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The culture show

MBLD lights Hadid's fluid lines at the Heydar Aliyev Cultural Centre in Azerbaijan

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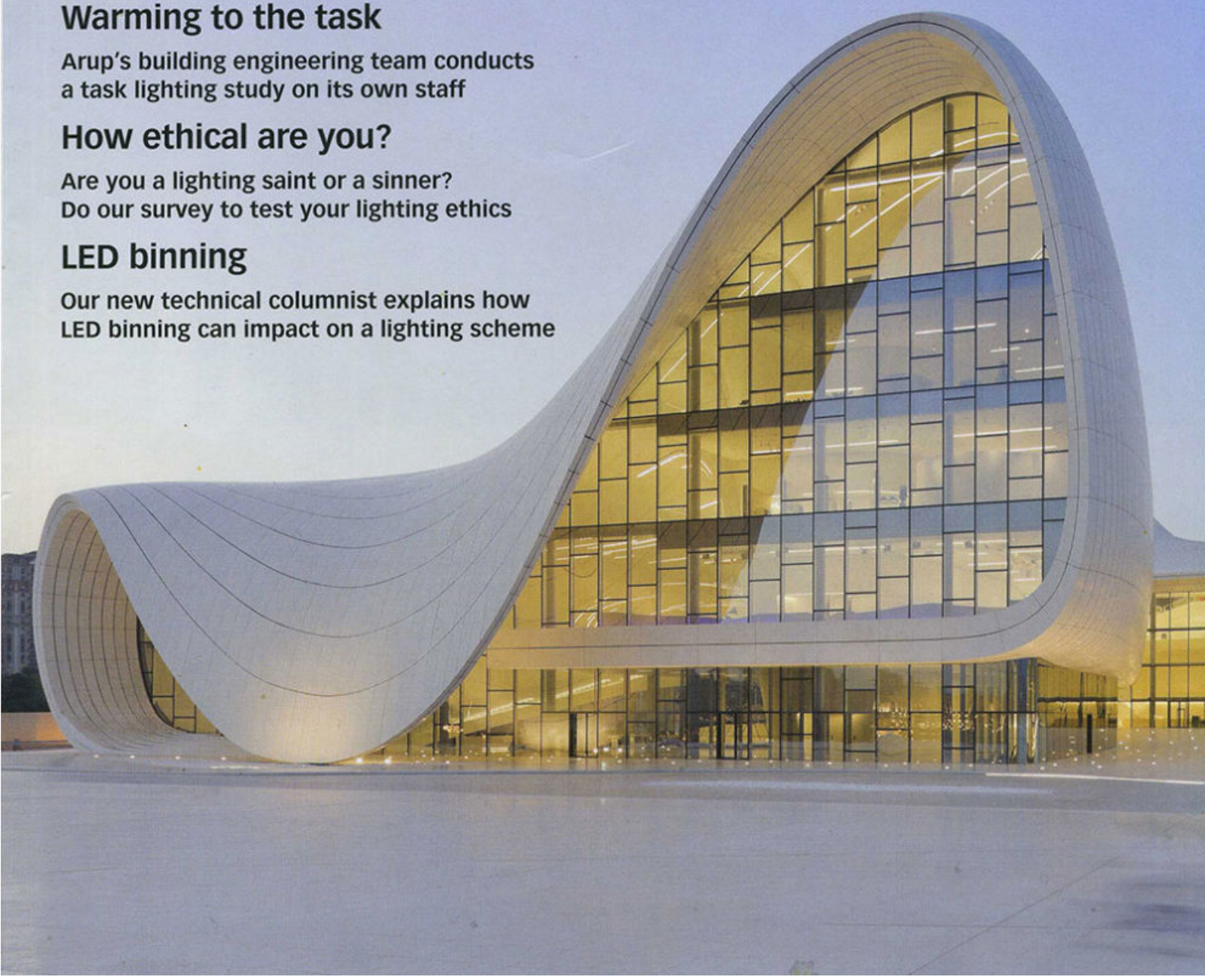
LED binning

Our new technical columnist explains how LED binning can impact on a lighting scheme



PROJECT DETAILS

PROJECT HEYDAR ALIYEV CULTURAL CENTER, BAKU, AZERBAIJAN

ARCHITECT ZAHA HADID ARCHITECTS

LIGHTING DESIGN MAURICE BRILL LIGHTING DESIGN

SUPPLIERS BEGA, DAVID MORGAN ASSOCIATES, ELLIPTIPAR, ERCO, INSTA, INTRALUX, LIGHT GRAPHIX, LUCENT LIGHTING, LUMASCAPE, MIKE STOANE LIGHTING, SELUX, SITECO, VIABIZZUNO, ZUMTOBEL

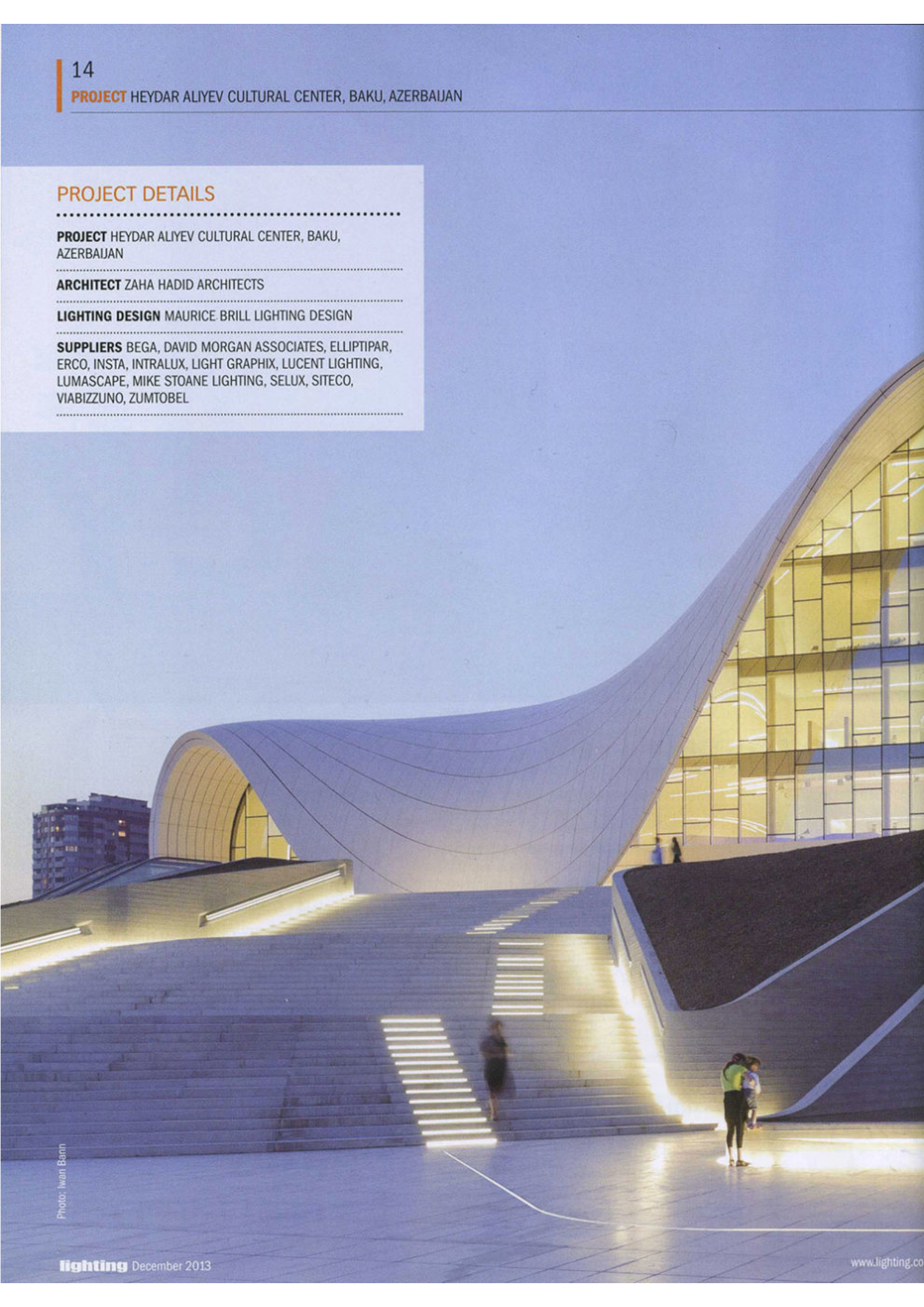


Photo: Iwan Baan

The bold and the beautiful

An innovative lighting scheme can get a building noticed but is rarely easy to achieve. **Jill Entwistle** finds out how MBLD came up with a solution to complement, rather than compete with, Baku's newest piece of outstanding architecture to put the city on the design map

It used to be a time-honoured tradition that when the economy looked a bit dodgy, art and culture were the first things to be dropped off the funding priorities list. Now, however, if you want to change your image and kick your economy out of the doldrums, you invest in a gallery, a museum or a cultural centre – preferably designed by a heavyweight architect.

Grand plans

The city of Baku, capital of Azerbaijan, has set about that strategy with a vengeance, launching a gigantic construction programme that has involved a series of *grands projets* including the well-publicised Flame Towers. The Heydar Aliyev Cultural Center by Zaha Hadid Architects (ZHA) was actually the first of these, but has taken the longest to complete. It has been pivotal in the role of redeveloping Baku.

The centre houses a museum, national library and a 1,200-seat theatre and conference centre. The building is stunning ▸

Photo: Iwan Bann

for its apparent simplicity and fluidity, flowing from the landscape to form a single continuous surface. It comprises an undulating space frame clad in 16,000 white panels. So complex were they, it took two and half years of testing and mock-ups before solutions were realised. Inside the ceiling is lined with 90,000 plasterboard sheets – a new material called Flex Board – adding up to the size of seven football fields.

ZHA's obsession with integration – it would have been sacrilege to take any other approach with such a clean, sinuous structure – and the complex, three-dimensional geometry added up to a demanding brief.

'We had to fuse the lighting within the fabric of the architecture,' says Rob Honeywill of MBLD. 'We were determined to find a lighting solution that would enhance the flowing nature of the single surface that encompassed the building – conventional lighting ideas fell short of creating a space that would complement the architecture.'

Skin deep Curvilinear slots incorporated within the building's internal skin meant lighting could be integrated without compromising the sculptural form of the ceiling

Because of the building's structure, all the lighting studies had to be made within 3D models to convince both MBLD and ZHA that no parameters or options had been left unexplored en route to the solution.

'It was through these studies that we came to the conclusion that using the ceiling surface as a secondary reflector would not only model the shape of the ceiling, but could also be used effectively to achieve ambient lighting,' says Honeywill.

"Using the ceiling surface as a secondary reflector would not only model the shape of the ceiling, but could also be used to achieve ambient lighting"
Rob Honeywill, MBLD

RING LEADERS

The sweeping, complex-shaped auditorium is entirely timber clad. Once more, integration is the key to the lighting approach and, ideally for MBLD, close collaboration meant it was able to provide feedback to Zaha Hadid Architects (ZHA) at an early stage. This enabled the timber detail housing the LEDs to be revised to achieve the correct light distribution while concealing the source.

'Most of the review had to be made within the 3D model itself,' says Rob Honeywill of MBLD, 'which meant checking every single section of the ring-lighting detail to ensure and demonstrate consistency of the ZHA detail and light output. The space is lit using a combination of DMA DMX-controlled, continuously mounted 10W Nichia LED modules within each of the timber rings, along with MR16 adjustable downlights linked to Multiload Voltmaster supply units.

The solution to the ceiling wash was a lighting shelf that could be mounted discreetly along the glazed façade's transom. Each houses double rows of high-output T5 asymmetric reflector lamps, as well as an internal row of T5 lamps to make the shelf glow. Each row is on a dimmable 0–10V lighting circuit. This is divided into five or six circuits so the lighting fade is smoother when coming close to the internal skin.

At the building's base sits a large floor trough, separating the skin from the floor and providing a wash of light to the walls.

'The challenge here was to create a continuous lighting detail with overlapping T5 lamps – IP54 internal and IP68 external – that followed the organic footprint of the building,' says Honeywill. 'It's important to point out that, during the time we were designing, the use of LEDs for ambient lighting was not yet available or else available at a very high cost and, therefore, limited only to certain areas of the building.'

Tricky situations

MBLD also had to resolve how to continue the concept of concealed fittings for the ambient lighting, where the geometry of the building prohibited the use of the light shelves and where the floor troughs weren't adequate.

'We also quickly realised that the need for emergency lighting was just going to prove too much for this principle,' says Honeywill. ZHA agreed to a concept of a curvilinear ceiling slot that could be used within the internal skin as it provided a way of expressing the sculptural nature of the ceiling, while still allowing the lighting to be integrated.

This was still tricky. As the exterior curve of the roof directly joins the interior ceiling, a ceiling slot that could be mounted and adjusted to fit curving planes in all three axes had to be made. The resultant 3D flexible T5 linear slot detail was able to fit all the locations proposed.

'We worked closely with ZHA to optimise the placement and quantity needed to achieve around 100–150 lux at floor level,' says Honeywill.

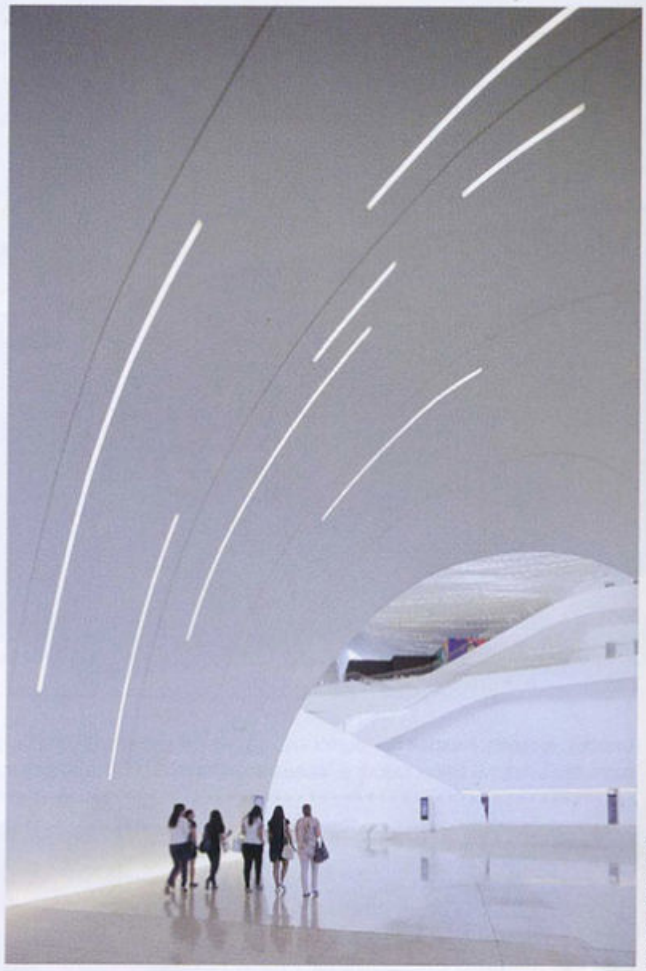


Photo: Iwan Bann

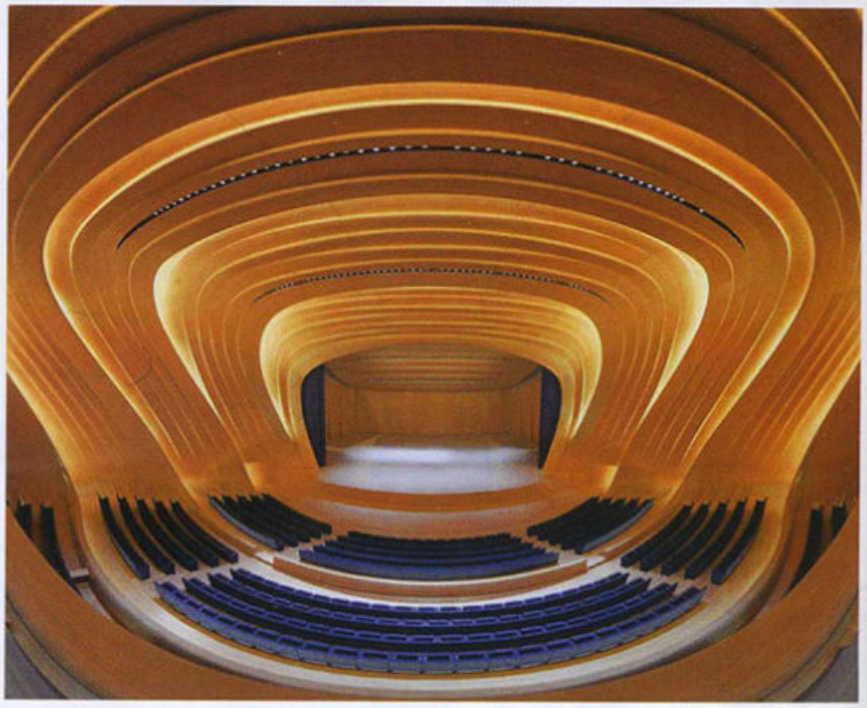
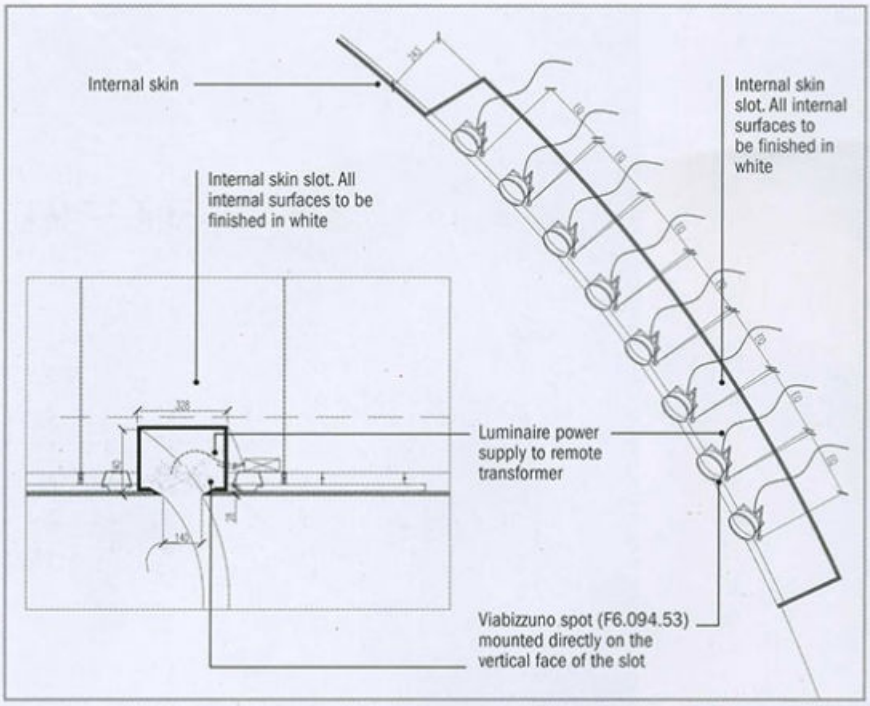


Photo: DIA Holding

Sweeping shapes Floor troughs allow the walls to be washed in light (above). The timber detail in the auditorium houses concealed Nichia LED modules contolled by a Voltmaster supply unit (below)



Location, location, location The interior skin lighting slots had to be carefully positioned (above). The auditorium's internal timber cladding housed and concealed LEDs to give the space a warm glow (below)

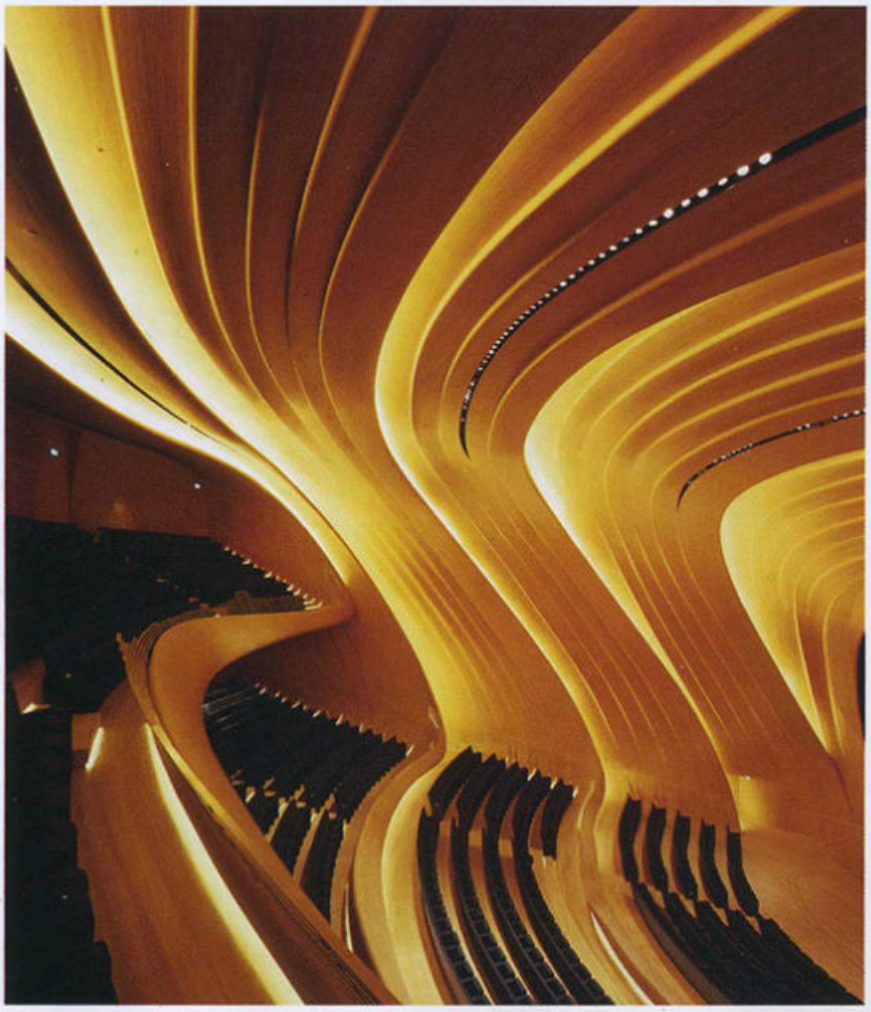


Photo: Helen Binet

TOP OF THE SLOTS

Photo: Hufton+Crow

Outside, the aim was to avoid clutter and create a sense of the building being encompassed by a feeling of light rather than a more formal, measured scheme. Only linear details are used, washing vertical surfaces. The approach to the main entrance is lit using a combination of continuous floor-trough uplighting and a series of custom-made LED wall slots and handrail details that wash the staircase and ramped areas.

'We wanted to avoid using any column or area lighting, and allow the landscape to lead the eye to the building, uninterrupted by any foreground pollution or clutter,' says MBLD's Rob Honeywill.

The indirect lighting theme was continued in the adjoining spaces, with ceiling troughs and continuous linear uplighting along the balustrades. Public-access area staircases have similar clean, concealed detailing – Barrisol perimeter T5 lighting is combined with handrail niche LED lighting.

The aim of the exterior scheme was to augment the lantern impression created by the accumulated effect of the uplighting and indirect lighting, and also further define the sculptural shape. Lighting the façades closest to the building's glazing creates an effect of a gradual fade as it moves away from the openings. Light and dark were important elements.

'We deliberately kept parts of the building façade dark to express the lit elements better,' says Honeywill. 'It was an incredible challenge to arrive at a solution that achieved a smooth fade-off of light as the building shape converges or merges into the landscape, giving very little room to place luminaires.'

Lumascape inground fittings with a limited range of beam distributions uplight carefully selected curved surfaces. Bega 70W HIT asymmetric inground luminaires wash the side wall panels as they curve between building and landscape. On the west side, the building rises up to 70m with overlapping fins. Here asymmetric projectors were installed inside the mechanical slots to hide them from view but achieve a smooth fade of light.

The project took more than five years to realise. Why did it take so long? 'The attention to every detail, line and facet has been considered to ensure the seamless integration of lighting within the architecture,' says Honeywill. ■