GENERAL LIGHTING SUPPLIERS:
INTERIOR: NEOLEC [COLD CATHODE]

EXHIBITION LIGHTING SUPPLIERS: MIKE STOANE LIGHTING [CUSTOM ADJUSTABLE LED ACCENT FITTINGS], TRAXON [LED PANELS/STRIPS, BIKE WALL AND CAR WALL], CONCORD [BEACON MOSE]

MUSEUM AND GALLERY LIGHTING: ENCAPSULITE [OSRAM T5 TUBES WITH DIMMABLE BALLASTS IN LINKABLE FITTINGS FOR FLOOR-MOUNTED SYSTEM], RS ROBERTSON [DECORATIVE CFL FITTINGS FOR THE GLASGOW STREET], VALMONT [575 STREETLAMP POLE]
Scotland the brave

The Glasgow Riverside Museum is the first Zaha Hadid building to be completed in the UK. Jill Entwistle speaks to Inverse Lighting and DHA Design about working with an architect famed for her inability to compromise.

Glasgow has notched up an architectural coup by completing its new transport museum ahead of the Olympic Aquatics Centre venue, beating England to the post with the first Zaha Hadid building in the UK. Hailed, predictably, as Glasgow’s Guggenheim, the Riverside Museum – it sits on the River Clyde where it meets the River Kelvin – is a flagship of the city’s Clyde Waterfront regeneration.

Zaha Hadid Architects is not famous for compromising, so like every other aspect of the design process, the lighting came in for some exacting demands. Originally ZHA insisted on an uplighting solution. A third party therefore came up with a concept using uplighting projectors hidden behind vertical grillage at the central spine of the main exhibition hall. However, while it answered the brief of keeping the three-dimensional ceiling free of attachments, ZHA decided it wasn’t clean enough.
Which is why Inverse Lighting was brought in. “The original request was to light the space without attaching anything to the ceiling,” says Inverse director Filip Vermeiren. “What makes them great is that they have a very strong concept and they keep to it. They don’t take no for an answer. It’s a difficult process but you have to try and make it work and in the end it pays off. It makes them what they are.”

Inverse looked at solutions that followed the lines of the ceiling, delineating the unique structure. One of the original ideas was to have a linear continuous light source held from one side of the gables, providing more intense uplighting on one side of the pitched roofs than on the other. The complications associated with this option were that the supporting structure and cable containment would be quite significant and prominent considering the full length of the main exhibition hall,” says Inverse’s Onur Sunguroglu.

As the ceiling is made of moulded GRG panels, the preferred alternative was a linear continuous light source that could be recessed in a slot and built as part of the moulding process. This option eliminated the need for additional supports and cable containment issues as everything could be accommodated behind the lighting slot. Having arrived at this solution, Inverse carried out a series of mock-ups and calculations for different slot details to establish which type would perform best.

The result is a 120mm-wide slot with a single line of high-output cold cathode. The lamp sits flush with the front of the slot keeping a sharp outline of the recess, while minimising shadowing. To create homogeneity with both daylight and display sources, the colour temperature is 4200K (the only point of liaison with display lighters DHA.

**PROJECT DETAILS**

**Lighting design:** Inverse Lighting (interior ceiling, exterior, landscape and tall ship Glenlee), DHA Design (exhibition)

**Additional lighting:** Buro Happold

**Architect:** Zaha Hadid Architects

**Main building contractor:** BAM

**M&E, structural and civil engineering:** Buro Happold

**Exhibition designer:** Event Communications

**Exhibition contractors:** Mivan, Black Light, S1 Electrical, Engage, Sysco, Stuart Frame
It was important to keep the visual link from outside into the exhibition space, maintaining the idea that the building links the city with the river," says Sunguroglu.

Exhibition lighting

DHA Design was responsible for the lighting of the exhibits in the museum. Here the brief was to design a predominantly ground-mounted display system, plus a flexible showcase lighting system and a number of large-scale interactive installations with kinetic lighting. The source count is kept tight: LED strips and adjustable LED spots for closer accent lighting, CDM AR111 for long throws, T5s backlighting glass plinths and a variable LED system for the showcases.

Given the degree of daylight ingress from both ends, harmonising the colour temperature of the different sources was an issue. DHA asked for the colour temperature of the cold cathode to be cool white, and then used 4000K for the fluorescent and 3000K for the LED and metal halide sources. “The result is a well-balanced transition that allows the eye to comfortably take in the grand daylit vistas with their exciting changes of light, and equally appreciate the close-up views of the exhibits as they are gently lifted out from the pistachio-tinted background light,” says DHA’s Adam Grater.

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Bigger is better
Large displays were uplit with continuous runs of floor-mounted fluorescents

Large object displays (trains, trams):
Uplit with continuous runs of floor-mounted fluorescents set behind clear glass with a Plexiglas diffuser. Details are clearly illuminated, while the long expanse of backlit glass provides numerous highlights on the reflective paint finishes of the vehicles.

Smaller objects (cars, turbines):
Fittings were limited to two sizes of LED strip, and a versatile adjustable accent light that could be recessed, used as an uplight, downlight or surface mounted. The customised fittings by Mike Stoane have 3 x 2W LEDs in a variety of beam angles. For larger displays, LEDs were set into various lengths of channel, also made by MSL, with a miniature version for smaller features. All the fittings have interchangeable lenses and a positive locking system.

Showcases (up to 8m long):
Minimal case frames with clear glass tops ruled out fibre optics on space grounds. DHA designed a flexible LED system—the same as used on small-plinth displays—that can swap between a strip giving a soft wash of light, and one mounted with adjustable spots to provide highlights. These sit in slots punched into the frames, and can also be blanked out where a light is not required. Large high-density displays set into walls are lit more traditionally with a fluorescent (with louvre) background wash and rows of adjustable fibre optic spots for highlights. Both tungsten and metal halide were used, depending on the throws and objects.

Lighting columns:
The display lighting is primarily from low level, but DHA also wanted a downlighting component. The ceiling was out as a location so, given this was a transport museum, a customised modular column seemed an appropriate solution. Working with MSL and using a standard streetlamp pole, DHA developed a vertical stacking cassette system housing adjustable 70W CDM AR111 heads. The through-wired cassettes can be stacked up to seven high and individually rotated to the desired position.

Special features:
The Velodrome, a suspended Mobius strip used as a mount for cycles, is lit with a continuous run of high-output LED tape set in a curved channel. The bikes also have three MSL pop-ups each for accent light.

Glasgow street:
A cobbled street with period units features light fittings that match, as closely as possible, actual fixtures. Lighting changes from day to night and to highlight objects for audio stories. The street also features cool and warm soft break-up washes (Source 4 Junior Zoom) and highlights from Source 4 Pars. The ceiling is uplit with Chromaflodes. The entire system is controlled by a set of Chilli dimmer and relay racks.

Picture perfect
All the fittings in the displays have interchangeable lenses and a positive locking system

Special effect
The Velodrome is lit with a continuous run of high-output LED tape set in a curved channel

A step in time
Glasgow Street is a cobbled street with period units. The lighting changes from day to night