, including three state theaters, and around 40 privately-owned theaters and museums, the city attracts more than five million tourists each year. Such is its popularity that Hamburg can lay claim to being the number one musical metropolis in mainland Europe.

Within this cultural center, a brand new, multifunctional theater opened its doors in March 2015 in the market hall, between the city center and the harbor.

The market hall, which was built in 1962, set new standards in architecture, as it was one of the last existing pre-stressed concrete buildings in Hamburg. Nowadays, placed under heritage protection, the market hall remains the city's main wholesale market for fruits and vegetables, with 1.5 million tons distributed at the venue.

The entire area occupies 430,000ft^2, though the new theater takes up only 10% of this floor space. Spread over three floors, the new theater occupies more than 70,000ft^2.

Carrying the weight

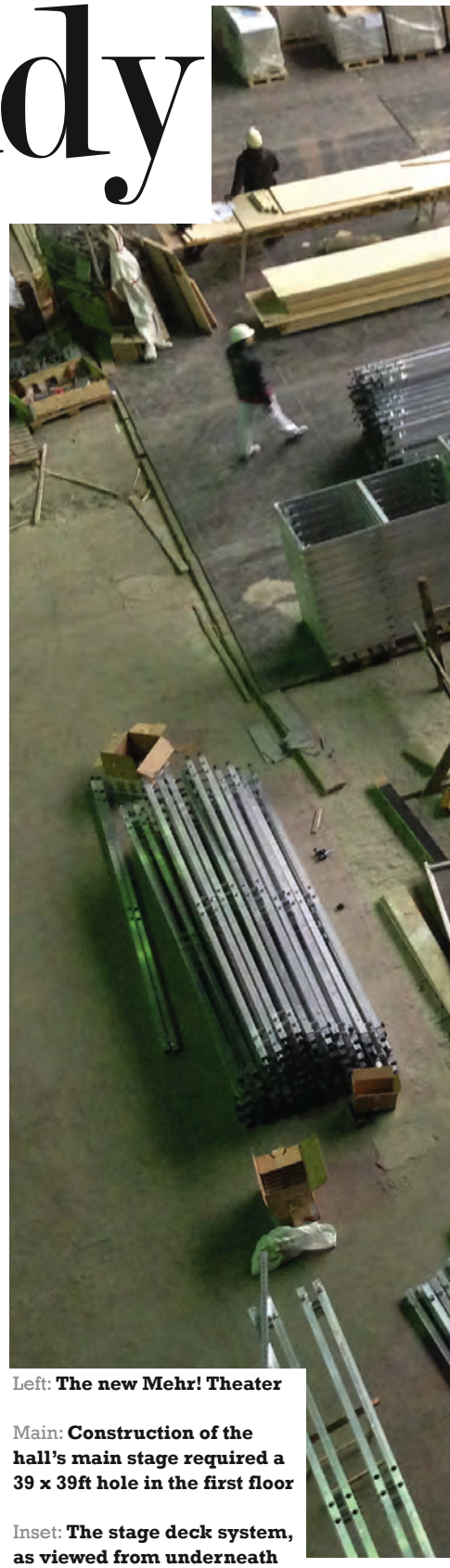
Mehr! Entertainment was contracted by the city to build a brand new theater. The Mehr! Theater is totally integrated into the construction of the market hall. The 66ft height and the span of the roof had to be preserved. The first step in construction was a scaffold wall to separate the main wholesale fruit and vegetable market from the dust created by the construction area of the new theater.

A particularly special part of the project was the implementation of the stage back wall, which had to carry the 60-ton stage roof. Two new steel arches, each weighing 40 tons, were built to carry the 60 tons of additional weight, caused by upper machinery, lighting and audio equipment.

In the basement of the market hall, existing walls were taken away, while new ventilation shafts and cabling were installed to create new rooms for the artists. For the main stage, a 39 x 39ft hole was put into the first floor to create a lower stage area. This hole was then filled by bringing in a mobile stage system. The HOAC StageDeck system was the perfect choice, and is designed to offer flexibility when building staging areas. It is possible to lift up frames in any part of the stage area without dismounting the whole row or stage. A new, patented link block, used for the connection of the frames, gives the user the freedom to open the stage wherever the show demands. The StageDeck columns ensure stable and tight stage under construction up to 5m. It is possible to manage each frame individually within the complete stage structure.

Multiple applications

The primary aim of the project was to build a multipurpose theater. The venue is designed for a maximum of 2,400 seats and, when a combination of standing space and seating is used, is capable of accommodating up to 3,500 spectators. The stage area can be used in various configurations, from a 3,445ft^2 center stage up to



Left: **The new Mehr! Theater**

Main: **Construction of the hall's main stage required a 39 x 39ft hole in the first floor**

Inset: **The stage deck system, as viewed from underneath**


DINO 230t

Mehr! Theater Hamburg | F101 Architekten | Photo: Andreas Meichsner

5,380ft² of stage area. The stage can be configured to be visible from all four sides. The variable seating system is a mixture of fixed installed steel tribunes, opposite the main stage and complemented by a flexible tribune system. Choosing the same frame system as for the main stage, the theater reached the perfect alliance of sustainability and flexibility. Using the HOAC SystemFrame with its compliant accessories makes it possible to save on critical setup time and manpower costs.

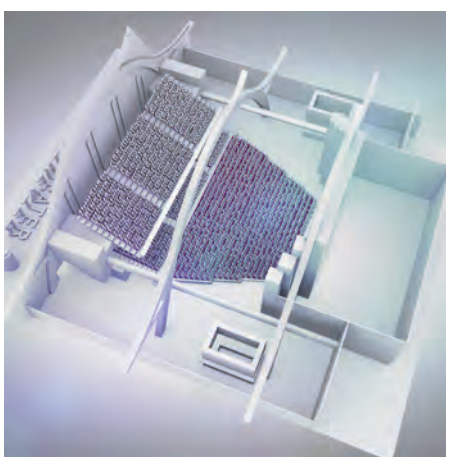
The architecture of the hall, the foyer and the bars was designed in an open-plan style, and the inner construction methods did not include dividing walls and false ceilings. As well as the outstanding architecture, the market hall benefits from its direct connection to the harbor.

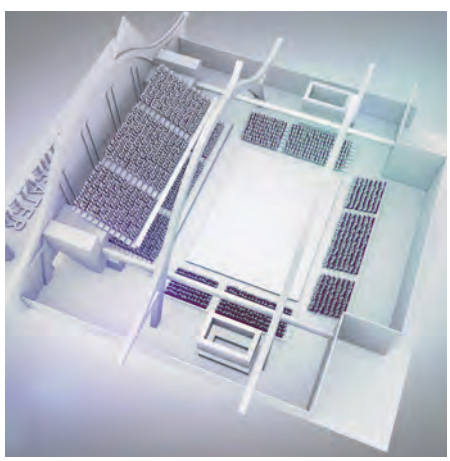
Above: **The London Symphony Orchestra perform at the hall's opening on March 7, 2015**

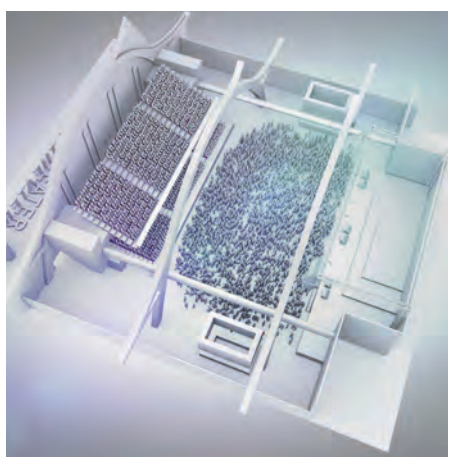
Below, from left: **The concert hall in three of the various possible configurations: with proscenium; with center stage; set up to stage a rock concert**

For the opening of the theater on March 7, 2015, and following 15 months of construction, a classic concert was planned. HOAC delivered the mobile aluminum construction for the acoustical shell just in time for the performance. The London Symphony Orchestra travelled to the new venue, and welcomed the 2,400 concert guests with a "Moin, Moin" – the traditional Hamburg greeting. ■

www.hoac.de







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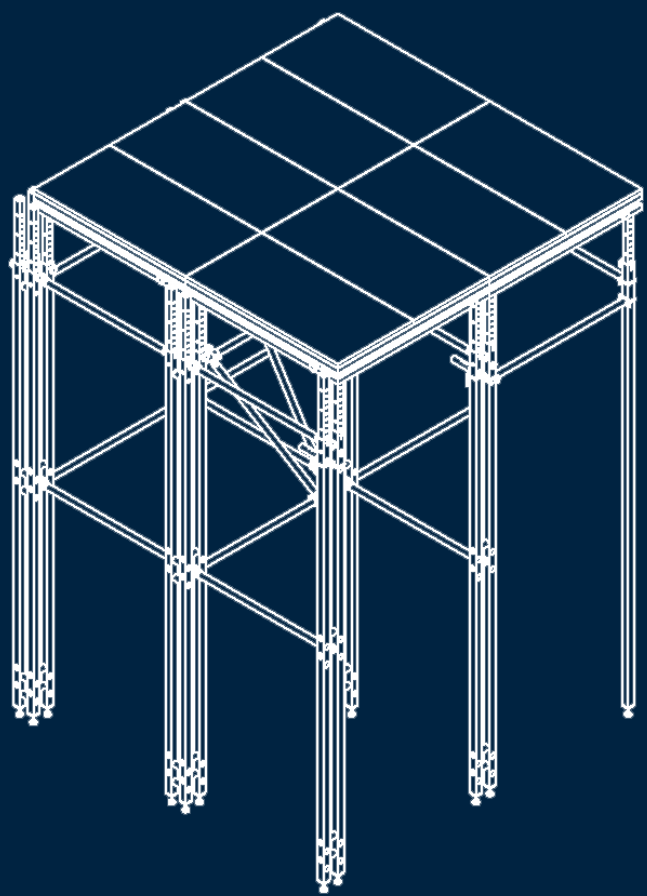
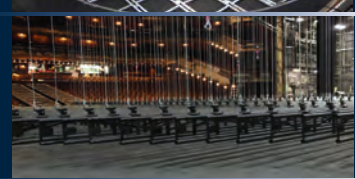


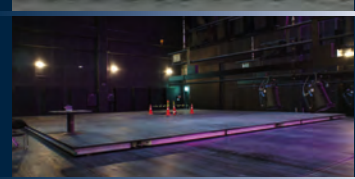
STAGE DECK

TRIBUNES

TURNTABLES



TRACK SYSTEMS



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Meeting demands

A collaborative project to design seating for a conference hall has led to the creation of a cutting-edge product line

During development of the new conference hall for the Geneva-based World Intellectual Property Organization (WIPO), Poltrona Frau Contract collaborated with German architecture company Behnisch Architekten to create a system of cutting-edge, high-performance seating.

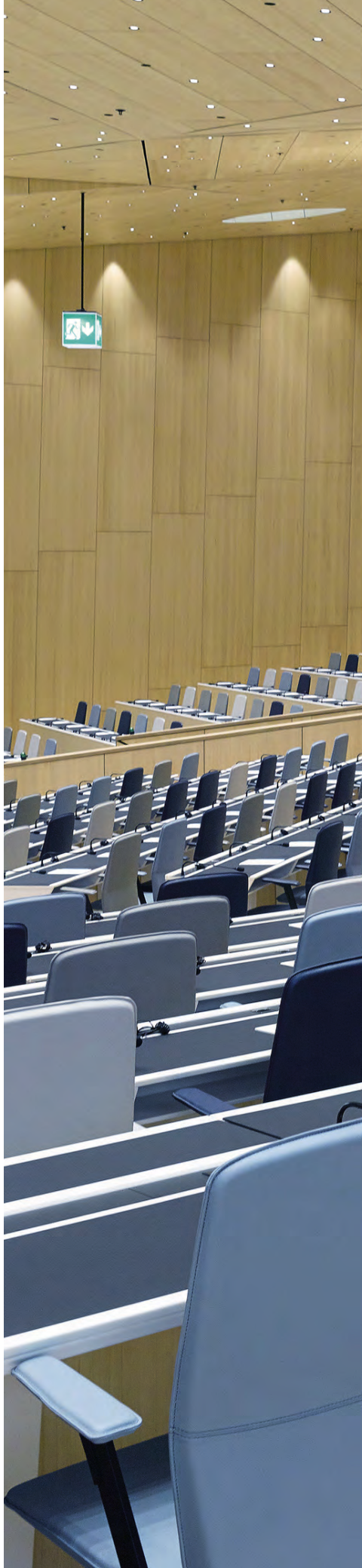
WIPO, the global forum for intellectual property services, policy, information and cooperation, is a United Nations agency with 188 member states. The new conference hall – inaugurated on September 22, 2014, during the annual WIPO general assembly – was conceived and designed to meet the needs of the organization. The 900 seats, which are arranged around a single stage, are also positioned in an entirely non-hierarchical arrangement. The room is therefore dynamic, comfortable and suitable for interaction between the representatives of the various countries. Several smaller meeting rooms complete the functionality of this state-of-the-art conference hall.

Selecting partners

Poltrona Frau Contract delivered seating that focused on ergonomics, functionality and space management. To install as many seats as possible in the space, the two firms collaborated on a solution in which a seat can be mounted either on wheels or on a rail system. This ensures the stability of the seats, which are fixed to the floor, while preserving their functionality. In fact, the seats can rotate to a right angle.

"Our architecture office isn't specialized in furniture design," explains Behnisch founder Stefan Behnisch, "and so for this important project we needed a strong, highly experienced partner that was interested in designing the seats with us. We had a clear idea of what we wanted to do, but we needed expert support. Poltrona Frau Contract's approach was extremely pragmatic and collaborative."

"For us, every new project is a chance to perfect our engineering expertise and demonstrate to the client our reliability in any type of project," continues Kurt Wallner, the managing director of Poltrona Frau Contract.



The conference hall at the WIPO seats 900. Mounted on rails, the seats were produced in a color gradient in tones of blue and gray, and are arranged without hierarchy to facilitate member interaction Photo: Behnisch Architekten

Inspired by the innovative and technological characteristics of the new seats, Poltrona Frau Contract opted to develop a complete collection for similar conference rooms. Given the link to the WIPO conference hall, the seat is called the Geneva Chair.

The padding, in flexible and flame-retardant polyurethane, was created to offer maximum comfort. The cold foam ensures that the padding will not shrink over time and maintains the seat's load capacity and textural features. The chair is available in high or low backrest versions, with or without armrests, and in leather colors from the Pelle Frau Color System collection. The five-spoke metal base can come with or without wheels. The stitching and details can be customized in a number of different ways and the special certifications required for application in public places can also be obtained.

Adding textile options

In June 2015, Poltrona Frau Contract launched a brand new version of the Geneva Chair. "For the conference hall of the WIPO, we had to develop a chair that could meet specific conditions," explains Stefan Behnisch. "The cooperation with Poltrona Frau was subsequently marked by very open and good work. Yet we believe that the Geneva Chair – although originally intended for the conference hall of the WIPO – has a quality that can exist outside of the project."

The new line of chairs is now available with upholstery in Kvadrat textiles. As Poltrona Frau Contract's Wallner adds, "We are happy to have Kvadrat as our partner for the textiles for the chair as it is another joint project in our long-lasting partnership."

The textiles selected for the new range, which was presented at the Kvadrat showroom in Berlin, are Hallingdal 65 and Steelcut Trio 2.

Hallingdal 65 is made of wool and viscose, which complement each other well. The wool provides excellent durability and flexibility, while the viscose adds brilliance and depth to the color. Both materials are dyed before they are spun, which highlights the rich texture of the fabric. It remains one of the best-selling textiles of the Kvadrat collection, and has been continually produced since the company was established. It comes in 58 color combinations.

After developing the Geneva chair for the WIPO conference hall, Poltrona Frau Contract launched a new version of the seating solution, offered in a range of performance textiles

Steelcut Trio 2 is a hard-wearing upholstery textile, available in 49 different choices of color. It features an innovative weave, which gives the fabric a three-dimensional surface resembling small pyramids or steel points and, despite the complexity of the weave, a simple and precise expression. It is yarn-dyed and made from three differently colored yarns, often with very bright tones on the warp and lighter tones on the weft. This particular combination accentuates the three-dimensional character of the weave, and adds life to the fabric.

Poltrona Frau Contract has produced seating solutions for some of the world's most prestigious theaters and concert halls. The company has also provided seating for the interiors of luxurious airplanes and cruise ships, as well as for palaces, embassies, 5-star hotels and many other types of publicly and privately owned collective spaces. The company has worked on over 1,000 projects in more than 50 countries, and offers 20 customizable seat collections.

Behnisch Architekten was founded in 1989 as a branch office of Günter Behnisch's firm, Behnisch & Partner. The office became independent in 1991 and with 25 years of experience, now operates offices in Stuttgart, Boston and Munich. With a staff of more than 100 people and projects in an array of various sectors, the firm continues to focus on research and design, and is widely publicized and exhibited at major international shows and events. ■

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DESIGN
MARTINEZ + JOHNSON ARCHITECTURE
SCHULER SHOOK

The Kings Theatre had fallen into such a state of disrepair that restoration took a decade

Public service

After years of standing dormant, a project to restore a famed New York theater focused on rejuvenating public areas and facilities in a bid to return the iconic venue to its former glory

The presence of water falling 80ft to the audience chamber floor in the Loew's Kings Theatre made it clear to the design team – Martinez +Johnson Architecture and theater planner Schuler Shook – that the level of damage to the venue, as well as the scale of possible repair scenarios, was considerable. Thus began the decade-long effort to save the theater in Brooklyn, New York.

One of the five 'wonder' theaters constructed in New York City from 1927-1929 by the Loew's Theatre chain, the Kings Theatre had long existed as a prime candidate for rejuvenation by the city. Championed by the borough of Brooklyn, the project garnered the support of NYC with a US$50m grant. Through the investment in federal historic preservation tax credits, new market economic development tax credits and state-sponsored preservation tax credits by private sources, the total design and construction expenditure of the project grew to US$93.4m.

Backed by such robust investment, the renewal strategy for the theater focused specific attention on the restoration of public areas of the historic venue, improvements to the public amenities and patron facilities, and expansion of the stage and back-of-house support areas. The operator of the venue, ACE Theatrical, considers each of these three areas to be critical to the long-term success of the center.

Determining audience demands

Extensive programming investigations were undertaken, revealing a large market for music and theatrical entertainment. To augment this performance profile, dance, cinema, and private business presentations were added to the program for the multi-use center. In fact, it was this breadth and diversity of programming that attracted the city to the redevelopment proposal put forward by the operators. The long-term health and vitality of the venue was grounded in the wide range of shows presented by ACE, appealing to the numerous ethnic and cultural groups of Brooklyn's Flatbush neighborhood.

The impact of this program on the strategies employed by the design team – in terms of the architectural, theatrical and lighting aspects of the project – had a large role in establishing the challenges and hurdles to revitalizing the Kings Theatre. The limitations presented by the historic interiors of the theater required the design team to take a specific approach to the installation of new systems and materials. As Gary Martinez (FAIA) noted, "Designing in such tight quarters placed a special emphasis on close teamwork and knowing that Schuler Shook was with us every step of the way gave me a great deal of confidence in our ultimate success."

Adapting the existing stage house to the projected program of operation constituted one of the major challenges of the project. The ideal solution dictated by the program entailed the replacement of the existing fly tower with a new, larger facility. As this approach was invalidated by the available funds for construction, Schuler Shook developed a solution that increased the depth of the rigging wall along stage right, maintained the depth of the stage, and provided necessary stage floor dimensions for touring music and theatrical shows. Martinez + Johnson's architectural response was to keep the existing stage house box and to tailor an expansion of stage right, working from the remaining side and back walls of the historic venue.

Working to tolerances of less than one inch, the team threaded new structures in and around existing columns, stage walls and subterranean foundations burdened with service utilities. A new loading facility for the tractor trailers of touring music and theatrical shows, a materials lift of 20,000 lb to move scenery and road boxes from the dock area to stage level, 3m (9.8ft) below grade, and 3,000A of power for stage and theater, were carefully situated within the extant infrastructure; all placed to maximize the capacity of the venue while maintaining the efficiency of load-in and load-out operations.

Lighting the way

The second major challenge for the design team members involved the replacement throughout the venue of historic lighting which had been lost over time. Apart from the major large chandeliers in the foyer and main lobby, and one historic hanging basket lamp, all other original fixtures were missing. The architectural lighting design was developed through careful research of old photos, remnants of existing fixtures, and extrapolating the etched glass, brass and crystal design of the existing chandeliers. As Michael DiBlasi, partner and principal designer at Schuler Shook, observes, "Our research into the types of fixtures of the period proved invaluable in enabling us to replace lost fixtures with new units of the appropriate style and proportions."

The restored ornate fabric of the building required careful consideration as Schuler Shook and Martinez + Johnson introduced new technologies, performance and patron accommodations, and code-compliant measures into the house chamber. The box boom lighting positions were tucked into the colonnade arches and numerous rigging points were integrated into the decorative plasterwork. Access and power were provided throughout the facility to allow the technicians to accommodate the multitude of events presented at the Kings.

Enhanced experience

Perhaps the most important area of change undertaken by the team was a directed effort to enhance the patron experience beyond simply restoring a lost treasure to new life. In 1927, a mere dozen restroom fixtures were deemed satisfactory for over 3,600 filmgoers. The primary concessions area consisted of just a candy stand at the base of the grand stair in the main lobby.

The concession situation was addressed with the creation of eight built-in bars and food stations. Designed to complement the grandeur of the surrounding decorative interiors, the bars were executed in stained mahogany to match the American walnut of the millwork in the theater.

For the new restroom facilities, the design team created a second grand stair leading to a

An extensive rejuvenation project has returned the Kings Theatre to its original glory, and improved many of the venue's areas and facilities

basement area designated in the original 1927 drawings as a basketball court for the use of the ushers. Martinez + Johnson placed a new lounge with a five-station bar at the base of the stair and added more than 80 new fixtures in two new restrooms for women, and one for men; thereby reducing the lengthy waiting times for facilities during intermissions.

With all the physical changes that took place in the theater itself, the greatest test for the venue wasn't resolved until the evening of its grand reopening. Having stood dormant and empty for over 30 years, the Kings Theatre had abdicated its position as the communal heart and soul of the Flatbush neighborhood in Brooklyn. During the 10-year sprint to save the theater, as strategies for revitalizing the venue gave way to active planning, design and construction, the excitement of the citizenry grew as word of the work on the historic building spread. On February 3, 2015, the Kings Theatre reopened its doors to its fans and the homecoming was complete as they again proclaimed their theater the "wonder theater" of New York City. ■

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Sound engineering

Installation of a house sound system at a famed London venue has raised the standard of audio performance for visiting productions

The Apollo's new sound system was tuned to the building's architecture

London's Eventim Apollo is a truly iconic venue, first built in 1932 in splendid Art Deco style. Since its inception, the space has held many names, with perhaps the most renowned being the Hammersmith Odeon. The Apollo is also home to a lovingly restored 1932 Compton pipe organ, one of the few still housed in their original buildings and still in working condition.

But the Apollo is perhaps best known and loved for its live music and comedy –countless artists have released live CDs or DVDs of their performances in the venue, including Kate Bush, Dire Straits, Frank Zappa, Duran Duran, Bruce Springsteen and Eddie Izzard.

Recently, venue owners Eventim and AEG Live observed that the touring sound systems in the venue were producing inconsistent and sometimes disappointing audio results. They felt that a house system tuned to the building's architecture would be welcomed by both touring artists and audiences alike.

Alastair Parley, the technical manager at The Eventim Apollo, explains some of the advantages of a house system: "Obviously there was the desire to achieve a high-quality, uniform sound for the Apollo, but there are also several other benefits. We now have improved sightlines and a much less cluttered stage, and a fixed installation brings improved reliability and lower maintenance costs. Not having the continual rigging and dropping of heavy speaker systems brings improved safety, reduces the chance of injury, and production costs are lower as less crew is required."

Audio requirements

Eventim approached SSE Audio Group in the autumn of 2013 with a design brief for a house PA system that would be able to cater for the broad spectrum of visiting artists, including an increasing number of spoken word performances, particularly comedy acts.

The venue researched the various systems that had been used at the Apollo over the preceding three years and discovered that L-Acoustics was by far the most popular choice. At this time, the new L-Acoustics K2 system was entering its pilot phase and was deployed at the Apollo twice over this period. On hearing the system in situ, it became apparent that the K2 would be a good candidate for the new house system.

Six companies participated in the tender, with audio consultant Vanguardia carrying out acoustic surveys of the venue with the proposed design prior to the contract being awarded.

For the main PA system, the Eventim Apollo's operators chose a flown array of 12 L-Acoustics K2 cabinets per side. During the design process, new rigging points closer to the outside walls were identified, to provide optimum coverage of the stalls and improved sightlines. The original points would remain, should any production opt to use their own touring system. The motor control system for the arrays has custom-built controls, mounted close to the arrays for ease of use whenever the system needs to be dropped.

Six ground-stacked SB28s per side supply the sub-bass. An additional four Arcs WiFo cabinets and five 8XT cabinets provide the near-field infill close to the stage. A special mounting panel was manufactured for the WiFo cabinets, enabling

them to sit neatly on the subs, utilizing custom mounting brackets that mate with the cabinet's standard rigging hardware. In the event of the cabinets being removed for a production, they can be reinstalled in exactly the correct position. The positive mounting also avoids the use of load straps, maintaining the aesthetics of the cabinets.

Overcoming obstacles

The layout of the Apollo presented a number of acoustic challenges. "There's a large area of the stalls that is under the balcony, which flown systems have struggled to provide coverage for in the past," explains Yan Stile, director at SSE. "In addition, the traditional mix position is at the rear of this area, which means that the front-of-house engineer has found it difficult to hear how the system is performing." This challenge was overcome by fitting six Arcs WiFo cabinets to the underside of the balcony, mounted on custom brackets, designed to allow rapid and precise installation and enable the cabinets to be placed as close to the ceiling as possible to minimize sightline obstruction.

The Arcs WiFo cabinets were selected for this application because they use the L-Acoustics Dosc waveguide and the same HF driver as the K2, so the voicing of the cabinet is identical. This gives the house engineer an accurate representation of how the main PA hangs are performing. The cabinet directly in front of the engineer is on its own signal circuit, so can be easily muted momentarily via LA Network Manager if the engineer wants to compare the audio reference with the main hangs.

For balcony coverage, L-C-R hangs were specified, each comprising three Kara(i) cabinets. These are located on new flying points to provide optimal acoustic performance with coverage to the back of the balcony. In addition, 12 8XT cabinets provide audio in the foyer and in the bar area. These are fed via a BSS Soundweb, so they can be configured to relay the main PA with an announcement microphone override, or configured with separate audio feeds from DJ/playback equipment for aftershow parties or other such events.

Overall system control is via a discreet drive rack positioned at front of house. From here, the system technician can control the system without distracting the front-of-house engineer. A wireless tablet has also been provided so that these tasks can be carried out remotely around the venue.

Well received

The main installation took place in January 2015 and was first used for the concert of Swedish folk duo, First Aid Kit, on January 26. Since then, it has been used for most of the events held at the Apollo, to great acclaim from both customers and visiting productions.

Pete Russell, FOH engineer for Thunder, one of the first bands to use the system, comments, "The L-Acoustics system sounded great. The SSE installations team has designed a solution that has superb coverage throughout."

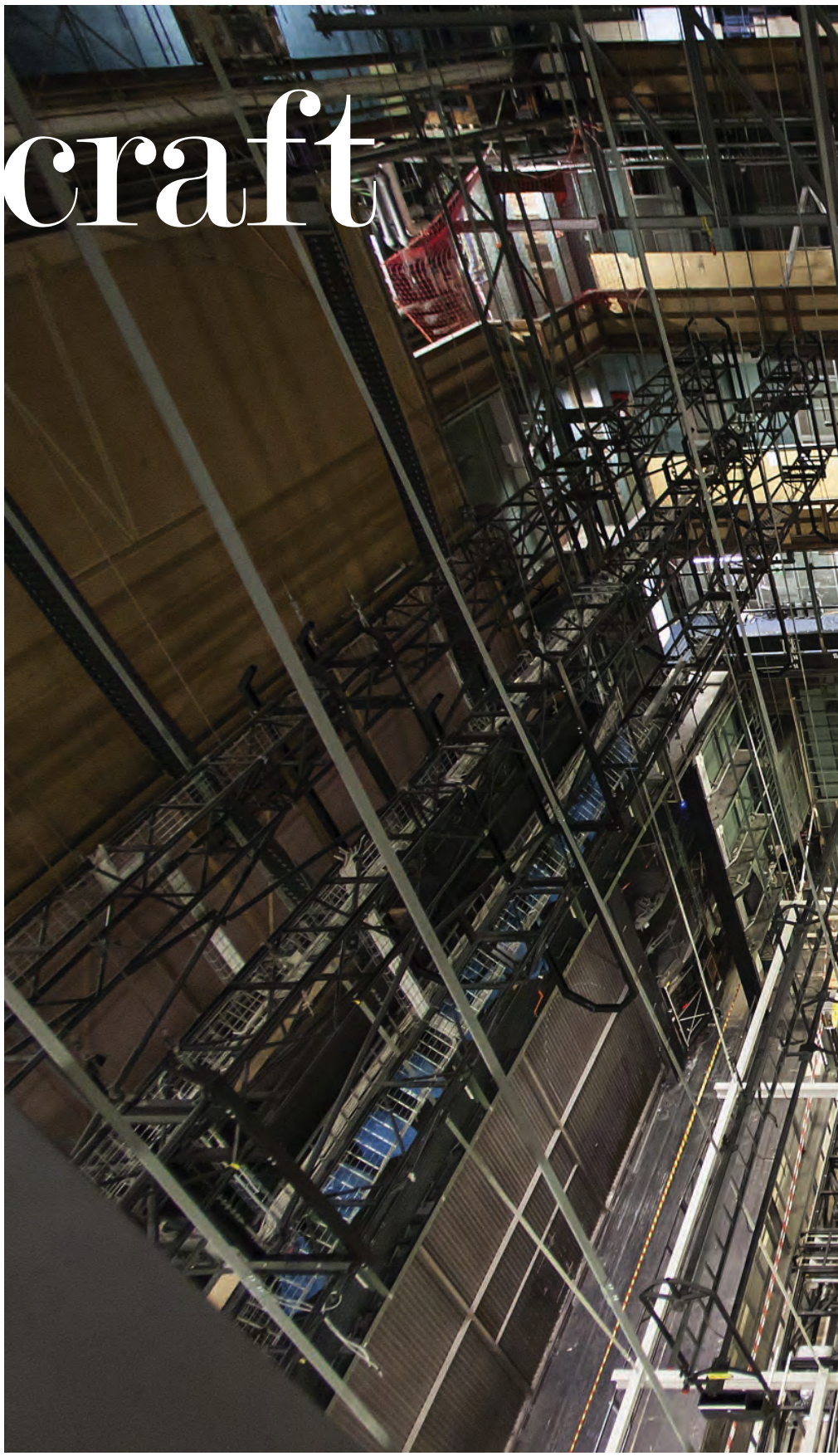
"Our show went really well and I thought the system sounded great and covered the room evenly," adds Russell Fischer, FOH engineer for The Mavericks. "I was particularly impressed by the coverage the Kara(i) provided in the balcony."

Parley was delighted with how the installation was carried out, and was also impressed with the finished result: "The standard of finish and attention to detail is excellent, with every rack and panel finished to the highest of standards. When the system was first run up, it was clear straight away that the quality and coverage of the system far surpassed anything that had previously been heard in the Apollo." ■

www.l-acoustics.com

The main installation of the Apollo's new house sound system was carried out in January 2015, ready for a performance at the end of the same month

Stagecraft



Innovative, efficient understage machinery reduced energy consumption at a Swedish opera house, and was also delivered in line with very challenging deadlines

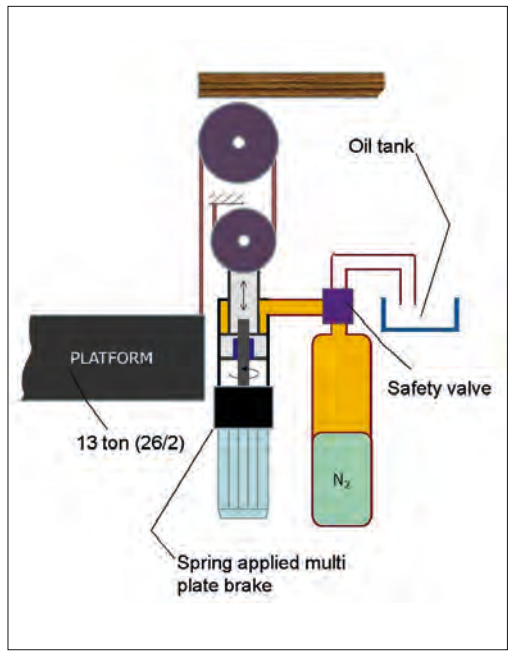
Drive solutions provided by Bosch Rexroth have reduced the energy consumption at the Royal Opera House in Stockholm, Sweden. The modernization of the opera house had to progress quickly – the season's program allowed for just five months to upgrade the understage machinery. Energy-efficient drive technology is extremely important to the venue, and Bosch Rexroth met the requirement with a new development from NovoScen for the hydraulic counterbalancing of permanent loads. The compact solution enables the movement of heavy loads with low noise levels.

The opera house's existing stage equipment, from 1975, was outdated. Old-fashioned safety equipment, declining availability and a lack of spare parts necessitated a full replacement. As a result, the modernization of the understage machinery was announced in the autumn of 2013, with a specific focus on energy-efficient drive technology.

The understage machinery consists of five primary elevators, each with three mounted secondary elevators. The primary elevators can cover vertical travel of 7m (23ft) at a maximum speed of 0.35m/s (1ft/s), the secondary elevators cover 2.5m (8.2ft) of vertical travel at the same maximum speed. It was the operator's wish that all the elevators could travel simultaneously, with a total maximum connected load of 400A. In addition, the new machinery had to be intuitive to operate and conform with the standard safety requirements of DIN 56950-1 and DIN EN 61508 SIL 3.

The view from the fourth gallery of the Royal Opera House in Stockholm, displaying the newly delivered drive solutions

Above: **The Royal Opera House in Stockholm. Prior to the modernization, the venue's machinery was last updated in 1975. Photo: Royal Opera**



Above right: **The schematic of NovoScen's hybrid actuator, which offers greater efficiency than conventional screw jack drive systems. Photo: NovoScen**

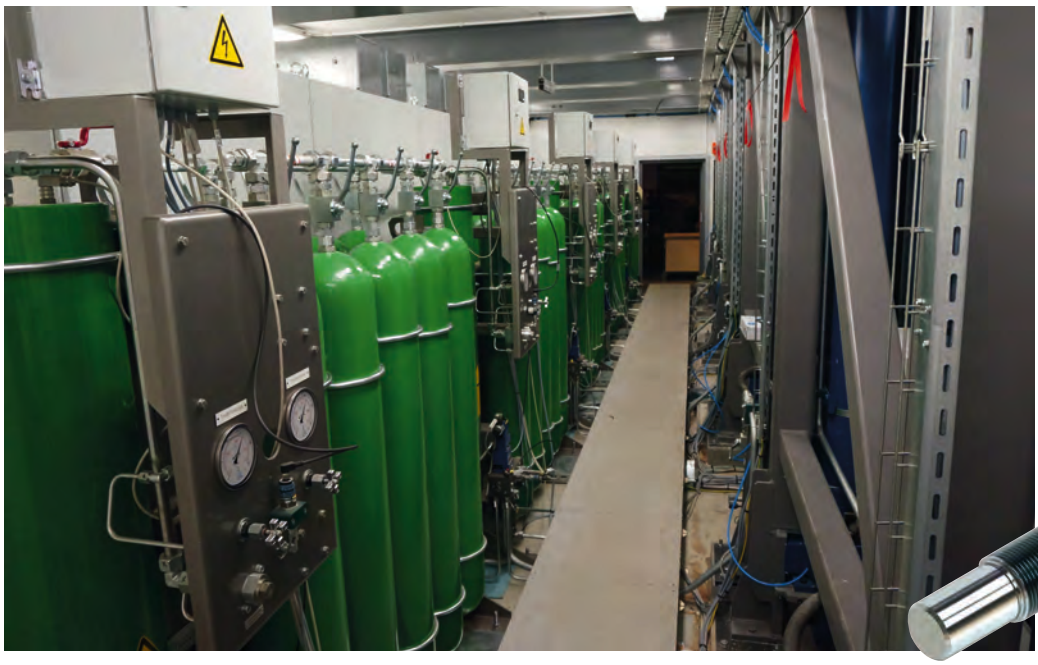
It was necessary to counterbalance the permanent loads to achieve the required energy efficiency. A conventional solution, utilizing mechanical counterweights, was not possible due to the limited space on the stage. Therefore an innovative technology was used, combining a hydraulic pull cylinder with mechanical screw propulsion. At the same time, the hydraulics take over the task of constantly counterbalancing the weights and the mechanics take over the movement of the differential loads. The podium is moved using a single threaded rope drive over the so-called hybrid actuator.

Counterbalancing is achieved by loading a ring-shaped face in the cylinder with hydraulic pressure. The force created by application of this pressure is used to compensate for the dead load of the elevator. The applied pressure equates to approximately 90% of this dead weight when the piston is fully extended, and decreases when the piston drives into the cylinder. It is provided by a piston accumulator connected behind the load safety valve. The screw propulsion, which moves the piston rod, is installed coaxially in the hydraulic cylinder. The mechanics consist of a planetary screw assembly. This technology enables heavy loads to be moved by an extremely compact design and with little noise. The drive's efficiency is much greater than that of a conventional screw jack drive, and is almost wear-free as a result of the low friction of the planetary rollers.

The drive has a number of advantages. The compact design is ideal for the existing building, given the restricted space; the maximum energy consumption is considerably below the set limit of 350A; the hydraulics and mechanics can take over the safety function independently of each other as a supporting construction element. Both technologies can also safely absorb the full load in the event of an incident, and if the other fails. Thanks to the hydraulic pretension, the mechanical drive technology has almost no radial play, which has a positive effect on rigidity, continuity of movement and positioning, even during changes in direction. With the use of an active logic load safety valve as the second safety device (in accordance with DIN 56950-1) dynamic forces can be greatly reduced in the event of an incident.

Development partners

The understage machinery was developed by Bosch Rexroth in collaboration with the Royal Opera House. The venue, supported by Swedish theater consultant NovoScen, provided a



Left: **The accumulator station in the venue's machine room**

Below: **Planetary screw assemblies are capable of moving high loads, yet are extremely compact and quiet**

mechanical construction design that was largely ready for production. During the course of the project, Bosch Rexroth completed the machinery with hydraulics and control technology. The drive characteristics were simulated beforehand as part of the cooperation.

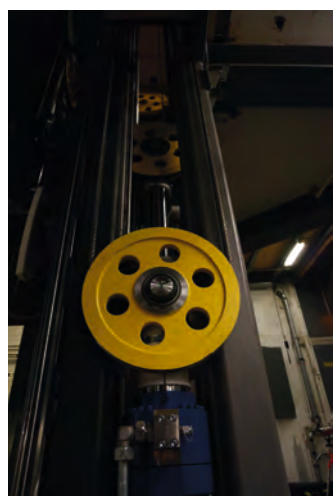
The control technology was designed to be state-of-the-art (in accordance with DIN EN 61508 SIL 3), covering 21 safety functions. It also provides a new generation of user interface. Just as smartphones and tablet PCs simplify the operation of complex technology all over the world, Bosch Rexroth is now transferring this convenience to stage technology. The multitouch screen of the new SCIV operator panel simplifies operation – operators can access menus using familiar gestures and can enter changes directly on the display. Operators can, for example, access important information on the entire understage and upper machinery, as well as scene changes that are already programmed. The operator panel, which features a high-quality aluminum housing, works noiselessly, as it does not have an active fan. Despite the 21.5-inch display, the panel is extremely compact and can be used anywhere. It can also be fitted with an integrated second display, enabling operators to carry out complex tasks in an even more clearly structured manner. Additional software functions in the SYB 3.0 stage control system increase the safety and availability of stage equipment.

Meeting deadlines

The installation was restricted to five months to limit interruption to the season. The Royal Opera House closed in May 2014 and Rexroth started by disassembling the building's stage elevators, while pre-assembly of the new elevator systems began at the manufacturer's plant. Once the stage pit was gutted, extensive structural work was required, although the depth of the stage pit remained unchanged. Pressure accumulators, frameworks for the hybrid actuators and the new elevators were brought into the building and assembled with high precision.

The opera season started on time in October. The drive characteristics of the hybrid actuators convinced everyone involved that the decision in favor of innovative drive technology was the right one, and the project was regarded as a complete success. The first use of a hybrid actuator drive in stage technology could be fundamental to the future of energy efficient and compact drive systems. ■

www.boschrexroth.com/stage



Above: **A hybrid actuator installed in its steel frame**


everyman
Twelfth Night
By William Shakespeare
08 Mar - 05 Apr
PLAY ON!

Photos: Philip Vile

Light the way

The redevelopment of a city's iconic theater called for energy-efficient lighting systems that use the latest technology advances without altering the venue's character

It is almost impossible to overstate the importance of the Everyman Theatre to the city of Liverpool, UK. To list the names of those whose careers are synonymous with it would be to compile a veritable who's who of artistic giants – its groundbreaking work has become deeply embedded in the UK's national psyche, and its place at the top table of British cultural history is assured. In the early 1960s, a group of artists, poets, writers and musicians who met at the then Hope Hall Cinema (itself a converted chapel), decided that the building would make a good theater and, in 1964, the Everyman was born. Closed in 1975 for rebuilding, it reopened in 1977 and there followed 34 years that shaped the careers of Willy Russell, Alan Bleasdale, Julie Walters, Bernard Hill and Pete Postlethwaite, to name but a handful. In 2011, the Everyman closed its doors again for a £28m (US$43.6m) redevelopment, funded for the most part by Arts Council England and The European Development Fund. Architect Haworth Tompkins was responsible for the design of the new Everyman. Shortly after its opening in March 2014, the project won a highly prized Royal Institute of British Architects (RIBA) award for North West Region Building of the Year, and subsequently won the national RIBA Stirling Prize – ahead of such notable projects as The Shard, in London, and The Library of Birmingham. By combining thermally massive construction with a series of natural ventilation systems and low-energy technical infrastructures, the building has achieved a BREEAM Excellent rating – BREEAM being the world's foremost environmental assessment method and rating system for buildings.

The 400-seater Everyman serves as a creative hub for the city. The theater boasts a dedicated youth and community space to house its extensive and growing work with schools and community groups, as well as rehearsal space and production workshops. The Stirling Prize judges noted that, in expertly rebuilding the Everyman and winning over a community that may (for good reason) have been resistant to change, it has become a destination space worthy of immense civic pride. Housed inside an award-winning, exciting, state-of-the-art building, the future of the Everyman looks set to match its rich heritage.

Assembled expertise

Central to the redevelopment of the theater was the appointment of leading acoustics and theater consultant Charcoalblue, a company whose reputation for exciting innovation perfectly complemented the vision of the architects and the wishes of the Everyman's own creative team. From the outset, the origins of the project pointed toward something exceptional, and the bar would remain high from start to finish. The low-energy technical infrastructures were key to the project's overall environmental picture, none more so than the provision for house lighting – and it was here that Global Design Solutions (GDS) entered the frame.

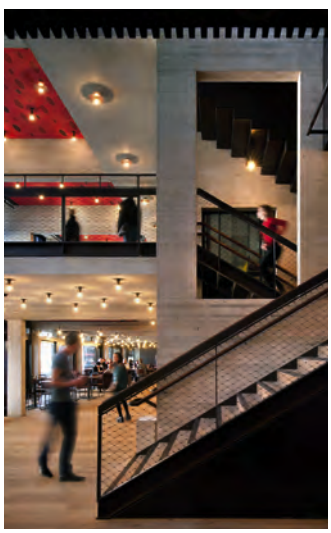
With an extensive portfolio of award-winning and industry leading products, GDS was a natural fit for the redevelopment. The brief of the

entire project demanded the most stringently efficient use of energy, something for which GDS's products are renowned worldwide. A back catalog of installations at similarly prestigious sites – such as Bristol Old Vic, the Savoy Theatre and Chichester Festival Theatre, to name but a few in the UK – served to emphasize the strength of the GDS brand and, significantly, each of the creative teams involved specified its use.

Maintaining warmth

The beating heart of the entire building is the auditorium, which is built from the recycled bricks of the original chapel. The audience sits closely packed around the faithfully recreated 132.8ft thrust stage.

When the decision was taken to use the original bricks, the partners considered how best to ensure the retention of the essential 'warmth' that had defined the Everyman to its community.



In addition to house lighting, GDS also provided emergency lighting throughout the theater

It was decided that the bricks would simply be cleaned up rather than painted, and that the lighting of them alone would create the desired effect. The theater's artistic director, Gemma Bodinetz, had a stated aim to achieve "warmth, earthiness and democratic humanity". The project partners, in the opinions of audiences, actors and RIBA judges, have achieved these aims and much more besides.

GDS's ArcSystem was utilized for the house lights and for the emergency lighting throughout the auditorium, and the lights are wirelessly controlled using GDS's ArcMesh protocol. These highly efficient LEDs produce outstanding light quality, while being fully dimmable from 100-0%. Surface- or recess-mounted, single or multi-cellular, and with optics offering a range of beam angles, they are convection-cooled and run silently. At the Everyman, in excess of 160 fittings were used, including Decor Fixture MR16 2700K

House lighting for the new Everyman's auditorium, which utilizes recycled bricks from the original chapel, is provided by GDS

50°, Pro Fixture two-cell 2700K 24° and 37°, and Pro Fixture four-cell square 2700K 37°. ArcSystem offers a typical energy saving of 70-90% and is maintenance free.

"When the initial house-lighting scheme for the new Everyman was designed, we had resigned ourselves to using tungsten fittings," explains Ian Stickland, senior consultant at Charcoalblue. "But as the Everyman Theatre is naturally ventilated and designed to achieve BREEAM Excellent, we were keen to explore a suitable LED alternative. With the development of the ArcSystem, we were able to offer a low-energy system that met the client's exacting standards for flexibility, dimming and color temperature. [GDS managing director] Matt Lloyd demonstrated the installation at Bristol Old Vic to the architect and artistic director. They were suitably convinced and so the entire house- and work-lighting scheme was changed for the Arc fittings.

Theatergoers responses to the new Everyman Theatre have been overwhelmingly positive

"The key to the success of the Everyman auditorium is its ability to maintain the warmth and charm of the old theater in a sustainable, flexible way, and the use of the GDS ArcSystem is an important factor in achieving this."

"As we celebrate our 11th anniversary, I think we're entitled to take a measure of pride and satisfaction from the progress we've made and this project pretty much epitomizes everything we work toward at GDS," says Lloyd. "Being involved in something that is so important to Liverpool as a community asset really stirs the passion to succeed. The people of Liverpool love the Everyman – it's not only an important symbol of the city's cultural history, but an exciting, vibrant, contemporary venue that maintains that culture in rude health. To know that GDS played a significant role in delivering an Everyman that has met with such a universally positive response is hugely gratifying. For us, the most important verdict is always delivered by the people who buy the tickets and watch the shows. The common theme among Liverpool's theatergoers is that the new Everyman is the same but better, and that is the highest recommendation possible."

That Everyman is a BREEAM Excellent-rated, famous theater that has won a RIBA award has naturally made headlines. For GDS, however, what speaks volumes is knowing that its products are recognized as 'go-to' systems across a huge range of venues. To date, there have been more than 170 ArcSystem installations worldwide, and as GDS continues to innovate, the number looks set to rise at an even greater rate.

GDS has established an international sales and distribution network in over 42 countries. With six market-leading brands and the ABTT 2014 Lighting Product of the Year award, GDS continues to innovate in the entertainment, architectural, television and corporate markets. With a portfolio that includes ArcSystem, BlueSystem backstage working lights, CueSystem cue lights, and stage managers' desks used around the world, the company continues to create innovative, flexible solutions that are used from New York's Broadway to the Liverpool Everyman, and from Esplanade in Singapore to the Savoy Theatre in London. ■

www.gds.uk.com

JOHN SERGIO FISHER

New discoveries

An expansion project for an established science exhibition center has enhanced the visitor experience, increased attendance levels and created a wealth of potential uses

On June 11, 2015, The Discovery Cube Orange County in Santa Ana, California, unveiled a 44,000ft^2 expansion, which contains the 10,000ft^2 Julianne Argyros Showcase Theater and Exhibition Hall, plus other science exhibit spaces.

Discovery Cube Orange County, presented by Taco Bell, offers hands-on permanent exhibits, themes, science adventures, interactive programs and shows (such as Bubblefest), and engineering and math (STEM) learning spaces, with a focus that ranges from micro-ecosystems on Earth to exploration of the universe.

Discovery Cube Orange County's theater has been transformed with telescopic seating, making the venue an ever-changing destination for education and entertainment. The first exhibit is The International Exhibition of Sherlock Holmes, a mystery production that is geared toward young sleuths-in-training.

"This expansion represents Discovery Cube Orange County's evolving commitment to expanding STEM proficiency by keeping up with the trends, events and news that are capturing the attention of kids – and creating an entertaining way to approach education through a day of family bonding," says Joe Adams, president of Discovery Cube Orange County.

The new exhibits help guests understand the roles they play in environmental stewardship and the importance of developing habits for health and wellness.

The new exhibit spaces surrounding the theater include: Mission Control; Helicopter Tour; Inspector Training Course; Petersonville Healthy Kitchen; Water Gallery; and Eat Well. Play Well. Sleep Well. In addition to these exhibits, the building contains enhanced guest service areas for families and teachers.

History lessons

Discovery Cube dates back to 1978, with The Experience Center on the campus of Culver Dale Elementary School in Irvine, California. Through the efforts of Janet and Walkie Ray, Betty Hutton, Karen Johnson and several new community leaders, it developed into a science center, located in the Crystal Court at South Coast Plaza in Newport Beach.

Its popularity caused it to outgrow its initial facility. In 1998, Taco Bell Discovery Science Center, under the leadership of Walkie Ray and Karen Johnson, renovated a warehouse with the iconic 10-story cube. Designed by Arquitectonica, the cube is tilted to face south and is covered by photovoltaic cells.

In 2003, the Science Center took a dramatic leap forward by hiring Joe Adams from the Walt Disney Company to run the center. Currently serving as president, Adams is responsible for the center's growth and expansion to another science center: Discovery Cube Los Angeles.

Bubblefest, which premiered at the science center, was the main reason for the 500-seat theater. The theater has 460 telescoping upholstered center seats, a permanent balcony, and a side gallery containing another 40 seats. The theatrical lighting, sound and projection systems are all supported by, or positioned on,

Expansion and renovation of The Discovery Cube Orange County has made the center an even more recognizable part of the landscape along California's major freeway

Photos: Ciro Cielho

Clockwise from top: **A staging of Bubblefest in the center's new theater; the venue's tension grid; the theater with seating in place; the center's theater with seating retracted, showing The International Exhibition of Sherlock Holmes**

a checkerboard-patterned tension grid, which is located in the audience chamber, and partially over the playing area. A small triangular stepping platform allows diagonal circulation from one tension grid module to another. A catwalk surrounds the playing area at the same level as the side gallery seating.

In addition to Bubblefest, the theater and the stage will be used for scientific demonstrations, 2D and 3D film presentations, lectures and future science-related entertainment shows. The telescoping seating does not have to be deployed to its maximum extent, and can be partially deployed to seven rows, yielding 221 seats, and still meeting exiting requirements. The stage is portable, so retracting the seating and removing the stage creates an exhibit hall of 8,600ft^2, suitable for mounting large exhibits.

The black box theater on the second floor has an exposed ceiling that slopes at 5° to prevent any vertical overlapping sound waves. The interior high point is 40ft above the floor. On the exterior, it is 74ft above grade. Sound absorption panels at the sides, and fabric-covered sound absorption panels at the rear balcony seating provide the correct reverberation time for the myriad of uses that will take place in the theater/exhibition hall.

Exterior improvements

Part of the project also included renovating the existing building and transforming the exterior finish from its original desert color scheme to more vivid and playful colors. The addition uses the same exterior insulation finishing system (EFIS) as the original building, and features a grand staircase to the black box theater, which is yellow on the exterior. The building has become a feature of the I5, California's major north/south freeway, complementing the iconic black cube. Mike McGee, VP for finance, remarked that the last time he flew into John Wayne Airport, instead of finding his eyes were drawn to Disneyland's Matterhorn, his attention was now attracted to the new yellow building.

The construction is a steel-braced frame with metal studs, gypsum wall boards and EFIS. The floors are primarily polished concrete and vinyl. The construction cost of the project is US$13.5m. John Sergio Fisher & Associates of Los Angeles and San Francisco is the architect, theater consultant and acoustical consultant. Driver SPG in Anaheim, California, is the general contractor. Griffin Structures is the construction manager.

Discovery Cube Orange County's goal is to inspire and educate young minds through engineering and science-based programs and exhibits, and to create a meaningful impact on the communities it serves. The addition of the black box theater has helped achieve that goal – attendance has increased, and the addition has been acclaimed by all. ■

www.jsfarchs.com

All photographs by Ciro Cielho, except Sherlock Holmes exhibit

CONSULTING
AUERBACH POLLOCK FRIEDLANDER

Breaking new ground

A new visitor and education facility enhances the outreach of an established research center, offering state-of-the-art capabilities while maintaining its tranquil atmosphere

The 388-seater Rothenberg Hall, outfitted with reflective panels

Where in the world can you find a Gutenberg Bible, Audubon's *The Birds of America* and Gainsborough's Blue Boy, set among fine art museums and a library, and surrounded by more than 120 acres of botanical wonders, including a bamboo forest with Chinese and Japanese tea gardens?

The place in question is the Huntington Library, Art Collections and Botanical Gardens – a 'collections-based research and educational center' established by Henry and Arabella Huntington in 1919. Located in the town of San Marino, south of Pasadena, this retreat serves as a welcome escape from the bustle of Los Angeles.

Development of the estate, over 100 years, has witnessed the addition of new art galleries, a botanical education center and a stunning system of pathways through rare species of plant life. While the venue's mission has never faltered, it is recognized for its family-friendly atmosphere and stunning grounds tucked into the base of the San Gabriel Mountains.

With so much to offer, and with new audiences yet to be introduced to the wonders of the Huntington Library, Art Collections and Botanical Gardens, the time had come for a leap forward. The vision was for improved outreach to all, especially families and scholars – a vibrant visitor center that would welcome patrons – more than 600,000 per year – into the wonders and tranquillity of the surrounding spaces.

Creating harmony

The new Steven S Koblik Education and Visitor Center provides about 100,000ft^2 of space for visitor arrival amenities, an auditorium, a multipurpose room, an educational complex, dining areas, support spaces, and an expanded subterranean archival storage area. The team saw the potential for a comfortable entry that harmonized with the historic Beaux-Arts architecture and offered appropriate spaces for The Huntington's rich education and research programs, and enhanced visitor amenities.

"This is incredibly important for us because it's a new front door," explains Laurie Sowd,

the Huntington Library, Art Collections and Botanical Gardens' vice president for operations. "We want you to feel like you are arriving at someone's home."

Architectural Resources Group led the design team for the new Steven S Koblik Education and Visitor Center. Also on the design team was landscape architect Office of Cheryl Barton; theater and audio-video consultant Auerbach Pollock Friedlander; and acoustical consultant Charles M Salter Associates.

The new center is a modern mini-campus for meetings, conferences, media presentations, lectures and the performing arts. Auerbach Pollock Friedlander and Charles M Salter Associates were charged with designing advanced systems and technologies for the assembly spaces that wouldn't detract from the architecture or the peacefulness of the surroundings.

New facilities

Rothenberg Hall, an intimate 388-seat venue with superior live sound, can be used for chamber groups, solo performances and lectures. While no amplification is needed for spoken word, appropriate control to modify the room for amplified events or audience Q&As is accommodated easily.

Inside Rothenberg Hall', a white oak veneer-surround wraps the audience in a basket-weave environment of panels. Sound attenuation is provided through several configurations. Sidewall panels in the stage surround are designed to pivot to offer either a diffusive/reflective side or an absorptive fiberglass side with acoustic fabric covering. These panels may be oriented to show all wood or all fabric. For staged readings or plays, the sidewall panels can be oriented parallel with the stage front, with the acoustic fabric surface facing the audience. A full-stage, bi-parting acoustical drape is available to conceal the faceted rear orchestra surround wall or simply to reduce the sound volume of loud or percussive instrumentation. The ceiling of the stage surround conceals a motorized front projection screen illuminated by a digital video projector, which is located behind glass in the booth at the rear of the hall. Infrastructure is also

Above: **The Steven S Koblik Education and Visitor Center**

Below: **The Haaga Hall multipurpose room**

Bottom: **Rothenberg Hall with absorptive materials in place**

provided to support rear projection for dance and similar events.

"We have had wonderful feedback from the Huntington's staff, audience members and musicians about the space," explains Steve Pollock, principal in charge for Auerbach Pollock Friedlander. "Because of the size of the theater, visitors feel very connected to the performers on stage. It is an intimate venue, made more so by the flexibility allowed by adjusting the sidewall panels for clarity from every position – no matter what type of performance."

The unique and versatile Rothenberg Hall fills a need for quality smaller venues in the LA area.

Addressing multiple needs

Haaga Hall is a 5,000ft^2 multipurpose room that can be configured as one large or two smaller spaces for meetings, dining, botanical shows, lectures and donor appreciation events – all with sound reinforcement, conference systems and projection support.

The Stewart R Smith Board Room, which features a mural from 1934 by regional artist Millard Sheets, provides a meeting space for the Huntington's volunteer leadership and other groups. Audio and video conference capabilities and collaboration support tools are integrated into the room's architecture. Auerbach Pollock Friedlander incorporated a projection system, as well as formal conferencing functions that include a microphone and loudspeaker for every two participants.

The new Steven S Koblik Education and Visitor Center also offers a substantially larger Huntington Store, specialty coffee shop, full-service admissions and membership area, and an orientation gallery – all of which are arranged amid new, beautifully landscaped, drought-tolerant gardens. In true California fashion, all of the visitor center's interior spaces open onto outdoor venues, including the rotunda of the Rose Hills Foundation Garden Court, with its open architecture and dome.

Adjacent to the Rose Hills Foundation Garden Court is the new June and Merle Banta Education Center, which features four classrooms and a central court, and supports a range of docent and school group teaching activities, from art to biological studies. Each room is equipped with electronic teaching and collaboration tools, such as large-screen video displays and infrastructure designed by Auerbach Pollock Friedlander for future distance learning.

Like the Huntington itself, the new Steven S Koblik Education and Visitor Center fulfills a variety of different purposes and offers something for everyone. ■

www.auerbachconsultants.com

Carnegie Hall's Resnick Education Wing, Weill Music Room
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DESIGN
SCHULER SHOOK
HGA

Working in concert

The design of a new performance hall needed to add capacity while retaining the original character, balancing technology and sympathetic styling

Photos: Paul Crosby Photography

Since the 1985 opening of the iconic Ordway Center for the Performing Arts, audiences have flocked to its offerings – including theater, dance, music and family events – fulfilling the dream of the late Saint Paul, Minnesota benefactor Sally Ordway Irvine, to provide a place "for lots of music. No – lots of everything, and for everybody!".

Situated along the perimeter of downtown Saint Paul's historic Rice Park, the Ordway, with its Beaux Arts glass and copper exterior, serves as a luminous magnet for patrons and visitors to the city. Its original 1,900-seat Music Theater and 300-seat McKnight Theatre became home to four treasured Minnesota arts organizations: The Ordway, The Schubert Club, The Minnesota Opera, and The Saint Paul Chamber Orchestra.

Ordway architect Ben Thompson's original vision included a 1,000-seat concert hall with a lobby enclosed in a glass curtain wall that extended around the corner of the building. Due to a lack of funds, the 300-seat McKnight Theatre, which has no exterior presence, was built instead. This venue was suited for small productions, but was insufficient for much of the four primary tenants' programming. Over time, scheduling became an increasingly contentious and untenable situation.

In 2005, concerned community leaders gathered the four organizations to solve the problem. The resulting Arts Partnership, a joint governing organization, successfully solved immediate challenges and helped leverage funding for an expansion.

In 2007, the Arts Partnership reached out to designer Tim Carl of HGA Architects & Engineers to create an initial design. The goal was to create a 1,100-seat concert hall to replace the under-utilized McKnight Theatre, and retain what the community loved about the building – in particular its stunning, reflective façade. Carl returned two weeks later with a design sketch that, unbeknown to him, eerily echoed Ben Thompson's original design and resonated with the Arts Partnership.

In addition to the concert hall, HGA designed a three-story support space adjacent to the existing building. The project would add a total of 57,000ft^2, with renovations to an additional 18,000ft^2, at a total project cost of US$39m.

Heading up

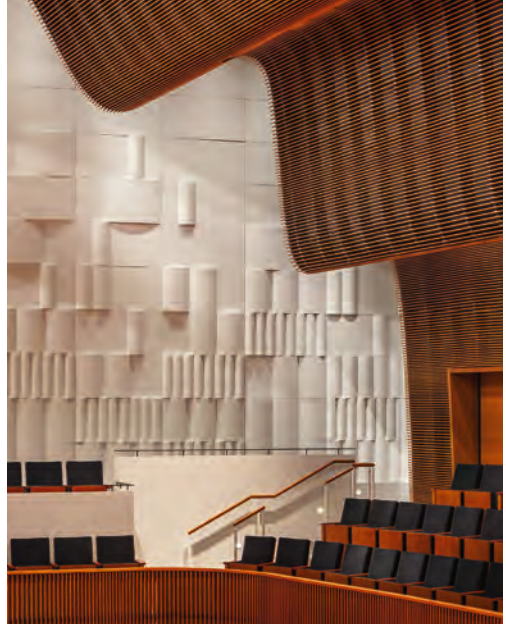
To replace a 300-seat black box with a 1,100-seat concert hall, with virtually no room to expand the footprint, the only way to go is up.

"The building could only expand 10ft to the north and 20ft to the east, so we raised the roof of the concert hall 30ft and expanded the lobby with a glass cantilevered space that hovers above the sidewalk on the corner of the building," says HGA's Carl.

The design team – featuring architects and engineers from HGA, theater planners and lighting designers from Schuler Shook, and acousticians from Akustiks – had to work hand in hand, as seemingly every inch of expansion was debated. Their flexibility was absolutely crucial to collectively producing the perfect blend of technical acuity and aesthetics.

Project designer Michael Burgoyne of Schuler Shook says, "Inches not absolutely required for the building envelope were given to seating and circulation. Chair widths, row spacing and aisle circulation were carefully considered, but always with the goal of maximizing capacity. There was no room for deviation."

"Not only did it have to fit," says Carl, "but it had to be beautiful, inspiring, comfortable, and



sound perfect. The final design was completely unique because of our partners' willingness to balance it all."

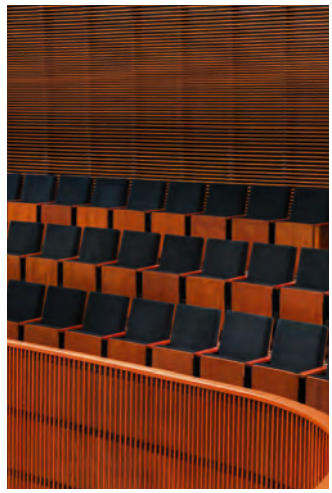
Creating connections

The new concert hall delivers an acoustically magnificent experience for both audiences and performers alike, with a sound that exudes the warmth, resonance and clarity required for chamber, recital and small ensemble music. Likewise, the interior's intimate setting fosters an engaged connection between artist and audience. With three levels of seating, no seat is more than 90ft from the stage. A choral loft hovers at the back of the stage, seating up to 117 choir or audience members.

The spectacular sweeping ceiling, made of over 14.7 linear miles of oak dowels, visually envelops the stage and the audience, and ensures acoustic qualities specifically designed for the sounds of natural instruments. Hidden behind the structure are catwalks that support theatrical infrastructure and acoustic curtains that can be drawn to enhance percussive or amplified programming as needed. Within the walls, a technological infrastructure makes the hall multimedia-ready, able to accept current and future technology.

According to Schuler Shook principal designer Michael DiBlasi, a full-scale mock-up of the ceiling system created at the fabricator's shop "was extraordinary. It allowed us to evaluate the construction of the system behind it, the integration of theatrical and architectural lighting, and to ensure superior aesthetic and acoustic functions."

The hall's white walls are sculpted with abstract shapes made from more than 1,100 glass fiber-reinforced gypsum acoustic panels. "They're designed like abstract fluted columns," explains Carl, "and their placement, although it may look random, is actually completely driven by acoustics." Each panel – there are 10 different designs – was specifically created in close consultation with Paul Scarbrough of Akustiks.

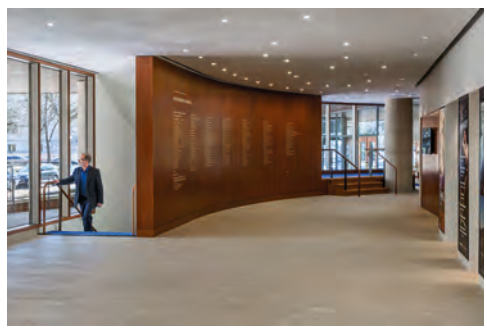


Top left: **The 1,110-seat concert hall replaces the previous, 300-seat black box theater**

Top right: **The walls feature more than 1,100 glass fiber reinforced gypsum panels**

Above: **The seating design, and its impact on acoustics, was also carefully considered**

Below: **The building's lobby extension connects with the venue's original entrance**



Seamless transition

The extension of the lobby seamlessly connects with the original entrance. Custom-colored brick and chemically- aged copper match the aged patina of the existing exterior and the curtain wall's rhythm of undulating windows now wraps around the corner of the building, giving the Ordway a dramatic new presence on the corner of a main thoroughfare with incredible views of the city.

HGA and Schuler Shook worked closely to ensure a sympathetic aesthetic between the new and existing lobby interiors, but imprinted the new spaces with more contemporary elements. As Schuler Shook's DiBlasi notes, "The original fluted glass chandeliers, sconces and brass fixtures are beautiful, but to modernize, we shifted to wall washing and random down-lights, making it as simple and clean as possible without shunning the existing design."

Audiences enthusiastically cite the hall's vibrant sound and intimacy. Musicians refer to the hall as if it were another instrument, with its tremendous expressive possibilities and dynamism. *The New York Times* described it as "acoustically ideal". The Arts Partnership and its supporters are both ecstatic and energized by future programming possibilities, which will truly fulfill Sally Ordway Irvine's vision of a place that creates "lots of everything, and for everybody!". ■

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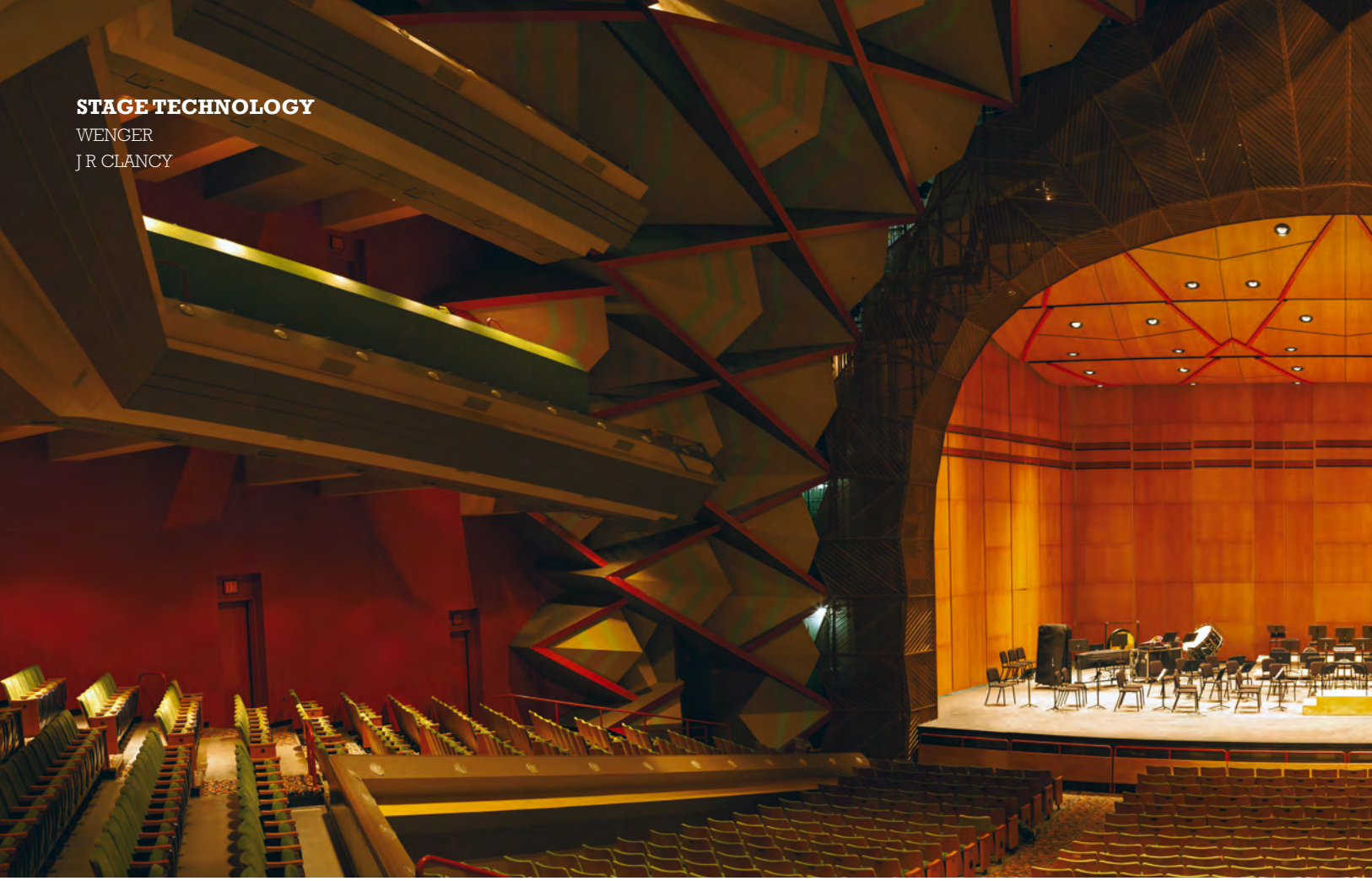


Aural aurora

A collaborative design approach ensured that, both acoustically and visually, a new orchestra shell for an Alaska concert hall has made a dramatic impact

Inside the Atwood Concert Hall, located at the Alaska Center for the Performing Arts (ACPA) in Anchorage, Alaska, audiences have marveled at the hall's interior – which draws inspiration from the aurora borealis – since it opened in 1988.

When the ACPA took the decision to install a new acoustical shell in the Atwood, collaboration among the project team resulted in a stunning aesthetic complement that improved acoustics for musicians and audiences while offering easy use and expanding the venue's flexibility.

Enhanced acoustics

The Atwood originally featured a white acoustical shell that was designed for a smaller ACPA venue. Its size meant that large concerts were always challenging, according to production manager Fred Sager. His staff enlarged the shell with fillers for the ceilings and walls, but gaps remained.

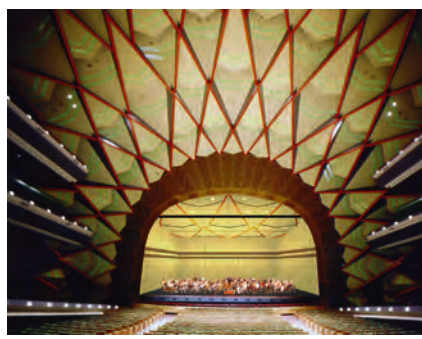
"We had two primary goals with the new shell," he recalls. "First was improving sound; second was unifying the look of the shell and hall. Wenger was our choice based on its past history, track record of satisfied customers, and consultant recommendation."

The previous shell's size and lightweight construction meant that music performances in the 2,000-seat auditorium had been under-supported for years according to Scott Pfeiffer, partner at Threshold Acoustics. "It takes a lot of sound energy to excite a room that size," he notes, adding that the native acoustics worked well fundamentally. "We just needed to tie the room more closely to the shell."

Threshold reviewed Atwood's performance schedule, from comedians to symphonies, and sized the new Diva shell from Wenger to suit 90% of typical events, while ensuring bigger events could be accommodated.

Above: **The acoustical shell in the Atwood Concert Hall was sized to suit 90% of typical productions, but is also suited for larger events. Photo: Pacific Rim Media/Avé Photo**

Below: **The shell deliberately forges a visual link with the rest of the concert hall, thanks to the aurora borealis-inspired design chosen by operators**



"Given the Atwood's large proscenium opening – 65ft wide – we used as much stage volume as possible," explains Pfeiffer, who says the shell is unusual for its size – towers are 30ft or 33ft high – and the cubic volume it encloses.

The architect's design for the brand new shell recalled the depth and shape of the house ceiling; Threshold Acoustics' adjustments optimized the acoustical response for onstage communication and sound projection.

"Our new shell is much more reflective," Sager notes. "It's made a really big difference. Audience members enjoy concerts more because they can hear better. Musicians are much happier because they can hear themselves and each other." The acoustical unity of the stage and house is also reinforced visually.

Inspiration from above

"Early on, we developed several design concepts to join the shell and house," says Scott Bohne, AIA, principal with RIM Architects. The ideas included angular folds (which proved to be too expensive), music staff lines and an aurora-inspired design. The latter was embraced by ACPA personnel.

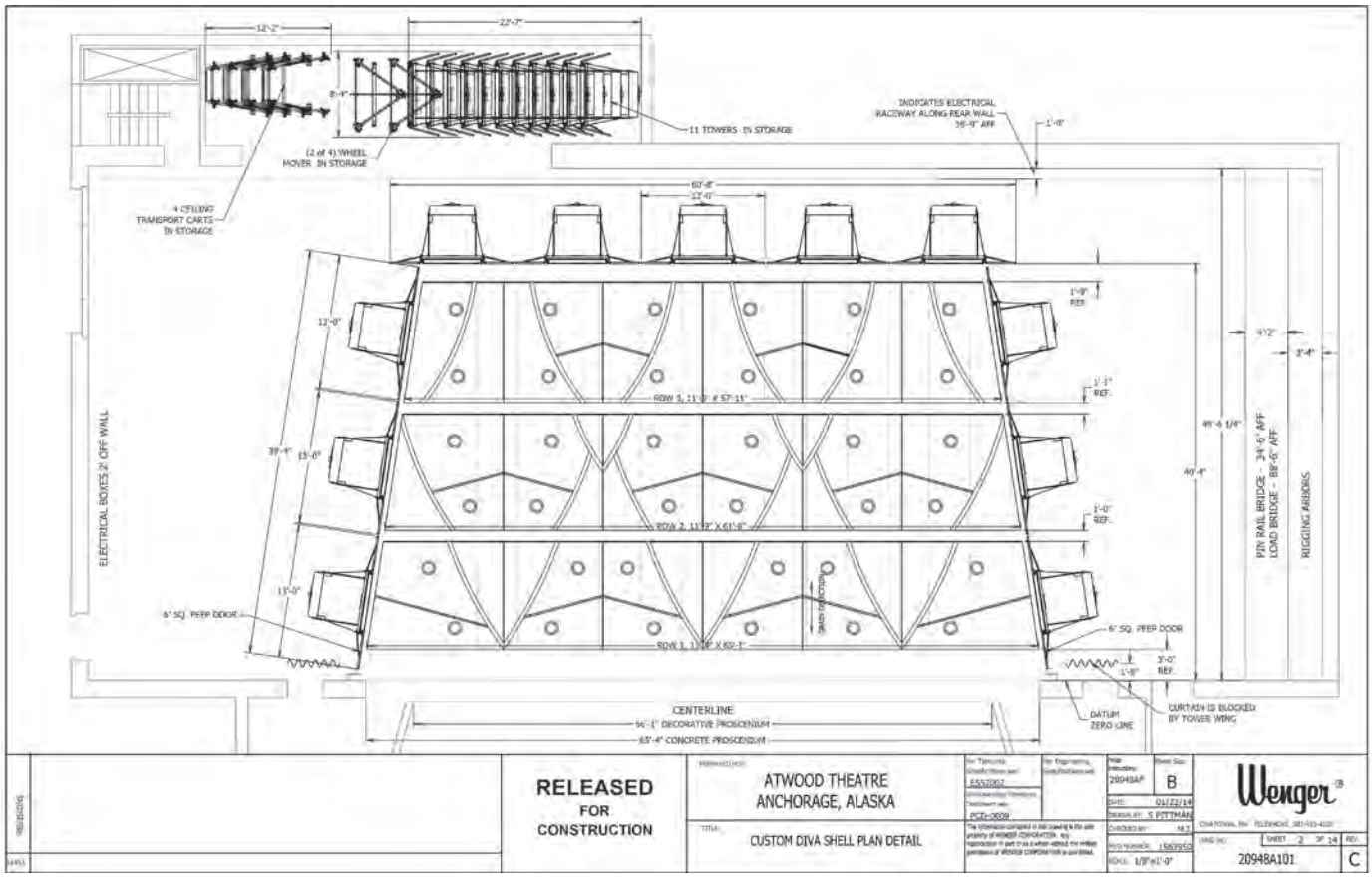
To echo the house ceiling, the shell's ceiling features ornamental, three-dimensional ribs that demanded fabrication skill by Wenger. Making the ribs appear to follow a consistent line along the curved shell ceiling required bending them in two dimensions.

After exploring a number of options, Wenger engineers found a creative solution to curve the ribs. Planks of PVC plastic decking were attached together to achieve the desired width, cut to size and heated in industrial ovens. Once pliable, ribs were molded against a curved dummy panel – when cooled, they held the proper shape and were later attached to the ceilings on-site.

"Wenger did a brilliant job figuring out the ribs and their compound curves," comments Millie Dixon, principal with Theatre Projects.

Using Sketch-up and FormZ software, RIM Architects rendered the ribs in several different colors before orange was selected. Ceiling panels also feature narrow strips painted gray, subtly reinforcing the aurora pattern.

To assist the selection of veneer color, Wenger provided unfinished samples that were stained by a local vendor. "We reviewed samples under stage lights for the warmth and life we wanted," Bohne states. Darker stain was used to provide each tower's distinctive horizontal bands. "The entire project was a terrific, collaborative effort," he says. "Along with our design principles, we



Above: **Technical drawings for the customized Diva shell**

Below: **The custom J R Clancy drum hoist was installed backstage to support the Atwood's new acoustical shell**

leveraged the expertise of Threshold Acoustics and Theatre Projects."

As with any shell project, ease of use and flexibility were important goals, facilitated by innovative rigging and storage solutions.

Rigging right

Although the new shell's towers are taller and heavier than the previous shell, Sager says that maneuvering is faster and easier. A six-person crew can set up or strike the shell in a standard three-hour union call, a process which is made simpler by built-in ceiling lights. While the full configuration consists of 11 towers and three ceilings, smaller setups are possible to suit ensemble size.

The ceilings are operated by variable-speed counterweight-assist custom drum hoist line sets from J R Clancy, with a SceneControl 5100 pendant controller that ensures accurate and repeatable positioning with touchscreen simplicity for up to eight presets. Hoist speed is kept low with ceilings on the battens; higher speeds are possible for general-purpose sets when the ceilings are removed.

To clear all line sets, such as for large-scale Broadway shows, Theatre Projects specified the ability to remove the three shell ceilings, roll them upstage on carts custom-built by Wenger, and fly them for storage while piggybacked together using a high-capacity custom line shaft hoist by J R Clancy; the combined weight is in excess of six tons.

"Getting the shell out of the way when you need to is always a challenge, especially when space is limited," comments Dixon.

Sager says the process works smoothly. "Storing the ceilings is very quick and easy – each takes 20 minutes," he comments. "When you consider the size and the weight of the ceilings, that simplicity is pretty amazing."

To streamline major projects such as the Atwood shell and rigging, Dixon believes the combination of Wenger and J R Clancy offers advantages. "They're a one-stop shop for orchestra shells and rigging, from start to finish. This new shell was a triumph all the way around."

Sager compliments the customer support the ACPA received from Wenger and J R Clancy. "Both companies were professional and very pleasant to work with. We are wowed by the shell – we're extremely happy with it." ■

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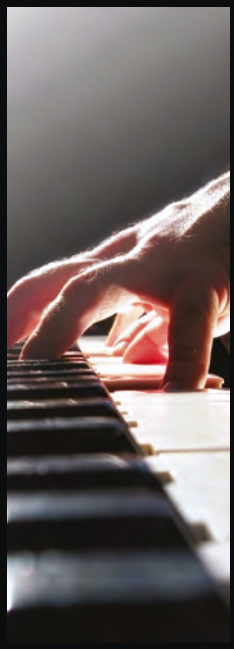

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Race against time

Technical expertise, local project management and industry experience are vital to complex machinery refurbishments

Over the years, Waagner-Biro has developed significant expertise in completing projects with seemingly impossible deadlines and a high degree of complexity – particularly refurbishment schemes where part of the project involves the disassembly of existing equipment, or the integration of remaining equipment into a new control system. Such projects must also be completed within a short timespan to avoid closing venues for extended periods, and thus demand the technical expertise, management know-how and workforce of a company such as Waagner-Biro. Increasingly, the company is faced with projects that call for just months from the signing of a contract to handover. During the summer of 2015, Waagner-Biro has undertaken the challenge of exchanging the complete upper machinery of Basel's city theater for more than 80 hoists. The project was scheduled to take place between July 6 and September 9, 2015. The contract was awarded to Waagner-Biro just a few months earlier, in mid-April, 2015.

During the summer of 2014, Waagner-Biro realized two fast-track refurbishments in parallel – one was the Esplanade Theater in Singapore, the other was the Grieg Hall in Bergen, Norway.

Improving control

The Esplanade Theater in Singapore, completed in 2002, is one of the busiest event venues in Asia. Featuring impressive architecture, which resembles the shape of two durian fruits, the Esplanade has quickly become one of Singapore's landmarks. An area of more than 1.18 million square feet offers diverse opportunities for artistic activities, including a 2,000-seat theater, a 1,600-seat concert hall, and various open-air stages. After an extended planning period, the renovation specifications were tendered in 2013, and involved complete renovation of the entire automated fly system and upper machinery. The aim of the renovation was to meet the ever-rising standards of modern stage scenery design, and to achieve a high degree of system availability and user friendliness. As a consequence, the control system became the focus of an extended evaluation, during which Waagner-Biro prevailed over its competitors.

One of the greatest challenges was to complete the job within such a limited timeframe, given the extent of the renovation works – between May 2, 2014 and October 3, 2014. Waagner-Biro managed to convince the client of its technical and organizational competence, and was commissioned to start the renovations in May 2014. The tender and the analysis of bids from four pre-qualified suppliers were managed by theater planners from the Arup Group. The short timespan for on-site works represented a significant challenge, as did the renovation itself, starting with the disassembly of heavy and bulky scenery hoists. Undertaking a replacement in an existing building is a very delicate process, requiring perfect coordination, so an experienced employee was appointed to the role of local project manager. His task was to guarantee smooth project delivery and on-time completion, and to coordinate the disassembly and installation works with a local stage engineering company. All works were carried out in accordance with Singapore industry standards

Main image: **The Esplanade Theater required renovation of the entire automated fly system and upper machinery**

Inset: **Singapore's Esplanade Theater has become one of the busiest event venues in Asia. Photo: Mori Hidetaka**

and local regulations – not only with regard to the stage machinery, but also with respect to imports, work permits for assembly technicians, and so on. In total, Waagner-Biro supplied and installed more than 100 hoists and a CAT V4 control system. Additionally, existing equipment was integrated into the control system.

Drive to succeed

Bergen's Grieg Hall was built in the mid-1970s, and is one of Norway's most prominent cultural buildings. In the past two years, the building has been undergoing an extensive refurbishment. The tender for renewing the stage machinery included the refurbishment of the entire upper-stage machinery and the stage control system with over 50 drives, as well as the grid, portal area and proscenium of the venue, and the installation of four new stage platforms in the Peer Gynt Hall. Once again, the primary aim of the refurbishment was to provide a system that meets the increasing technical requirements of modern stage set design, and that offers high levels of availability and user-friendliness. The decision-making process during the tender therefore focused particularly on the quality of the upper stage machinery drives and the control system. Again, a major project challenge was the timeframe of the refurbishment, which had to be carried out between June 23, 2014 and September 30, 2014. Waagner-Biro was awarded the contract for the refurbishment in March 2014. Aside from the short period during which access to the site was available, the refurbishment also required extensive dismantling, often in extremely limited space and requiring close coordination with a number of other companies working on site.

Above left: **The four new stage platforms installed in the Peer Gynt Hall. Photo: Eilif Stene**

Above right: **The renovated winch system in the Esplanade**

Below: **Grieg Hall is among the most prominent venues in Norway. Photo: Eilif Stene**

Opposite: **Grieg Hall's CAT V4 control system enables fast programming of very complex shows. Photo: Eilif Stene**

As in the Singapore example, an experienced member of staff was installed as a local project manager, in order to guarantee the smooth execution of the project and to ensure that the strict completion deadline was met. This project manager coordinated directly with the customer throughout the brief planning and design phase, and subsequently coordinated the dismantling and installation works. This positive, constructive cooperation with the customer, in addition to the professional project management, was absolutely fundamental to the successful implementation of the project.

Both clients are extremely happy with the new equipment. It was not only handed over on time, but the new systems are more user-friendly and flexible, are designed for higher loads, and are easier to service and maintain. The CAT V4 controls not only support fast programming of complex shows, but also provide many options for remote service and review.

"It has been really great working with Waagner-Biro on this project," comments Colman Rupp, the technical director at the Esplanade Theater, on the renovation. "Overall, it has gone as well as any renovation project possibly could. We thank them for the care and precision they brought to this project." ■

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Brief encounter

The acoustic requirements for the new Philharmonie de Paris were carefully specified to ensure the venue's exceptional acoustic quality, yet leave the freedom for innovation

The inaugural concert at the new Philharmonie de Paris hall, which opened its doors on January 14, 2015, featured the Orchestre de Paris, and was attended by both the President of France and the Mayor of Paris. While there are still some ongoing debates as to whether the hall opened too early (before the completion of all works), and surrounding the construction cost (which officially currently stands at US$436m), the praise is unanimous for the acoustic quality of this highly innovative concert hall.

Kahle Acoustics from Brussels, working in collaboration with Paris-based company Altia Acoustique, joined the project as the client-side acousticians, beginning work prior to the architectural competition and continuing on the project during all the planning and construction phases, right the way up to the opening. The first (and possibly most important) part of Kahle's appointment was to write the acoustic brief for the concert hall. There were some assumptions by some parties that the client acoustician would be fixing the basic design shape of the concert hall by limiting the design possibilities to well-established shapes, such as shoebox or vineyard. To the team at Kahle, however, it was clear from the onset that this was neither possible nor a good starting point. The client brief asked for a "high-quality acoustic concert hall, comparable in acoustic quality to the best recent realizations" and "an innovative architectural concept", therefore the brief had to ensure acoustic quality while defining the framework within which the project's architectural creativity could be fully developed – an acoustician cannot design an innovative architectural concept without an architect around the table.

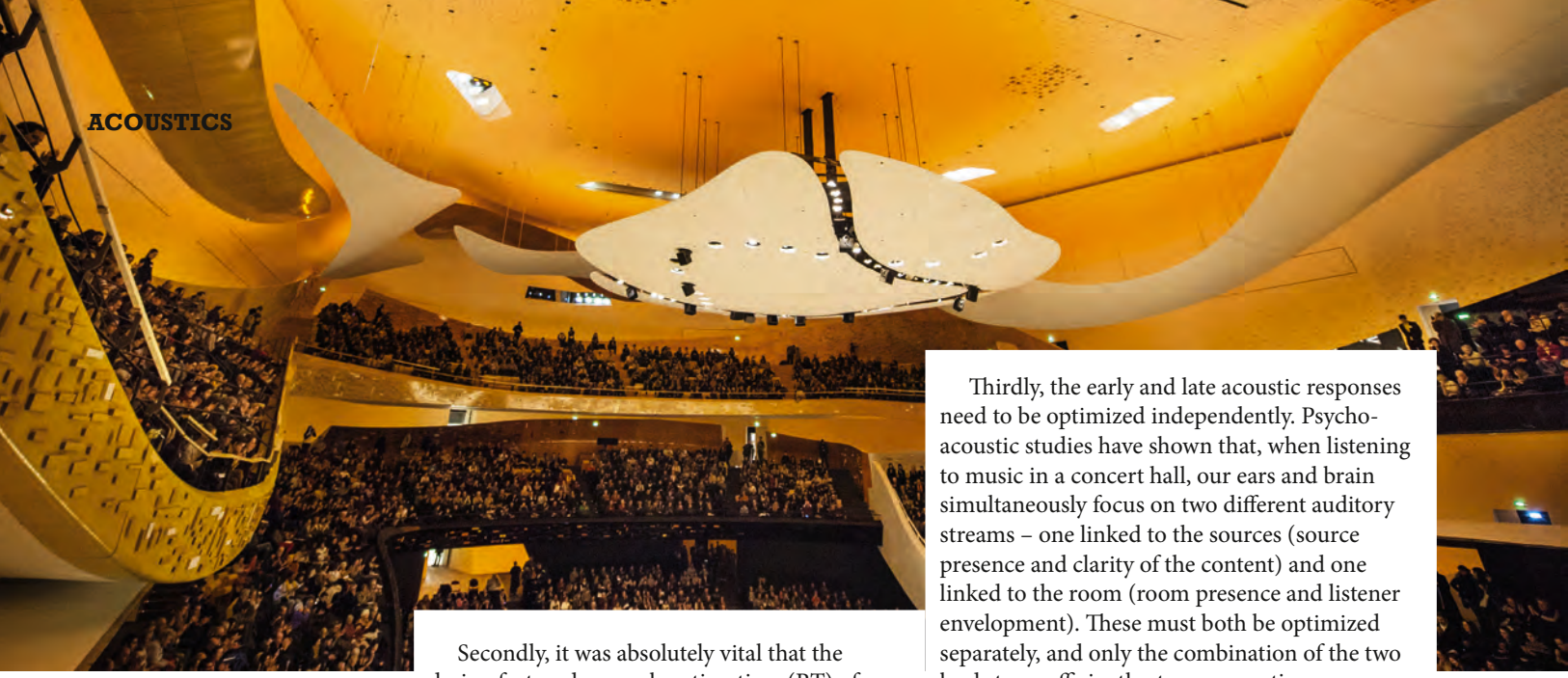
The architectural competition was won by lead architect Ateliers Jean Nouvel, which teamed up with Brigitte Métra Associés for the design of the concert hall. Marshall Day Acoustics (Harold Marshall and collaborators) was the design team acoustician, with Yasuhisa Toyota (Nagata Acoustics) taking the role of special advisor to Jean Nouvel. Studio DAP (Federico Cruz Barney) from Paris also joined the team, and was responsible for all rooms other than the concert hall (including the seven large-scale rehearsal rooms and the pôle éducatif reserved for musical training and education) and for building acoustics. Later, Jean-Paul Lamoureux and ASC worked on the project as acousticians for the contractors. Ducks Scéno of Lyon, a regular collaborator with Jean Nouvel on performing arts projects, was responsible for theater planning and theater equipment.

Challenges and innovations

The client brief called for a 2,400-seat concert hall; a new typology providing a central stage for classical music concerts and a frontal stage for amplified concerts and events; high-quality acoustics; and innovative architecture. And, of course, ideal acoustic conditions for the musicians on stage.

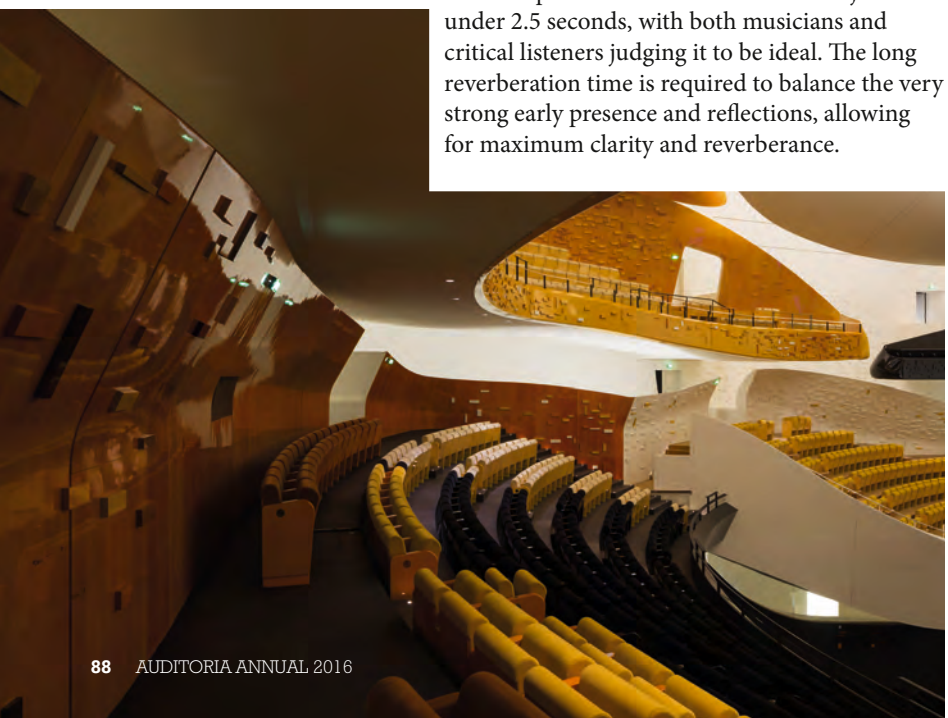
Detailed studies of reference projects and research into different room typologies – and their connection with objective acoustic criteria and subjective acoustical qualities – led to a number of the main recommendations and elements in the acoustic brief.

Firstly, avoid a shoebox hall design. For a seat count significantly above 2,000, and with contemporary seat spacing and aisle widths, shoebox halls will either be too long or too wide to ensure intimacy and good acoustics. While there are indeed issues with seats behind the orchestra, placing the stage toward the middle of the hall enables a significant reduction of the average distance from the musicians to the listeners. Furthermore, it was suggested that the hall – contrary to the Berlin Philharmonie and most other vineyard halls – should have balconies, further reducing the distances and increasing the feeling of intimacy. In the final hall, no seat is more than 32m (105ft) away from the stage edge. At the same time, maintaining some beneficial acoustic elements of the shoebox design (including reflection coverage from balcony soffits and lateral reflections) was recommended.



The acoustic brief set out during the development of the Philharmonie de Paris was key to the positive reaction to the venue's sound quality

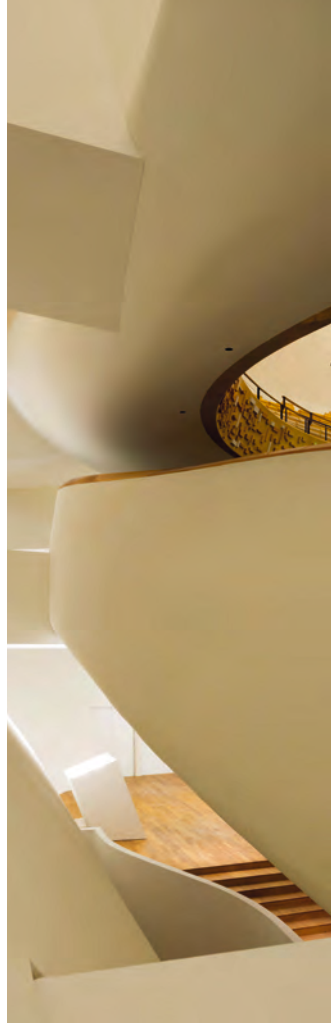
Secondly, it was absolutely vital that the design featured a reverberation time (RT) of more than 2.0 seconds. Even though an RT of 2.0 seconds is often quoted as being ideal for symphony concerts, more detailed research demonstrates that this is no longer true for a contemporary concert hall with a seat count of more than 2,000. For optimal presence and source definition, a significant amount of early reflections has to be designed and created. To balance this strong early response, a longer reverberation time is required to optimize both early and late responses. Furthermore, the larger the volume of the room, the weaker the energy of the late reverberation, and for equal audibility of the late response, the reverberation time needs to be increased for larger rooms. In the final room, at opening (prior to the installation of acoustic curtains around the back of the stage) the occupied reverberation time was significantly above 2.5 seconds – deemed by some to be perfect, and by others as being slightly excessive. The occupied reverberation time is now just under 2.5 seconds, with both musicians and critical listeners judging it to be ideal. The long reverberation time is required to balance the very strong early presence and reflections, allowing for maximum clarity and reverberance.



Thirdly, the early and late acoustic responses need to be optimized independently. Psycho-acoustic studies have shown that, when listening to music in a concert hall, our ears and brain simultaneously focus on two different auditory streams – one linked to the sources (source presence and clarity of the content) and one linked to the room (room presence and listener envelopment). These must both be optimized separately, and only the combination of the two leads to a sufficiently strong acoustic response, an especially important issue for concert halls with more than 2,000 seats. In the acoustic brief, this separation of early room response and late room response was clearly explained and indicated – and for both responses, optimization possibilities are given that can be accommodated within different architectural concepts.

Going the distance

Also highlighted in the brief was the decoupling of acoustic volume and the distance to acoustic reflectors. When concert halls grow bigger in order to accommodate larger audiences and/or more comfortable seats, the walls and all of the boundary surfaces are moving further away from the sources and receivers. As a consequence, not only are the acoustic reflections getting weaker, but they are also arriving later. The human ear has fixed time constants – explained simply, all reflections arriving within 80ms of the direct sound are integrated into the source presence, while all reflections arriving later than 80ms are integrated into the room response – irrespective of room size. The danger is that, the bigger the room is, the less reflections are integrated into the source presence. In order to counteract this effect, a minimum early reflection surface (in square meters) was specified in the brief and it was suggested that those surfaces might be others than the boundary surfaces of the room, so that they can be closer to the sound sources and listeners. The idea is that reflection surfaces (which need to be sufficiently close, even in a room for 2,400 audience members) can be different from the boundary surfaces that create the acoustic volume (which needs to be large for sufficient reverberation). It is interesting to note that, prior to the Philharmonie, two different concepts already existed that allow this



decoupling of reflection surfaces and acoustic volume. The first is the concept of reverberation chambers, which provides a more intimate room (for reflections) surrounded by an additional volume (for reverberation), and often with the coupling between the inner and outer volume being variable (KKL Luzern, for example). The second concept involves the placement of large suspended reflectors inside a bigger volume, oriented to send energy from the stage to audience areas (as seen in Christchurch Town Hall). Acoustically, both concepts are similar and can in fact be generalized into the notion of early room response and late room response.

Finally, there was a project requirement for strong lateral reflections, more so than in the Berlin Philharmonie and most other vineyard concert halls. Vineyard concert halls can have many acoustic qualities, but a detailed comparison of available acoustic data for both shoebox and vineyard concert halls shows that, on average, vineyard concert halls have fewer (and/or less strong) lateral reflections, leading to reduced listener envelopment. While this shortcoming is, to a certain degree, intrinsic to the hall shape, it can be compensated for by adequate acoustic design features, some of which were discussed in the acoustic brief. It is interesting to note that it was Harold Marshall – acoustic designer of the Philharmonie de Paris – who established the importance of lateral reflections in the late 1960s, following the opening of the Berlin Philharmonie.

The acoustic-architectural design proposed by the architects and their acousticians – including free-floating balconies in a bigger acoustic volume, with clouds and ribbons providing early reflection surfaces and a freeform yet optimized shape – is a highly creative and pertinent response to the requirements and requests formulated in the brief. ■

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DESIGN
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Theater expansion

Expansion and renovation of an already successful theater has added new social and hospitality experiences to the venue and is already yielding results

Above: **New facilities and the renovation of existing venues at the Broward Center for the Performing Arts were deemed the solution to shrinking audiences**

Below: **A new bistro developed for the Huizenga Pavilion has increased after-performance engagement with audiences**

A US$54m project to expand and renovate the Broward Center for the Performing Arts, designed by Boston-based Wilson Butler Architects, fulfills the center's vision of increased patron engagement beyond the performance, and advances an already strong connection with the community.

The multiphase redesign features a mixture of social experiences and entertainment venues that encourage patrons to arrive early, stay late, engage with artists, take a class, or savor a meal. "Most performing arts venues are active for only four hours a night, 200 nights a year," says Scott Butler of Wilson Butler Architects. "With the theater's redesign and expansion of guest options, the Broward Center is now bustling 14 hours a day, seven days a week, year round."

Ranked in the 10 most visited theaters in the world, the Broward Center presents more than 700 performances each year to more than 600,000 patrons. Overlooking the New River in downtown Fort Lauderdale, this premier performing arts venue hosts concerts, musicals, operas, ballets, plays, multicultural performances, lectures, workshops and educational events – and offers one of the largest arts-in-education programs in the USA, serving more than 150,000 students annually.

Meeting the audience challenge

Like many theater organizations, the center needed to assess the risk of a shrinking audience, alongside the need to update the facility. Scott Wilson describes the Broward Center project planning as a challenge that allowed the team to look beyond traditional limits of what a theater experience should be: "Performance and arts venues need to change the conventional way of delivering entertainment in order to capture audiences that have countless other choices. The Broward Center Board saw this and had the conviction to act."

Selected in 2009 to lead the design effort, the Wilson Butler team worked with the center's staff to create a destination offering a series of

The project provided a chance for the architects to look at design solutions beyond the traditional constraints of the theater-going experience

compelling reasons for new audiences to come. The team studied every aspect of the patron experience. The design concept called for changing the physical layout by offering strong first and last impressions. An exciting arrival experience, a strong emphasis on increasing activity outdoors and along the waterfront, enhanced visibility into the facilities, unique new food and beverage offerings, and tiered patron experiences for corporate and private members were each designed to serve a broader audience and enhance revenues.

Kelley Shanley, president of the Broward Center, described the transformational benefits of rebranding not only the center, but the whole idea of an evening at the theater: "The pre- and post-performance spaces really moved us a long way toward our strategic goals," Shanley says. "The idea is a continuation of what we always believed in, but we lacked the space to do many of the things we can do today. With these new spaces and social experiences, we have developed three frontiers of engagement beyond what happens on stage: patron with artist, patron with the organization, and patron with patron."

The next level

Among the 'patron with patron' success stories is the popular new Skybox, a first for theaters. Modeled on the luxury club experiences in professional sports, the 71-seat Club Level is perched on the mezzanine level of the Au-Rene Theater – the center's flagship performance venue. It is a distinctive private lounge with views to the stage, dedicated bar and food service, and more opulent seating in a private mezzanine section just outside the Club.

"In the arts," Shanley says, "there is a whole category of audience member we know as the drag-along patron. They come because someone else is truly interested in the performance. With the Club Level, we can offer an experience that extends beyond the one dimension of what's happening on the stage." The warm, rich and inviting ambiance of the Club appeals to corporate groups, private parties, season pass

Top left: **The Au-Rene Theater's seating was replaced and the restroom facilities were improved. The theater's mechanical systems were overhauled and new lighting and audio systems were added**

Top right: **The 71-seater Club Level, on the mezzanine floor of the Au-Rene Theater, is modeled on the luxury club facilities at sports venues**

Above: **The JM Family Studio Theater is located within the recently renovated complex**

holders and drag-alongs, all of whom appreciate the VIP exclusivity of the Skybox.

Riverfront connections

Before and after a performance, no one needs to be dragged to the Huizenga Pavilion, the entirely new two-story event space and waterfront bistro. It features floor-to-ceiling windows and indoor and outdoor seating looking out onto Fort Lauderdale's Riverwalk. The New River Bistro on the Pavilion's first floor offers casual dining and some of the best people-watching spots in the city. On the upper level, the 3,500ft² Porter Riverview Ballroom hosts social, wedding and business events.

Outside the Huizenga Pavilion, the Wendt Terraces offer waterfront seating and alfresco dining. The Pavilion and the Terraces extend the Broward Center campus to a waterfront dock and the city's high-traffic pedestrian Riverwalk, offering a new point of entry for the public.

Rejuvenating flagship space

Early phases of the project included renovations to the Au-Rene Theater, the Broward Center's flagship performance space. The original building, completed in 1991, was designed by Scott Wilson and Scott Butler when they both worked with Benjamin Thompson Associates in Cambridge, Massachusetts. After two decades of intensive use, the theater was in need of many upgrades to allow for the next 25 years of patron loyalty. This work included replacing seats, improving restrooms, and overhauling the old mechanical systems. Lighting and audio systems were added, including a sound mix position on a lift that can convert to additional seating.

This required stewardship was seen as another opportunity to even further enhance the patron experience. Outside the theater, the previous island bars were consolidated into a feature Lobby Bar that increased points of sale while requiring less space. Restrooms were elevated to a 'hospitality' standard, and a Freshen Up women's powder room was carved out of a little-used lobby alcove. The Intermezzo Tastings Room added another revenue opportunity by offering gourmet food, vintage wines and dessert, available one hour before performances and during intermissions.

Community building

The final phase of the Broward Center expansion is perhaps its most impactful. The Rose Miniaci Arts Education Center is a prominent addition, continuing a 25-year partnership with Broward County Schools, and meets a steadily increasing demand for educational programming in the arts. According to the Broward Center's vice president of external affairs, Jan Goodheart, nearly three million students have participated in the Student Enrichment Through the Arts program, free of charge, since 1991. These are tomorrow's artists and arts patrons, already becoming excited about the theater experience.

The business community, corporate partners and sponsors are enthused as well. The Club Level is a runaway hit, with numerous sponsors lining up to entertain clients in the Skybox. Shows in the 2,600-seat Au-Rene Theater sell out on a regular basis. The Broward Center's revenue from Circle Membership subscribers has increased from US$60,000 per year to US$400,000. The bars and restaurants are busy, with many customers booking dinner reservations for the entire season.

"The work we have done has re-energized the community and changed the perception of the Broward Center," says Goodheart. "The experience of attending is so different with our new spaces and programming. The level of activity on show nights, which used to begin at 7:00pm or 7:30pm, now starts to build up at 5:30pm. We are reaching and hosting a different kind of patron, and the redesign provides a range of entry points and choices for our audiences." ■

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Studio time

The redevelopment of an awkward space required extensive expertise, and has breathed new life into a little-used UK studio theater

Below: **The Mercury Theatre in Colchester, UK, opened in 1972**

Opposite: **The retractable seating system, combined with a change in the audience entrance point, has vastly improved the studio theater**

Colchester's Mercury Theatre has been reliably serving the people of the Essex town with high-quality theater since it opened in 1972. Then, it finally provided a purpose-built home for the long-established Colchester Repertory Company, which had been occupying a theater converted from the former assembly rooms and art gallery in the town's main street. The Mercury was a dramatic change, a 500-seat open stage with the audience arranged on seating stepping up from three sides of a hexagonal stage that drives the shape of the entire building.

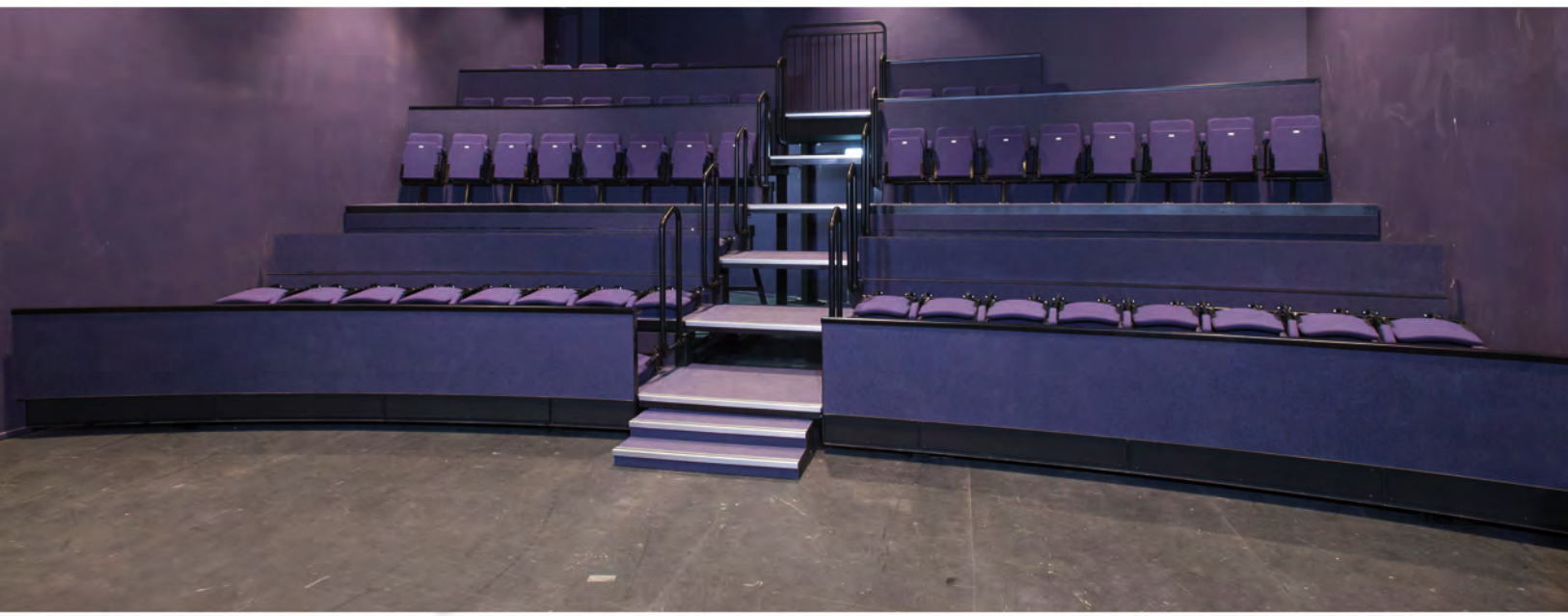
Intended for a producing theater company, the building didn't just house a theater, but also workshops and other facilities. Alongside the main auditorium, the Mercury has long had a smaller studio theater – a simple black box space into which Steeldeck staging and individual foldable seats for an audience of about 60 could be placed as required. Unfortunately, the space suffered from not actually having been intended for performance purposes. "When the building was designed, the room was meant as a rehearsal space," explains Nik Frampton, the Mercury's IT and facilities manager and a 15-year veteran of the venue. "While a simple lighting grid had been added at some point, the room was always problematic – being located in the middle of the building with no outside walls, it was like an oven. There was no air-conditioning to help with this, no acoustic separation from the adjacent main auditorium or workshop, and there was an oddly-angled wall at one end. It wasn't comfortable; it just wasn't a very nice space." That, in addition to the costs and effort involved in setting up the space for any particular production, meant that over time the studio had drifted out of regular use.

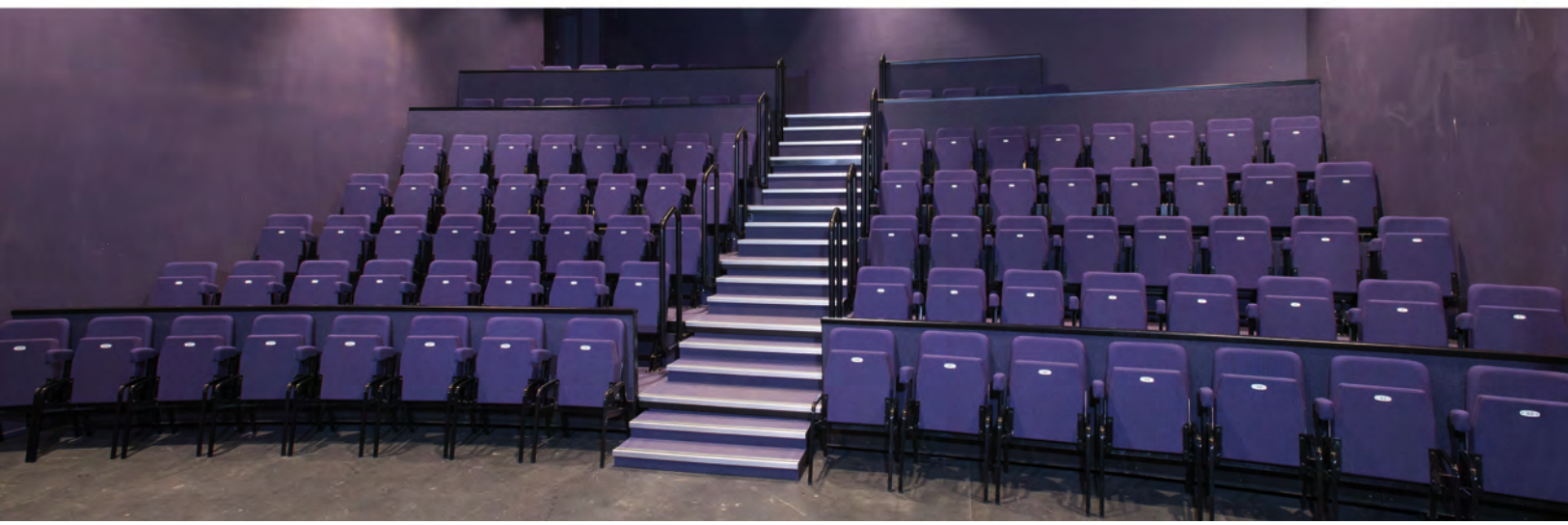
Reviving space

But the Mercury's management team, led by present artistic director Daniel Buckroyd and executive director Steve Mannix, had exciting plans for their venue, which serves a town that is one of the fastest-growing in the UK. In particular, the theater had an ambition to work with new writers and new artists. "To do that, we needed a space where we could develop work that might not fill the 500-seat main auditorium, but would sit perfectly in a 100-seat space," Frampton notes. "We were also getting requests from people looking for conference spaces, and we wanted to have a space we could offer to community groups and local organizations."

Frampton knew that the building had the physical space – if only they could work out how to make it more usable and less awkward. The eventual solution came from a moment of inspiration by designer Michael Passmore, who trained as an architect before pursuing a career in theater design and production. His idea: using the awkward, angled end of the room as the audience entrance, but reconfiguring it so they could arrive at first-floor rather than ground-floor level. This meant that there was suddenly the possibility of installing a stepped seating unit, with the audience arriving at the top and processing down (with wheelchair spaces at this top level), rather than at the bottom and processing up.

It also meant that a retractable seating unit could be installed. "Within that, making the seat rows curved made it fit better, letting us squeeze in just enough seats and also improving the audience sightlines," Passmore says. When not required it could be pushed away, and the central





staircase removed to leave an audience entrance at ground level. The space could now be either a comfortable end-stage performance space, or quickly converted to an open room for non-performance and other uses.

With the concept now in place, the theater set about raising funds to realize it as part of a larger refurbishment project for the building as a whole, ultimately receiving support totaling £580,000 (US$888,000) from the Arts Council and the local council, along with grants from other charitable trusts, and £50,000 (US$76,500) from the theater's own reserves. With funding in place, they set out to find people to implement it. "The building work and other aspects of the project have been handled by local companies, particularly Essex Mechanical Services and builder ND Smith," says Frampton, "but for the retractable seating, the obvious choice was Steeldeck. People here have worked with them at other venues and appreciated the quality of their work." Passmore agrees: "They are the only company that could, or would, tackle this kind of work."

With the concept in place, the space can now be used as an end-stage performance area, or an open room for a variety of other applications

Project challenges

During recent years, Steeldeck has made a name for itself in retractable seating – particularly involving complications such as curved or trapezoidal shapes – across a range of different projects, from the 450-seat Stratford ArtsHouse to the 12,000-seat SSE Hydro in Glasgow. The company's work, and reputation, extends beyond the UK, with its systems implemented in venues from Dakar to San Francisco.

"At first glance, the Colchester Studio seating might have seemed like a relatively simple project, just 100 or so seats on six levels," says Steeldeck director Philip Parsons, "which felt at first like it could be a version of our C-Pack system as at the Stratford ArtsHouse. But often it's these small projects that present the surprising new challenges. Here it was that the seating wasn't just curved with a consistent riser height – each level the same step up from the previous – but curved seating with the riser also designed as a parabolic curve, so each of the six rows of seating has a progressively increasing tier rise."

Parsons and his company, and particularly technical designer Nigel Parker, thrive on such challenges. Colchester's parabolic seating was the second major challenge they have solved this year – the other being folding guard rails on curved tiers for the new Imax Theater at the University of Southern California's Robert Zemeckis Center for Digital Arts. "Both of these things sound simple when you talk about them; they're not necessarily so when you have to engineer them," says Parsons. "But we have a mindset of solving difficult issues, rooted in our history of building theater sets with designers whose specialty is demanding the seemingly impossible!"

In Colchester, the tight budget meant that the system is completely manual, the seating running out on a fold-down track and the seats themselves, supplied by Specialists in Seating, then folding up ready for use. The system has been built to Steeldeck's usual uncompromising standards – Parsons' preference, driven by his background in theater, always to perhaps over-engineer rather than run the risk of something breaking when a theater crew are up against a tight deadline.

Together with other work, including a new grid system installed by technical specialist Stage Electrics, soundproofing installed on the walls shared with the main auditorium, and air-conditioning, Colchester's under-used room has been reborn as a practical, functional, elegant new performance space, with 98 comfortable seats ("a much more viable number", Frampton notes) rather than 60 temporary ones. Parsons describes it as "truly a quart squeezed into a pint pot – a real success, the curved shape and parabolic risers making it very much more than just a prosaic block of seats". It's a significant addition to the facilities available to this dynamic theater company and the ever-growing community it serves. ■

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Sound ideas

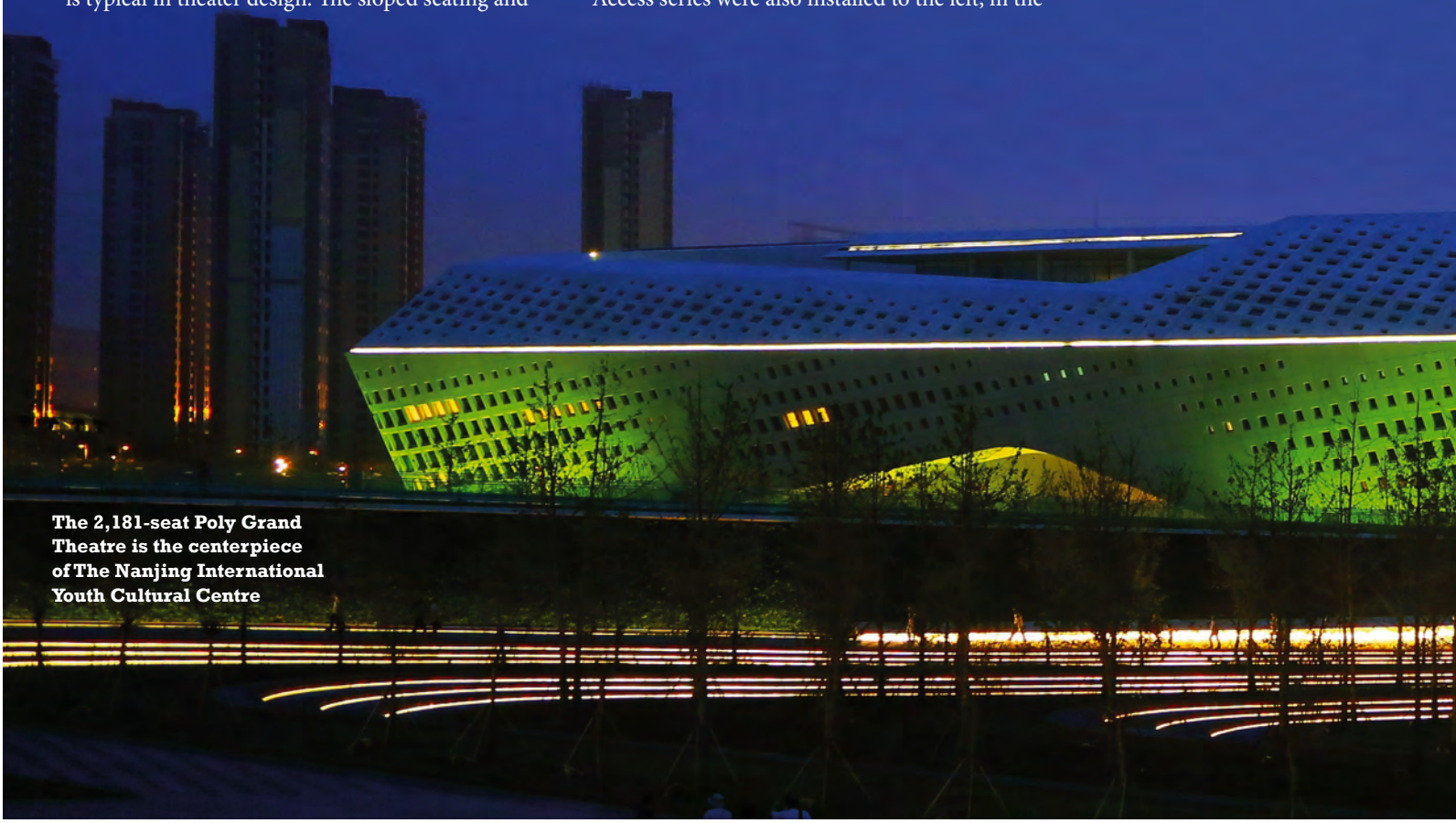
Innovative use of advanced loudspeaker systems helped to deliver high levels of acoustic quality in a new theater complex

The Nanjing Poly Grand Theatre is a new landmark for the city of Nanjing and the centerpiece of the Nanjing International Youth Cultural Centre. The impressive and modern group of buildings was designed by well-known architect Zaha Hadid.

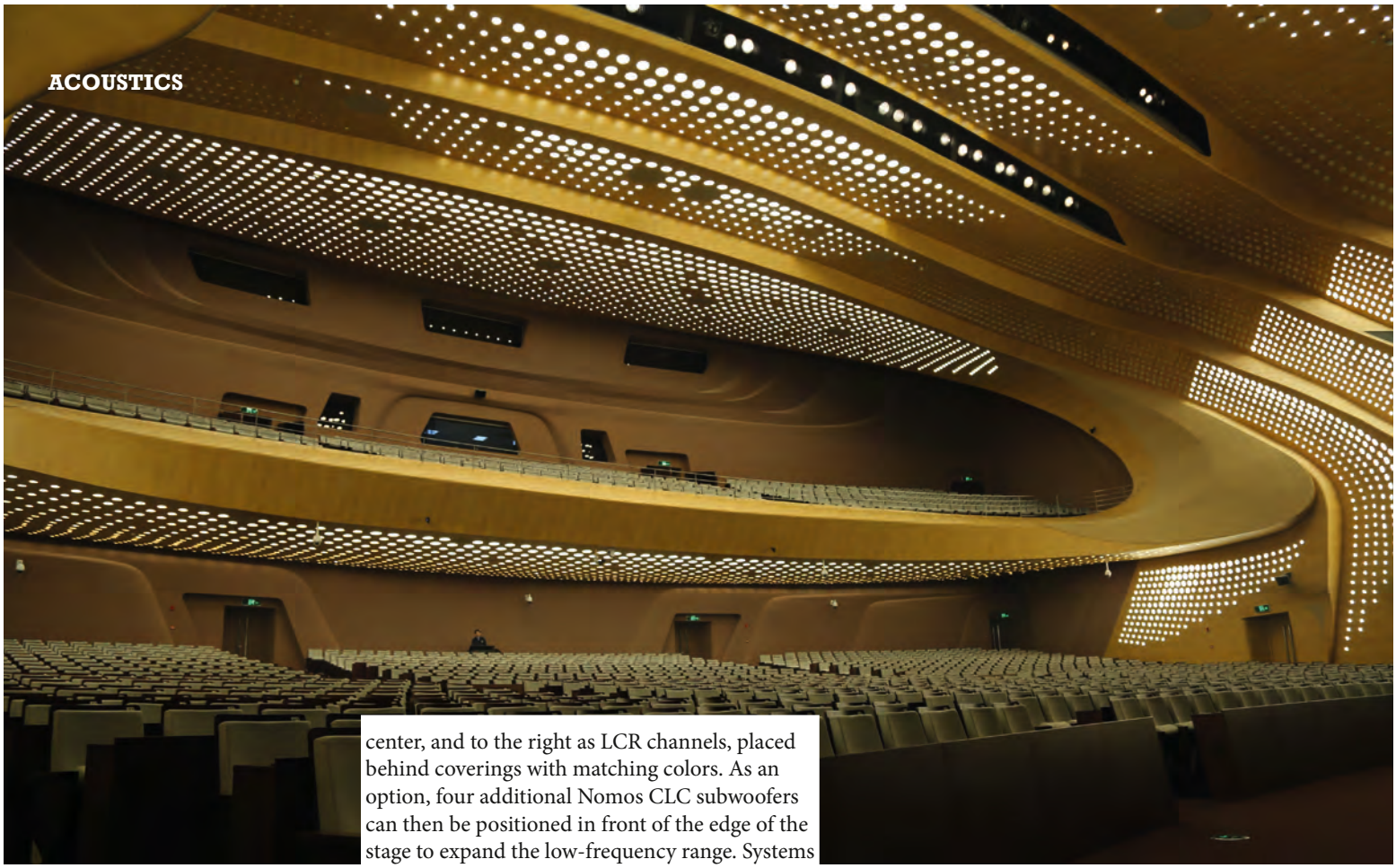
Inside the building complex there are two concert halls, both of which are used for a wide variety of activities, including musicals, concerts and other events. The main hall is the Grand Theatre, which, with 2,181 seats, is the larger of the two. Its stage is 78ft wide, which roughly matches the width at the hall entrance. Including the area of the two rear side stages makes for a total stage area of over 8,600ft². The audience area extends from the stage to a depth of almost 131ft into the hall, which, for acoustic reasons, also becomes wider toward the back, as is typical in theater design. The sloped seating and upper tier, also typical of theater design, give a total height of 78ft. The smaller hall has 505 seats, and a stage measuring 3,013ft². This multifunctional hall is used for smaller concerts, artistic performances and various events.

Speaker science

Shanghai MYC Technology, the distributor for Kling & Freitag in China, Hong Kong and Macao, installed loudspeaker systems from Kling & Freitag in both halls. Line array systems from the Sequenza 10 series are suspended in the large hall. On the right- and left-hand sides, there are 10 Sequenza 10 N full-range elements and three Sequenza 10 B subwoofers. To enable directional multi-track scenes, MYC has concealed various loudspeakers in the walls and ceiling of the hall. Systems from the Kling & Freitag Access series were also installed to the left, in the



The 2,181-seat Poly Grand Theatre is the centerpiece of The Nanjing International Youth Cultural Centre



Above: **Shanghai MYC Technology installed Kling & Freitag systems in both of the center's concert halls**

Right: **The venues feature almost 25 SystemRacks for loudspeakers**

Below: **Control technology for the performance halls is housed in a separate, well-ventilated tech room**

center, and to the right as LCR channels, placed behind coverings with matching colors. As an option, four additional Nomos CLC subwoofers can then be positioned in front of the edge of the stage to expand the low-frequency range. Systems from the Sequenza 10 series are positioned on the ceiling in the multifunctional hall to provide stereo sound. These are made up of a combination of six Sequenza 10 full-range elements and three Sequenza 10 B subwoofers on each side. Following on from a number of acoustic measurements and simulations, the decision was taken to use the three subwoofers on each side as a cardioid system. This means that the middle of the three vertically suspended subwoofers is horizontally rotated by 180° and rear attenuation is achieved by means of the venue's installed Kling & Freitag SystemRacks and proper control. Both halls will accommodate almost 25 SystemRacks for the loudspeakers, consisting of the Kling & Freitag SystemController CD44 and four-channel SystemAmps. The complete control technology is housed in separate and adequately ventilated technical rooms.

For the opening of the theater, Shanghai MYC Technology organized the staging of a spectacular show in cooperation with the China Stage Art Association. The event was attended by a number of representatives from professional companies in the Chinese audio sector, as well as industry and planning companies. The objective was to demonstrate the high standard of sound and room acoustics, unprecedented in this form. Well-known sound designer Jin Shaogang was hired for a live mix of a variety of musical genres so that, together with the technical crew, he could convince the invited guests of the high level of sound quality. From the diverse reactions in the audience, it was clear that the show was suitably impressive. After the show, there was outstanding praise for the sound quality in the halls – it was clear that this was an acoustic highlight in Nanjing's culture of Chinese theater. ■

www.kling-freitag.biz

Sound thinking

Tailoring venue acoustics to suit the requirements of a variety of productions is fundamental to project success

Above: **Logomo Hall hosting *The Voice* for TV broadcast. Photo: Ralph Larmann**

Opposite, clockwise from top left: **The hall in 1,900-seater setting. Photo: Joni Rantasalo; cage fighting in front of 1,500 seated spectators; configured for 3,500 standing viewers. Photo: Rabbit Photography**

The Logomo project at the heart of the Finnish coastal city of Turku was initiated in 2007 by real estate and construction company Hartela as a project to bring a hub for creative business into the town center. Architects Vapaavuori drew up the first drafts in 2008, and in June 2015 the project was finalized with the opening of the last part of the complex. A former railroad depot is now filled with creativity.

Logomo has two main functions: short- and long-term rental services. The long-term tenants, 80 different companies from across the creative industries, occupy 107,600ft^2 of office areas and artist studios. That leaves 183,000ft^2 for a variety of event spaces. Nine venues, 12 meeting rooms, restaurants, and event technology rental cater for the needs of clients in an easy-to-reach location in the town center.

Logomo Hall is the crown jewel of the complex. Its multifunctional auditorium – scalable from a 400-seat conference venue to a 1,500-seat concert hall or a rock arena boasting 3,500 seats – can accommodate events such as live TV broadcasts, concerts, banquets and conferences.

Visiting productions have need of spaces that are acoustically, functionally and technically adaptable, where all events are possible without compromising the quality of the performance or the audience's experience. But a multipurpose event space is extremely difficult to achieve within reasonable construction or operating costs. One of the major problems is acoustics.

Sound challenges

Logomo is designed to be an example of thinking differently, so the challenge of the project was to create something truly functional. A hall with very short reverberation time was prioritized, to provide a perfect environment for events with reproduced sound. But in order to be a truly multifunctional space, the hall should also work for acoustic classical concerts.

It soon became very clear to the acoustic and theater consultants at Akukon that the shape and the dimensions of the hall would not create even a decent concert hall. Therefore a different approach was chosen, and Logomo Hall was equipped with a Meyer Sound Constellation virtual acoustics system. With the combination of a dry hall and virtual concert acoustics, all kinds of performances and events are now possible.

Janne Auvinen, venue director for Logomo, is very satisfied with the extraordinary versatility.

"Variable hall is an absolutely crucial part of our public profile as a diverse arts and entertainment venue," Auvinen says. "We can stage operas, concerts, theater, conferences, and even films, without having to accept compromises. That's what makes the venue truly different." Turku is a small economical area, so concentrating only on certain types of events would not be diverse enough. Now all users get something, from high culture to public festivals.

Logomo is rapidly becoming one of the top venues in Finland. The first full year welcomed 320,000 spectators to more than 950 events – not a bad turnout for an area with only 160,000 inhabitants. In the case of Logomo, form has followed function, rather than vice versa. ■

www.akukon.fi

Resounding success

The collaborative development of a new Parisian venue was vital in creating the clarity, envelopment and loudness required for symphonic performances

Above: **The Philharmonie de Paris playing host to a capacity audience. Photo: Yves Chanoit**

Opposite: **The overstage reflectors form part of the complex acoustic setup**

The Philharmonie de Paris opened its doors on January 14, 2015, and has received resounding praise for its excellent acoustics, which combine the long reverberation and sound clarity necessary for a large orchestral repertoire. After 20 years stuck in the planning phase, three years of design and four years of construction, the 2,400-seat Grande Salle of the Philharmonie was finally revealed to existing audiences and the new, local community – a goal which was a well-publicized part of the project.

Located within the cultural and science precinct of Parc de la Villette, on the northeast boundary of the 19th arrondissement, the project was aimed at renewing the community's music audience by bridging the northern suburbs and the Parc's new center. Thanks to the addition of the Philharmonie de Paris to the Cité de la Musique (whose main hall is now branded as Philharmonie 2), the complex is one of both excellence and discovery.

Selected as part of an international architecture competition – which included very carefully defined acoustic requirements – the winning team which was chosen for the Grande Salle project was led by the renowned French architect Jean Nouvel, and also included theater planners Ducks Scénographie and consultants Marshall Day Acoustics.

The acoustic brief for the project, prepared by Kahle Acoustics, required the concert hall to have a new typology, so the venue could be neither a shoebox nor a vineyard hall. The brief also required independent control of the early and late acoustic response of the room. The hall was to be a flexible 21st century venue, able to host the resident Orchestre de Paris with uncompromisingly symphonic acoustics in a 2,400-seater setting, as well as jazz, rock and world music concerts for an audience of 3,600.

Creating new concepts

The acoustic solution was found in a simple concept of nesting an intimate chamber for the audience and performers within a larger, reverberant volume. This concept, developed by Ateliers Jean Nouvel and Marshall Day Acoustics, resulted in the extraordinary acoustic intimacy that the Philharmonie de Paris has been praised for, while maintaining the ample reverberation necessary for the symphonic repertoire.

The surfaces that definine the inner chamber provide the early lateral sound reflections that are necessary for the acoustic clarity, envelopment and loudness – the three principal qualities required for acoustic intimacy. The volume between these surfaces and the larger envelope provides the long reverberation that percolates back to the audience through the openings

between the floating balconies, adding to the sensation of being surrounded by the sound.

The deployment of acoustic banners in the outer volume reduces the reverberation without affecting the lateral reflections and clarity. This enables the Philharmonie de Paris to retain its acoustic intimacy in a wide range of audience configurations and stage conditions.

The three-dimensional acoustic response of the Philharmonie de Paris, one of the most complex designs to provide such high clarity, envelopment and reverberation, was developed using Marshall Day Acoustics' proprietary 3D acoustic measurement system, Iris, which has the capability to reveal the interaction between volume, reflectors, stage and audience.

As conductor Simon Rattle says, "There was the Musikverein, Concertgebouw, Boston Symphony Hall and Berlin Philharmonie – now there is the Philharmonie de Paris. Lucky Paris!" ■

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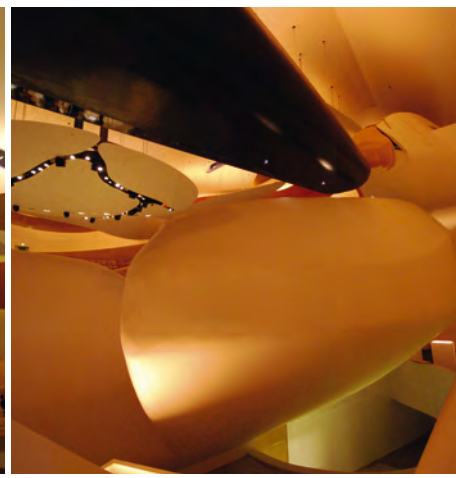

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Creating synergy

The development of a pair of arts venues presented a rare opportunity to create dynamic relationships between the two adjacent facilities

Designing adjacent performing arts facilities for two different clients is a rare assignment for an architectural firm. Opening in late 2015, the FirstOntario Performing Arts Centre (PAC) and the Marilyn I Walker School of Fine and Performing Arts at Brock University will inject the Niagara region's largest city, St Catharines, in southern Canada, with some dynamic interplay.

The four-stage, city-run PAC lines the main St Paul Street with a glazed and unified façade revealing a number of lobbies that activate a connection with the urban environment during both the day and night. The 110,000ft^2 complex is an integral component as a catalyst for rejuvenating the downtown area. It boasts four programmatically different rooms with the versatility to mount a wide range of performance and events.

Partridge Hall, with 773 seats, is a natural acoustic concert hall that is also equipped to support amplified productions. "Acoustically absorbent material allows modification to the room without altering its appearance," explains Gary McCluskie, principal with Diamond Schmitt Architects of Toronto. "The architectural character is consistent in both modes as the acoustic material is lowered for amplified concerts behind scalloped wooden slat panels that line the room."

A similar kind of flexibility is programmed in the Robertson Theatre, a black box that accommodates 150 people. "It's a technical room where the working components of stagecraft are revealed, creating an ambience that you're part of the performance space," McCluskie says. A rare feature for this type of room is a triple-glazed window wall that reveals the skyline as a backdrop, adding to its versatility and appeal as an event space.

The other rooms are the 304-seat Cairns Recital Hall and a 200-seat cinema, which is acoustically isolated from the Robertson Theatre above it. The university employs both rooms in the daytime for music classes, and as a lecture hall and screening room. All four spaces benefit from resilient structural elements and acoustically treated doors for sound isolation between performance venues. Slow air diffusion through acoustically lined ductwork ensures the quiet operation of heating, ventilation and air-conditioning.

Making connections

A sloped embankment connects the PAC and Brock's School of Fine and Performing Arts, where 500 students plus staff are relocating from the suburban main campus to a repurposed 19th century brick and beam textile factory. Sharing program areas with the PAC provides a unified approach for the multi-use arts complex, with opportunities for creative intersections of dramatic, music and visual arts, not just spatially but also both intellectually and physically.

The heritage of St Catharines' unique and historic neighborhood – cantilevered buildings supported by stilts where the land slopes away – is referenced in the design of Brock's new 25,000ft^2 Studio Theatre. "We put the theater on stilts as well," says Michael Leckman, principal with the firm overseeing the Brock project. "The raised vantage point offers views back to the main campus across the valley." The 235-moveable-seat theater accommodates different stage setups and has a sizable rolling gantry system modeled on one at The Julliard School at Lincoln Center for the Performing Arts that allows technicians to hang and focus lights off a pipe grid without the use of ladders and lifts below.

The theater's design makes the most of the sloping grade on the site to create two ground-floor levels: the lower ground floor has the main entrance lobby, study area and art gallery; while the second ground-floor entry provides seamless connection between the Studio Theatre, the scene

Above: **The Marilyn I Walker School of Fine and Performing Arts. Photo: Cicada Design/ Diamond Schmitt Architects**

shop, costume shop and four rehearsal studios, as well access to the PAC back of house.

Upcoming shows at St Catharines' PAC are taking maximum advantage of the synergies created by the proximity of the two facilities. A theater festival will access Brock's state-of-the-art stage production facility, enhancing students' education and providing work experience in a professional setting for the next generation of performers and theater craftspeople. ■

www.dsai.ca

Above: **The St Catharines FirstOntario Performing Arts Centre. Photo: Cicada Design/ Diamond Schmitt Architects**

Euro vision

The design of the sound, video and control systems for a Swedish venue relied on the early involvement of acoustic consultants

Above: **The 1,700-seat concert hall is the largest in Sweden**

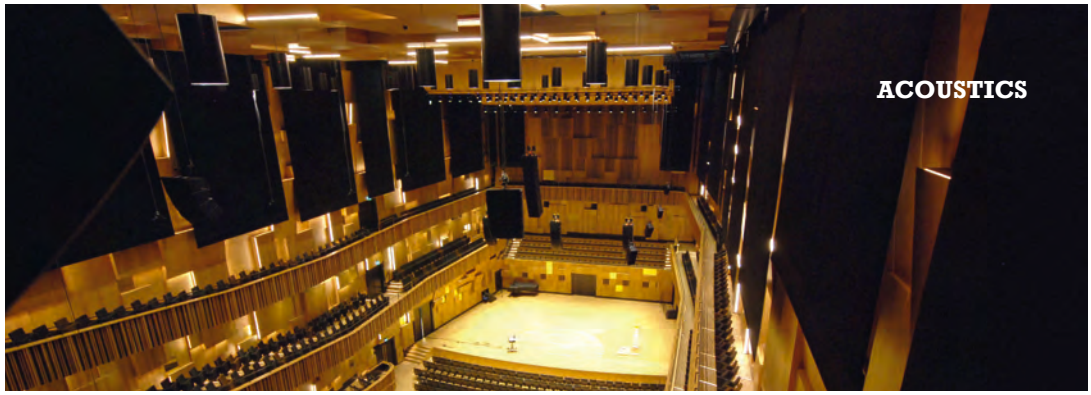
Opposite: **The large concert hall with all its absorptive curtains lowered into place**

Inaugurated in 2015, Malmö Live is a building complex consisting of a concert house, a congress center and a hotel. Danish architect Schmidt Hammer Lassen designed the 56,000m^2 building as a cluster of rectangular blocks. The congress block contains a 1,500-seat congress hall and several meeting rooms. The 17,000m^2 concert block contains two concert halls, rehearsal rooms and administration facilities. The large hall is essentially a shoebox with two balconies and, with its 1,700 seats, is the biggest concert hall in Sweden. The small hall is a flexible black box with around 300 seats. Both halls have motorized absorptive roller curtains for easily variable acoustics. In the small hall the reverberation time can be varied between 1.2 and 1.6 seconds, and in the large hall between 1.5 and 2.2 seconds in the mid-frequency range – these variations lead to a significant difference in the sound produced.

Healthy competition

In 2011, Swedish acoustic and AV consultancy company Artifon was tasked with the design of the sound, video and control systems for the concert block. Systems were designed for sound reinforcement, sound and video recording, calling, stage listening, show control, video projection, video distribution, wireless intercom and digital signage.

"We had the privilege of being involved early in the planning process," explains Alf Berntson, chief consultant at Artifon. "This is important since the AV equipment has a high impact on the building and a successful result depends on placement possibilities and room acoustic

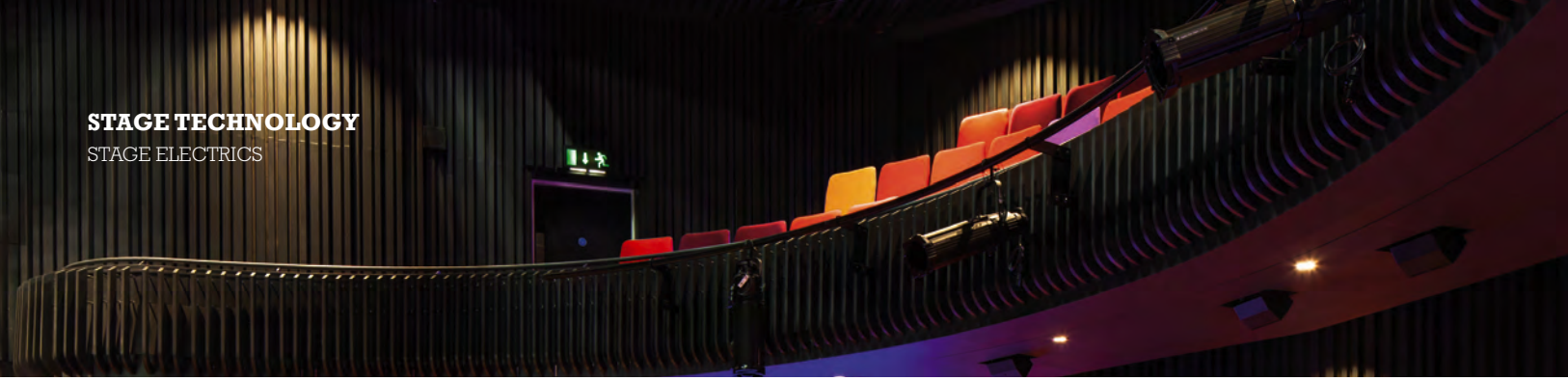


conditions." It was decided to divide the systems into seven contracts to increase competition and attract the most qualified contractors.

There are two loudspeaker systems in the large hall – a main sound reinforcement system and a surround system. Extensive calculations of the main system were performed in CATT Acoustics to optimize the coverage and achieve high definition from the loudspeakers. "Through careful design we were able to achieve calculated mean values of the speech transmission index (STI) of 0.64 without curtains and over 0.70 with curtains, which is a very good result," says Berntson. The requirements set out in the original specification documents were a little lower, but with clearly defined conditions and percentage of coverage that were easy to verify with measurements. The maximum sound pressure level was set to Leq ≥113dB with a maximum standard deviation of 1dB, as this level was deemed sufficient for most performances. The main loudspeaker system supplied by d&b consists of three FOH line arrays (L/C/R) for the parterre and the first balcony, a vertical sub-array of cardioid subwoofers, five front fills, three array fills for the rear part of the second balcony, eight fills for the second balcony sides, and 13 hidden fills for the first balcony around the stage. The surround system around the walls and in the ceiling consists of 53 loudspeakers from EM Acoustics, all with individual amplifiers.

The high sound quality was praised by the audience following the first test concert, which featured some of the most famous artists in Sweden, including the winner of the 2015 Eurovision Song Contest, Måns Zelmerlöw. ■

www.artifon.se



Multiple choice

A new venue at the heart of the Manchester art scene features an advanced technical infrastructure, designed to support a wide range of performances and events

The fruit of a merger between two of Manchester's primary arts organizations – Cornerhouse and the Library Theatre Company – Home is a new, multipurpose venue that includes two theaters, five cinema screens, a gallery and/or exhibition space, bar, café bar, cinema bar, bookshop and digital production/ broadcast facilities.

The new venue's technical infrastructure was supplied and installed by Stage Electrics, working closely with the client and the main contractor, Wates Construction. Selected because of the company's knowledge and professionalism, borne of many years of delivering complex projects at the highest level of the entertainment industry, Stage Electrics was involved with the project from its inception.

Denis O'Neill, construction manager at Wates, comments on the collaboration: "We worked closely with Stage Electrics for 18 months and they were both professional and approachable throughout the process. The result is an excellent quality venue that fully meets the client's brief."

Providing flexibility

When it came to equipment choice, the company hosted a number of workshops to establish the operational and functional requirements for the sound, AV and stage lighting. The final equipment specification was agreed upon by all technical parties from the venue and the Stage Electrics engineers, cooperation which resulted in an extremely flexible system.

The main theater – which has a capacity of 465-499 – is a proscenium arch venue with seating arranged in stalls and two gallery levels. The upper gallery's side-slips stop short of the proscenium, while the lower gallery's slips wrap around to join it. At the front of the stalls, a temporary floor and removable seats allow for an additional forestage extension and cover a void for the later addition of an orchestra pit. The stage has a fly tower that will allow live flying when the flown proscenium header is deployed.

Stage Electrics supplied full audio, stage lighting and stage engineering systems. The new EM Acoustics EMS series audio system has proscenium-mounted L-R loudspeakers, center cluster, infills and removable front fills. Managed by BSS London Blu audio processing, it gives the theater a very natural sound. Lighting includes ETC Unison Paradigm control and ArcSystem LED house lights, ETC sensor dimmers and an ETC EU Gio lighting console.

The main theater shares a dimmer and audio-visual rack room with the studio theater, a flexible, flat-floored space with a capacity of 150, and fitted out with overhead lighting.

The five cinema screens are spread over the upper two floors of the building, the largest having 250 seats and the smallest 46. All are equipped with digital projection, with Cinema 1 also having 35mm capability. The two largest cinemas can also be used for live performances, with an extensive patching network and LED profile lighting.

Above: **Stage Electrics was responsible for the venue's new technical infrastructure**

Below: **The multipurpose venue boasts five cinema screens**

Opposite, left: **Home features a range of theaters, screens, galleries and other facilities**

Opposite, main: **Full audio, stage lighting and stage engineering systems were installed in the main theater**

Photos: Paul Karalius

Key to the building's technical flexibility is a site-wide AV distribution system, which enables multiple format audio and video signals to travel to and from anywhere in the building – including from one venue to another – enabling, by way of an example, a jazz band to set up and perform in the open foyer space. The system is designed to adapt to any requirement.

"As we have brought the building to life over the last couple of months, the extensive networking infrastructure has allowed us to use the building in a number of different ways," explains Jasper Gilbert, Home's technical director. "The patching of live music across all three foyer spaces has worked really well and there is plenty of scope and options we have yet to try out; the flexibility is really useful." ■

www.stage-electrics.co.uk

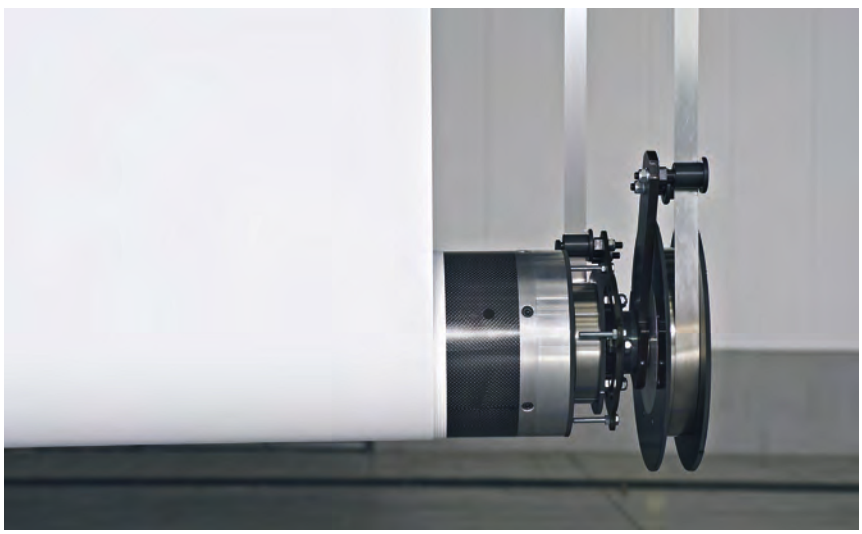
Screen stars

Lightweight, retractable screen technology is suitable for use in a variety of applications, and can meet the requirements of venues around the world

Above: **An 18m-wide Gerriets retractable Megascreen in a venue in Freiburg, Germany**

Below: **Unlike conventional top roller systems, Gerriets screens use bottom roller technology to avoid wrinkles**

From Oslo to Pretoria, from Chicago to Beijing, and in applications ranging from 9m to 30m in width, the industry demand for ultra-wide retractable projection screens is now gaining pace worldwide. It all started with a local cover band complaining about the weight of their 6 x 4m portable screen. At that time, steel or aluminum tubes were state of the art, but the weight of the systems caused very real problems.



The cover band in question wanted to invest in a retractable screen that was light enough for two people to load onto the roof of their touring van. At the time, Hannes Gerriets, CEO of Gerriets, gave a very simple answer – not knowing the domino effect his statement would cause: "If you are willing to pay double the price, we will halve the weight."

Technically, this was a very difficult task. The search for the proper material was crucial in the success of the design. After some preliminary research, carbon fiber represented the clear choice, thanks to its exceptional strength and relatively low weight. With only a quarter of the weight of aluminum tubes, carbon fiber tubes allow the manufacturing of ultra-wide retractable screens without the heavy weight of previously used materials such as steel or aluminum.

A key component of the design is the ability to assemble smaller sections of tubing on-site to produce a very wide singular tube. This feature enables very quick assembly and disassembly of the Gerriets Megascreen for systems measuring up to 30 x 15m. These unique oversize screens offer multifunctional versatility to a range of facilities around the world, including congress centers, exhibition halls, entertainment shows, theater venues and large houses of worship.

Problem solving

Not only is weight an issue in the design of large roller screen systems, but the tensioning of the screen surface needs to be considered – the wider the system, the more difficult it becomes to roll and tension the screen. A traditional top roller system uses a fixed top tube with the screen rolling down from this tube. A problem inherent with this method is the deflection of the tube and the wrinkles it produces in the screen. After a long development process, Gerriets' bottom roller system was designed. The carbon fiber tube is attached by stainless-steel bands on the left and right end of a self-supporting truss system. By lowering the complete tube with the top of the screen fixed to the truss system, the tube itself rolls downward, thereby tensioning the screen with its own weight.

With a speed up to 0.4m/s, the Megascreen can also be used as a scenic element in theater or modern ballet productions. The combination of lightweight construction and durable materials creates a wealth of new possibilities for directors, set designers and consultants. Who could have predicted that a local German cover band's need for a lightweight solution would lead to the invention of a unique product that is now in use in venues across the world. ■

Left: **The self-supporting truss system enables the screen to be tensioned by its own weight**

Right: **Gerriets Megascreens in use at the Second Baptist Church in Houston, Texas**

www.gerriets.com

Reimagining history

Two re-envisaged projects required a collaborative design process to draw on the venues' histories and create spaces for communication and participation

Friends House in Euston is the central offices of the Quakers in Britain. In 2009, architects John McAslan + Partners and Anne Minors Performance Consultants (AMPC) were selected to renovate the building, with Sound Space Design (SSD) joining the project to refurbish the 1,000-seat Large Meeting House – now named The Light.

The Basil Spence-designed Gardner Arts Centre at the University of Sussex opened in 1969 and was a receiving house until 2007. The university's desire for experimental multimedia performance facilities led to AMPC and SSD collaborating with RHP Architects to modernize the center which, as the Attenborough Centre for Creative Arts (ACCA), now includes a 350-seat main auditorium and diverse teaching and performance studios.

While Friends House and ACCA have features in common – such as their Grade II and II* listings, as well as an ambition to reach out to the wider community – SSD and AMPC worked closely with key stakeholders to navigate often conflicting requirements, resulting in very different briefs. ACCA's brief for experimental multimedia performance and better natural acoustics for unamplified music connected with SSD's expertise in ambisonic immersive sound, and combining amplified and natural instruments with acoustics. Friends House was developed to better suit the needs of Quaker worship, conference and performance use, unifying the participants in a single rake on three sides with natural daylight from above.

For each project, AMPC developed a unique, flexible landscape of movable floors, staging and seating components. The ACCA main auditorium can now be reconfigured as a full flat floor, end stage, in-the-round or thrust arrangement. At Friends House, seating wagons create the first rows of assembly and can be reversed to increase the flat floor area for use in exhibitions, standing gatherings and cabaret-style conference events.

Opposite: **The 1,000-seat main auditorium at Friends House, Euston. Photo: Hufton+Crow**

Below: **The ACCA's 350-seat auditorium at the University of Sussex. Photo: RHP Architects**

Sound ideas

Acoustically, the briefs called for very different approaches. To deliver the ACCA client vision with tools for creative artists, SSD designed new sound-reflective surfaces to balance the acoustics with enhanced natural resonance for speech and music, and control for amplified sound. Acoustic defects due to the circular form were creatively mitigated – a challenge within the listing framework that resulted in beautiful joinery and is now a defining feature of the auditorium.

Architect Hubert Lidbetter's 1926 Friends House design was envisioned to create a debating, worship and meeting chamber where any person could see and hear anyone else in the room. SSD and AMPC safeguarded this vision by optimizing the acoustics and seating layout for amplified and

natural speech communication. McAslan's vision of a soaring pyramidal ceiling was realized, in collaboration with SSD and AMPC, through careful selection of acoustical materials and integration of technical equipment.

AMPC and SSD's design approach stems from a care for the people that will gather, perform and communicate in these spaces. This leads to a holistic design philosophy that extends beyond the opening of the venue, into the future. In both projects, the technical systems are subtly integrated into the architecture, with infrastructure included for future expansion and to keep pace with technical developments.

Both of these projects have been successful in achieving their ultimate goals – of creating spaces to strengthen their resident communities and inspire communication, artistic endeavor and learning. ■

www.soundspacedesign.co.uk

Tailor-made partnership

Two companies with complementary stage technology specialties have combined their expertise to offer tailor-made solutions to international clients

Whether they are delivering installations for Olympic opening and closing ceremonies, or installing machinery for historical theaters, both Trekwerk and Show Canada pride themselves on delivering tailor-made stage technology solutions to world-class international stages. Their partnership (which was launched in November 2014) is a result of both companies foreseeing the growing need for tailor-made technology for events and venues.

"In the design of ever-evolving performances, there is a need for intuitive technology," explains Jean Labadie, the president and CEO of the Show Canada Group. "Our expertise lies in understage technology, in giant turning stages and fully automated scenic elements. Prior to 2014, we explored the possibilities of a partnership with the same tailor-made expertise – but in overstage technology. We at Show Canada have been really excited about the Trekwerk technology for some time now."

Above: **Trekwerk and Show Canada collaborated for the opening ceremony of the 2015 Baku Games in Azerbaijan**

Below and opposite: **At Baku, Show Canada developed the understage, while Trekwerk delivered a steel installation**

Trekwerk, which is based in the Netherlands, specializes in stage technology, designing, building and installing the overstages for theaters across the world. "With his TNM Software, partner and director of innovation Reind Brackman has developed, and also continues to develop, extraordinary software specifically for the stage," Labadie continues. "Reind has mastered the art of anticipating the trend of the ever-changing needs in performance venues."

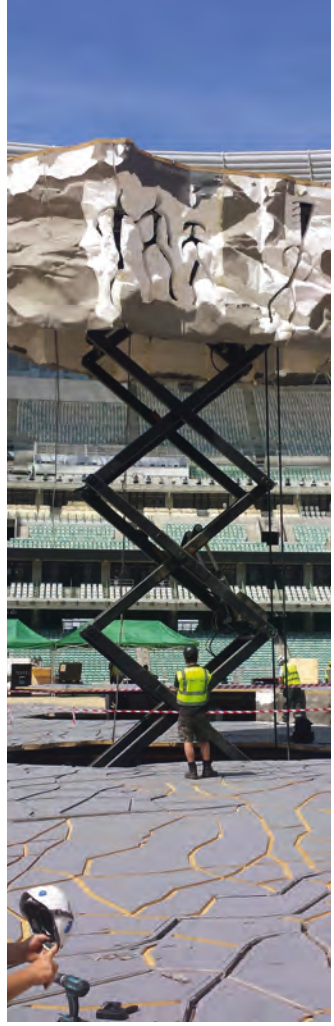
Opening gambit

The collaboration between the two companies was showcased to the world during the opening ceremony of the 2015 Baku Games in Azerbaijan.

Show Canada developed the understage – which involved an enormous turning stage hiding trap doors, exposing remarkable underground fire channels and carrying an unexpected pool of water. Trekwerk developed a steel construction – a lift installation carrying an enormous rock formation, bringing out the underground fire channels and creating an impressive, exclusive visual display. "Stage creativity is endless, we have done our job well if we can bring that creativity to life," Labadie explains.

The Baku Games was just one of a number of international opening ceremonies for which Show Canada has delivered the staging and technology. The company has also delivered the technology for the opening ceremonies of the winter games in Sochi, Russia, as well as the 2012 summer games in London.

Trekwerk takes special pride in the installation of the software and machinery for, among others, London's Barbican theater. Trekwerk delivered



77 SynchroDisks, 20 SynchroPoints and 12 chain hoists. The project also included the renovation of the fly loft with a 'Lamel' grid floor. All of the machinery and hoists are controlled by the Sil3 TNM control system.

Both Trekwerk and Show Canada deliver inspiring stages, yet both companies share an unpretentious attitude. "Just as important as the stage technology are the people with the know-how," explains Labadie. "Our employees share the theater and entertainment mentality. Whether their background comes from shows, sceneries, steel production or engineering, our employees understand stage venues down to the last detail and understand the need for flexibility and intuitive technology." The Trekwerk and Show Canada partnership continues to develop tailor-made stage technology for applications and projects all around the world. ■

www.trekwerk.com

Winning combination

Meeting the specific design requirements of a new building complex required close collaboration between seating developers and project architects

When Ferco Seating was selected to partner with the award-wining architect Moshe Safdie and his architectural firm to produce the seating for the Marina Bay Sands complex in Singapore, the opportunity came with equal amounts of honor and pressure.

Internationally revered for his first project – Habitat 67, in Montreal, Canada, built for the 1967 World Fair, Expo 67 – Moshe Safdie quickly earned a name for himself in the architectural world, and continues to push boundaries on every project he works on.

When it was time to address the seating at the Marina Bay Sands, Moshe Safdie and his team knew exactly what they required, down to the smallest detail. The seating had to match the rest of the building, and they were confident that they could trust Ferco Seating to produce the premium-quality solution that was needed.

Detailed specifications

When specifying the shape of the armrests, aisle panels, seat and back wood outers, and even the row numbers, Safdie Architects briefed Ferco in meticulous detail. After numerous prototypes, meetings, tweaks and sample rounds, both of the parties were happy, and the MBS Theatre Seating was finally ready for production.

In addition to the sleek aesthetic of the seating and intricate design features insisted upon by Moshe Safdie, Ferco's tip-up mechanism ensures that all seats tip silently and in a controlled manner. Rigorous tests were carried out so the seats met the acoustic properties specified, and ensured compliance with the Americans with Disabilities Act – making sure that the correct

number of seats had swing-out panels to allow disabled patrons to slide in and out of their seats with ease.

Ferco embraced demanding challenges during installation. The layout of the Marina Bay Sands meant that many configurations were required. Seats were floor- and riser-mounted, as well as mounted on sloping floors. Removable seats with quick-release fixings were also incorporated.

The combination of explicit specifications from the architect and the need for a large range of configurations to make the seating work perfectly made this particular project a complex and rewarding task for Ferco to complete – but complete it they did, on time, and exactly how Safdie Architects had imagined.

The comments from the Marina Bay Sands personnel are testament to the quality of Ferco's work on the project. "Ferco has always delivered our orders on time and has given us supplies that are of the best quality," says Lew Chong Kiat, facilities manager for Marina Bay Sands. "We have never received any defective items and have never had any problems with any of the products that have been installed and in operation for the past three years in our theaters."

The project was completed to the highest standard, and Ferco, Safdie Architects, Marina Bay Sands and owners Las Vegas Sands Corporation are all ecstatic with the result. ■

www.fercoseating.com

Above: **The Marina Bay Sands development in Singapore**

Below: **Seating within the new hall had to meet the exact specifications of the architects**

BACKSTAGE
MATT ROSS

Q&A

Michael Taormina, MD of the Cobb Energy Performing Arts Centre, on his distinguished career and recently announced retirement

Looking back on your career, do any particular highlights stand out? I don't think there's just one. Being involved in bringing major touring Broadway shows to New Orleans, with *A Chorus Line* in the late 1970s, and opening up that entire market. Producing Mardi Gras balls for all those years. Opening Louis Armstrong Park in 1980. Completing and remodeling the Benedum Center for the Performing Arts into the flagship property of the Pittsburgh Cultural Trust – and then with opera, ballet and dance, we built one of the largest touring Broadway markets in the USA. That's where the Gene Kelly Awards started, and I was involved in that. Then I was able to go to New York, working in the ticketing industry for a while, and that was great. I was wooed back to the venue business when the Hobby Center was opening in Houston – which also included incubating 20 or 25 small and mid-sized arts organizations to give them presence in the theater district through a program called Uniquely Houston. I've always been involved in arts education – it's something that I believe in giving back to.

What are you most proud of during your time at Cobb Energy Performing Arts Centre? It was the first performing arts center to be built in Atlanta in 40 years. It was built on time and on budget, and the Atlanta Opera and the Atlanta Ballet are resident companies along with the Arts Bridge Foundation, which has presented field trip programs to over 200,000 students since we opened. And then, of course, the Georgia High School Musical Theater Awards – the Shuler Awards – are all part of that.

Have you seen the relationship between venues and patrons change? Absolutely. There's nothing like a live performance. Since the days of the Colosseum, and even before that, people have been gathering in public venues to be together. I think it's all changed, but what we have today, given the technology in the phones in our hands, is the ability to instantaneously react to it. That can be positive, or it can be negative. Positively, thanks to people saying that what they're seeing is great, and promoting it. But negatively if those people let that reaction become the only thing in their lives – they have to post right away, it becomes almost competitive, and they interrupt a performance. Those are the courtesies that I believe have gone out.

Do you think that this technology could have a positive impact, overall? We need to figure out how we embrace things like our phones and social media in a positive way. Things have changed. If you walk into a Broadway theater and you see a beautiful set, and the show hasn't started yet – I don't see a problem with taking a picture and saying 'I'm at *Cinderella*, and I can't wait'. Now obviously when the show starts, you wouldn't do it. There's a reluctance to make these things work in a way that live theater can benefit from. But I do think there are the people out there who can do this.

Why is now the right time to retire? I've been working in this business for over 44 years, and at the same pace for all of that time. I'm 67, so I'm still young, and I wanted some good years to do the things that I wanted to do. I love the theater and I love the venue business, I wanted to be able to offer my expertise in any way I can, and have the chance to do other things. I still plan on working, but whether it's still in the business or something else, that remains to be seen. ■

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