THIS IS CONCRETE

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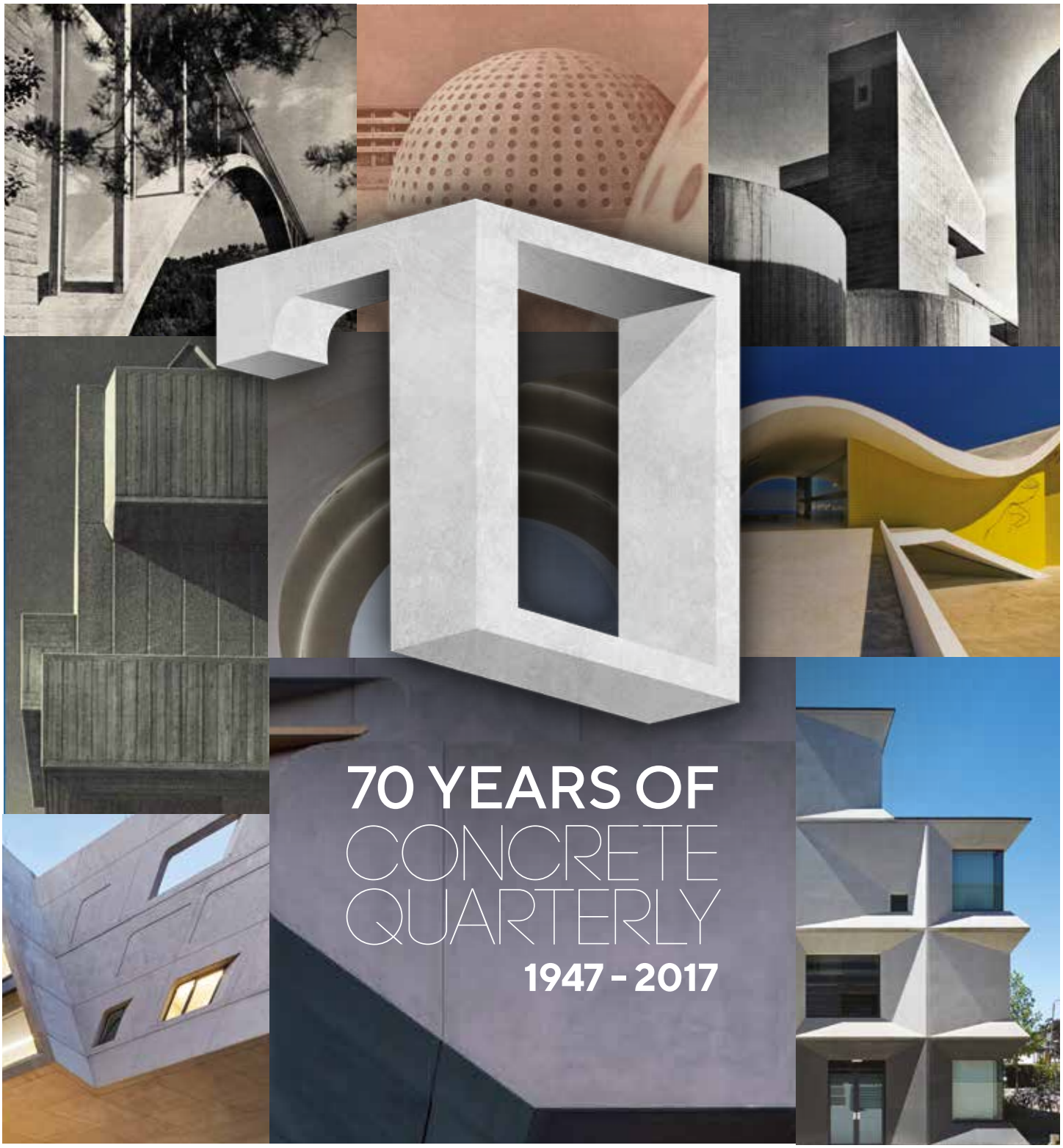

70 YEARS OF CONCRETE QUARTERLY

1947 – 2017

CELEBRATING SEVEN DECADES OF CONCRETE ARCHITECTURE AND ENGINEERING


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WINTER 2013 | ISSUE NUMBER 246: CONCRETE LIVING
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Exposed concrete brings simplicity and style to luxury retreats in the wilds of India and Australia
FOSTER IN ARGENTINA
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How Adrian James built an award-winning home from precast concrete panels in less than a week


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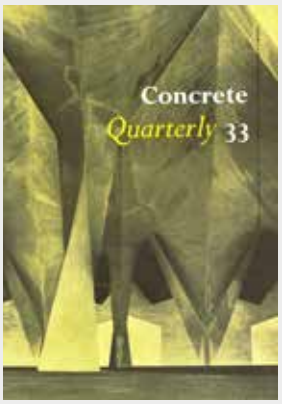
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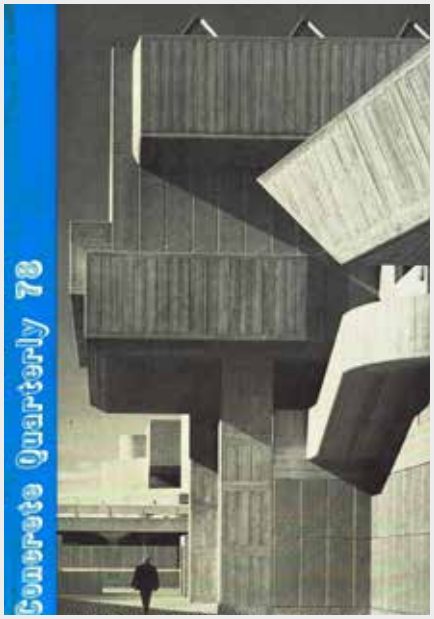
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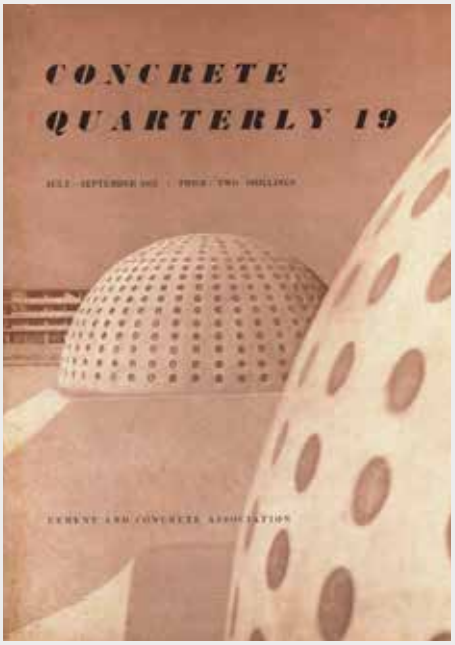
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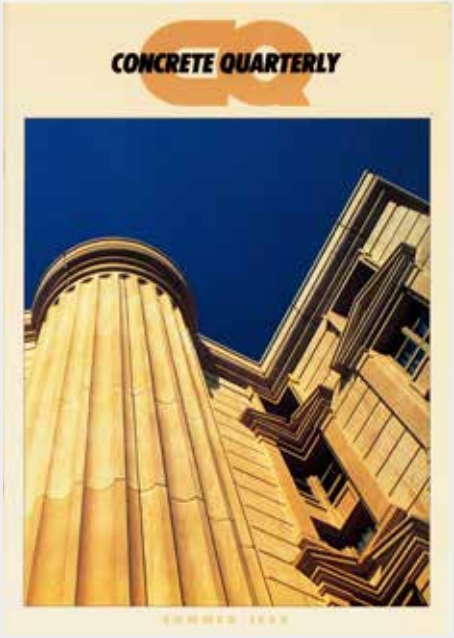
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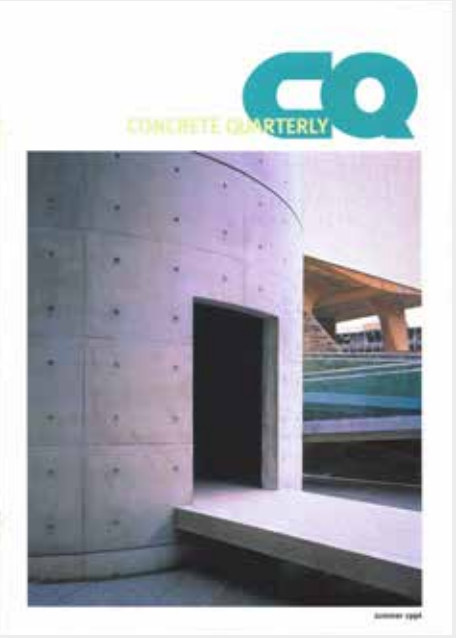
CONCRETE QUARTERLY

WELCOME

I think my colleagues were rather sceptical when I joined The Concrete Centre in 2003. If having a marketing background wasn't bad enough, I had no prior experience of the construction sector at all. I'd worked in the creative industries and in technology, but it seemed that it was going to take some time to earn my stripes among those who had dedicated much of their lives to architecture and engineering. The low point in those early days was probably when I admitted that I didn't know who Le Corbusier was.

Fourteen years on, Concrete Quarterly has a lot to answer for. I went from proofing the pages to actually reading them, to doing more research about the projects, to asking questions about the finer details of the concrete. Soon I was pinning images of Santiago Calatrava's Turning Torso tower (below) on my desk partition – I was particularly struck by how, as CQ wrote, he was able to "remove any boundaries between engineering, sculpture and architecture". It seemed that my initiation was complete – it had taken only a year.

In its long history, Concrete Quarterly has covered many of the great masters of architecture and engineering. I may now know their names, and be able to hold my head up high in conversation with colleagues, but it's the work of current practitioners that has most captured my imagination and respect. During my time helping to steer this magazine, there are a few projects that stand out as personal favourites: the MAXXI museum and London 2012 Aquatics Centre by Zaha Hadid, Persistence Works studio and gallery by Feilden Clegg Bradley, David Chipperfield's Neues Museum and the Angel Building by AHMM, and of course the Turning Torso.

It's a privilege to be the current publisher of Concrete Quarterly, and we hope that the 70th anniversary celebrations planned by The Concrete Centre will do credit to the magazine's illustrious legacy, as well as helping all those involved in shaping the built environment to feel inspired, reinvigorated and proud of the positive contribution that concrete makes to our lives, by making possible such feats of architecture and engineering.

With Artifice books on architecture, we are publishing a retrospective, The World Recast: 70 buildings from 70 years of Concrete Quarterly. Browsing its pages, it becomes clear how significant a part concrete has played in our social, economic and environmental development since the postwar period. The influence of the material and its evolution will no doubt continue – whatever lies ahead, it is my hope that Concrete Quarterly will continue to capture it.

Claire Ackerman, head of marketing and communications, The Concrete Centre

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The Concrete Centre provides guidance, seminars, courses, online resources and industry research for the design community. Our vision is to make concrete the material of choice, and to enable all those involved in building design, construction and maintenance to realise its full potential.

The Concrete Centre is supported by industry to inform, educate and inspire. Our members are Aggregate Industries, Allen Newport, British Precast, Breedon Group, Brett Group, Britannia Aggregates, Cemex, Cormac, Deme Building Materials, FM Conway, Gallagher Aggregates, Grundon, Hanson, Harleyford Aggregates, HH & HE Drew, Hills Quarry Products, J & J Franks, J Clubb, JJ Prior, Marshalls Group, Moorhouse Sand & Gravel, Moreton C Cullimore, Morris & Perry, Myers Group, Rotherham Sand & Gravel, Salop Sand & Gravel, Sea Aggregates, Smith & Sons, Springfield Farm, Tarmac, Trefigin, Tudor Griffiths, Volker Dredging and Wildmoor.

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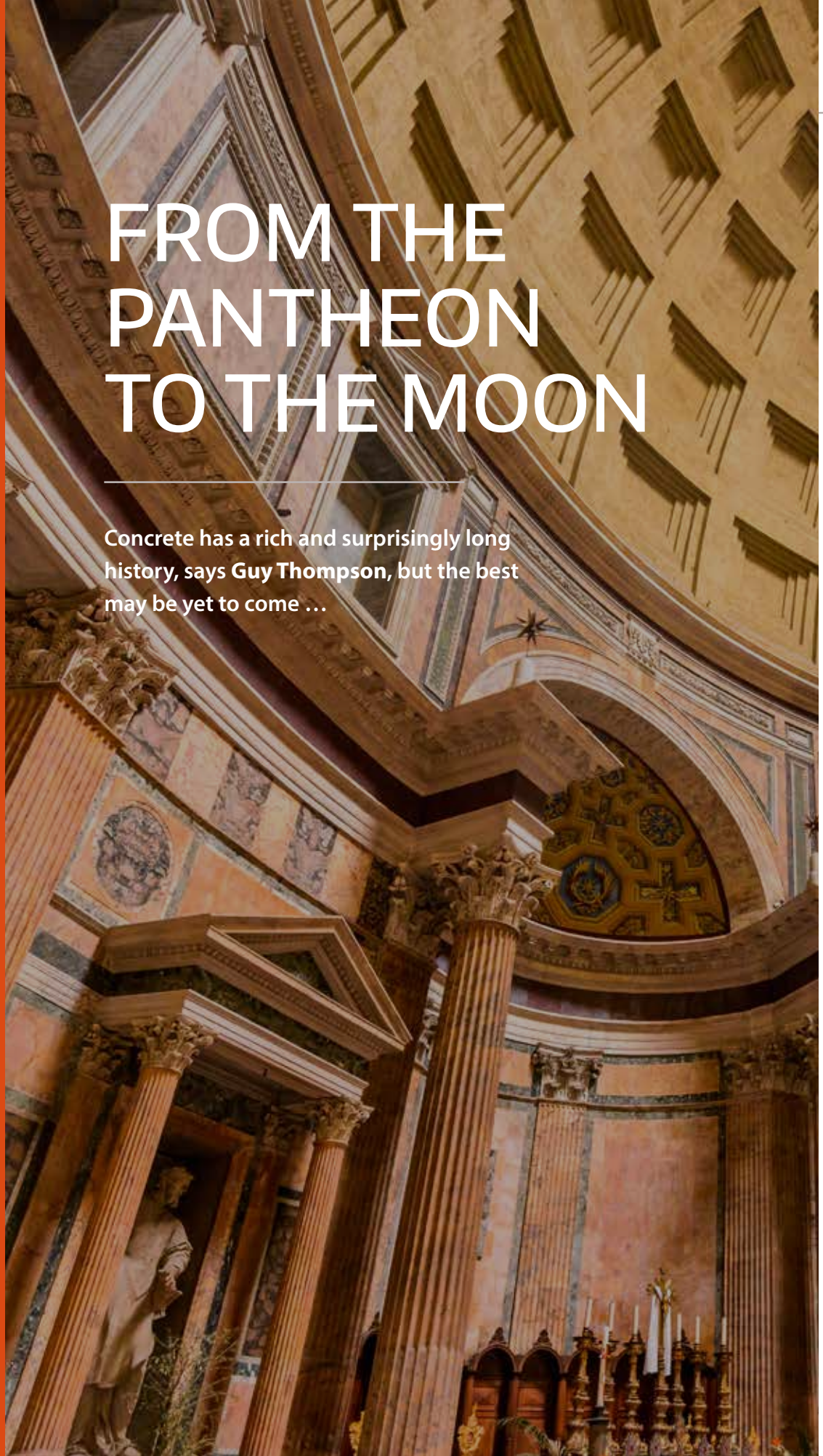


FROM THE PANTHEON TO THE MOON

Concrete has a rich and surprisingly long history, says Guy Thompson, but the best may be yet to come …

70 years is but a blink in the history of mankind, and even in the life of concrete architecture. Concrete has existed in some form since time immemorial, though it is only in the last 150 years, since the invention of reinforced concrete, that it has become the most used manmade material on earth, the second most used overall, only exceeded by water.

As early as 8000 years ago, a collation of materials including naturally occurring cementitious binders was used for a range of building types from organic earth shelters to major cultural complexes. But it was the Romans who first invented what we call hydraulic cement-based concrete. They built numerous concrete structures, including the Pantheon in Rome, one of the finest examples of Roman architecture, which has a 42m-diameter dome made of poured concrete.

In the concrete we pour today, Portland cement is the most commonly used kind, and the process to produce it was invented in England in 1824 by Joseph Aspdin. The name "Portland" may have been originally chosen to encourage a favourable comparison to the popular building stone, or it may merely have been the location from which the product was quarried.

As with most English inventions, early development took place abroad, in Germany, Italy, the US and France. In 1867, a French gardener named Joseph Monier decided to add iron mesh – and reinforced concrete was born. Its importance was immense: combining the two materials offered both tensile

ABOVE NASA is developing technologies that use local resources to construct lunar and martian infrastructure. In this research project, at the University of Southern California, robots would print building, landing pads and roads with concrete made from lunar rocks

and compressive strength, and made possible a whole new set of architectural forms. Monier took his invention to the 1897 Paris Exposition and patented it.

In 1903, architect Auguste Perret built an apartment building in Paris using clearly visible steel-reinforced concrete for the columns, beams and floor slabs. The walls of the residence on the Rue Franklin were non-load bearing, but its elegant tiled facade was much admired. People began to view concrete as a potential architectural material, as well as a structural one, and Perret's design would go on to influence many subsequent reinforced-concrete buildings.

There was another major leap in the public acceptance of concrete the following year, when the 16-storey Ingalls Building in Cincinnati, Ohio became the world's first reinforced concrete skyscraper. It took architects Elzner & Anderson and engineer Henry N Hooper two years to convince the city authorities that it wouldn't collapse under wind loads or even its own weight. The building is still standing today.

In 1921, another pioneering Frenchman, engineer Eugène Freyssinet, unveiled two gigantic parabolic-arched airship hangars at Orly Airport in Paris. His patent for prestressed concrete was granted in 1928. Reinforced concrete came to further public attention in the shell constructions of Heinz Isler and the bridges of Robert Maillart, both Swiss building engineers.

From the end of the first world war to the second, concrete became a key material for defensive structures. Concrete provided shelter in the form of bunkers, and played an important strategic role as floating harbours, motorways, bridges and tunnels.

At the same, leading architects and engineers such as Le Corbusier, Mies van der Rohe, Marcel Breuer, Frank Lloyd Wright and Pier Luigi Nervi were turning to concrete to enhance civilian life, designing mass housing, offices and factories.

CONCRETE WILL SURELY CONTINUE TO EVOLVE TO BETTER REFLECT THE NATURAL AND LOCAL MATERIALS FROM WHICH IT IS MADE

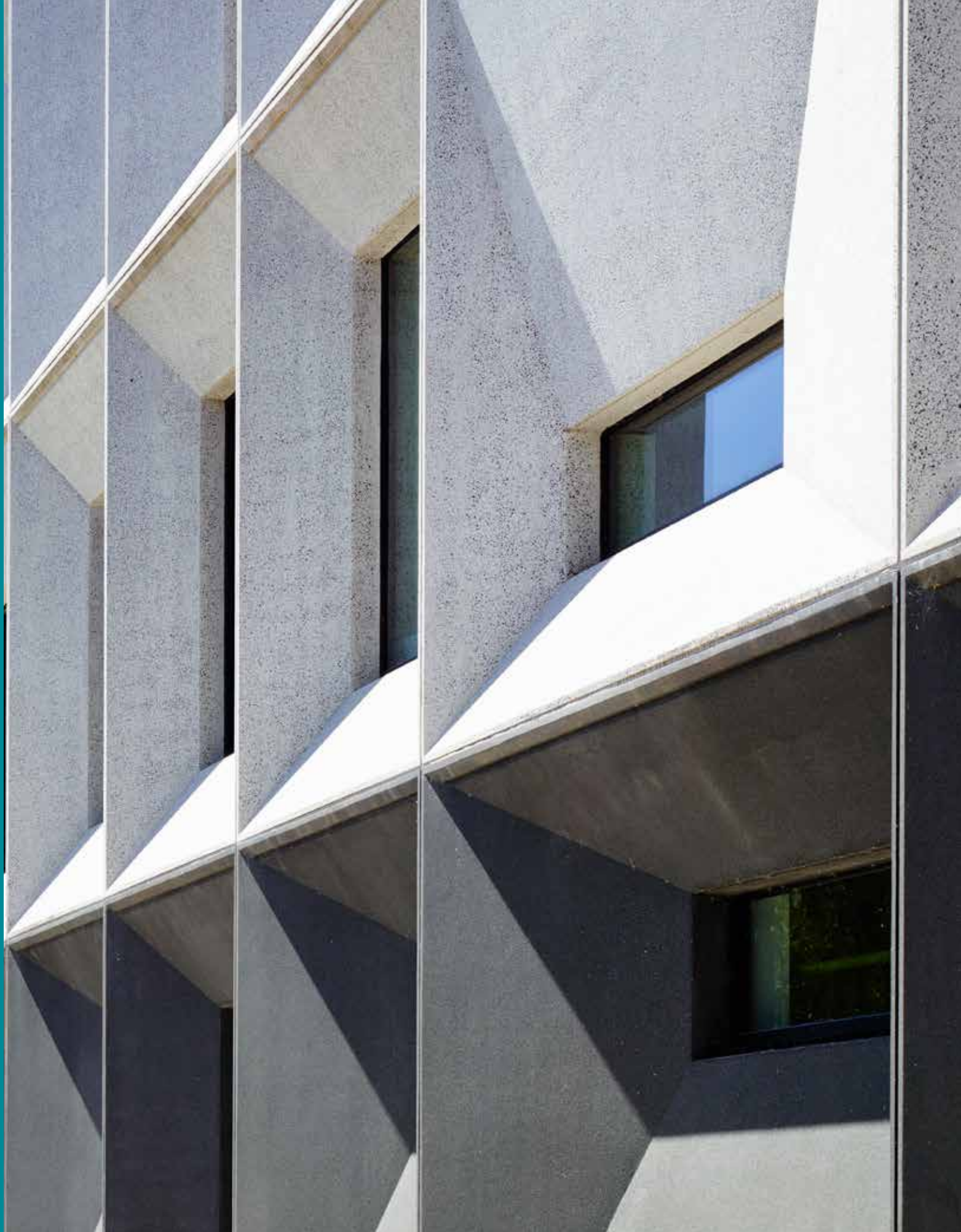
This was the world that Concrete Quarterly was established to document. It was first published in 1947, some 80 years after the invention of reinforced concrete. In those early years, its content was informed as much by the preceding war years as it was inspired by a brave new hope for the post-war future. Then, concrete was predominantly as a construction material for buildings and infrastructure, although throughout this period it was also used for a range of small-scale structures and household objects and decoration, from sheds, garages and fences to tables, worktops and polished floors.

Over the next 70 years, CQ was to reflect the rise, fall and more recent renaissance of concrete architecture. One style above all others encapsulates this trajectory: Brutalism. Loved and loathed in equal measure, Brutalism perhaps best encapsulates concrete architecture's contradictions and its challenges. Today, many iconic exemplars have been lost but many have been retained, reused and listed, having become much loved and an intrinsic part of our towns and cities.

As for the future direction of concrete architecture, there are plenty of exciting developments in the pipeline – technologies such as digitalisation and 3D printing, for example, and advances in the material itself, such as high-strength concrete, carbon-free cement and new forms of reinforcement. All of these will play a part in meeting the challenges of climate change and population growth. No doubt the drive for material efficiency and weight reduction will shape our buildings, and concrete will continue to evolve to better reflect the natural and local materials from which it is made. Though anchored in the UK, CQ has always cast an eye to the global scene. Perhaps in future we will look even further: NASA is already researching the potential for 3D printing with indigenous materials on the moon and Mars.

But the fundamental attributes of the material – and its appeal to designers – will remain unchanged: durability, resistance to fire and flood, energy efficiency, flexibility of form and function. All of these will continue to provide the architect not only with inspiration but technical responses to their clients' most challenging briefs.

Photos: Fotolia, NIAC Contour Crafting



SECOND COMING

Rough, smooth or intricately detailed, exposed concrete is back in vogue for new buildings of every kind. So why have architects fallen back in love with the concrete aesthetic, asks **Elaine Toogood**

At a recent panel discussion, I was asked to explain the resurgence in popularity of concrete architecture in the UK. But the truth is that it never really went away. It is the overt expression of concrete that has come back: we are simply seeing more of what might previously have been hidden.

This trend is clearly visible in the winners of the Stirling Prize. Over last 20 years, at least half have featured a significant amount of exposed concrete. This rises to seven out of 10 of the most recent winners: David Chipperfield's Museum of Modern Literature, Rogers Stirk Harbour + Partners' Maggie's Centre, the MAXXI Centre and the Evelyn Grace Academy by Zaha Hadid Architects, Stanton Williams' Sainsbury Laboratory, Haworth Tompkins' Everyman Theatre and Allford Hall Monaghan Morris' Burntwood School.

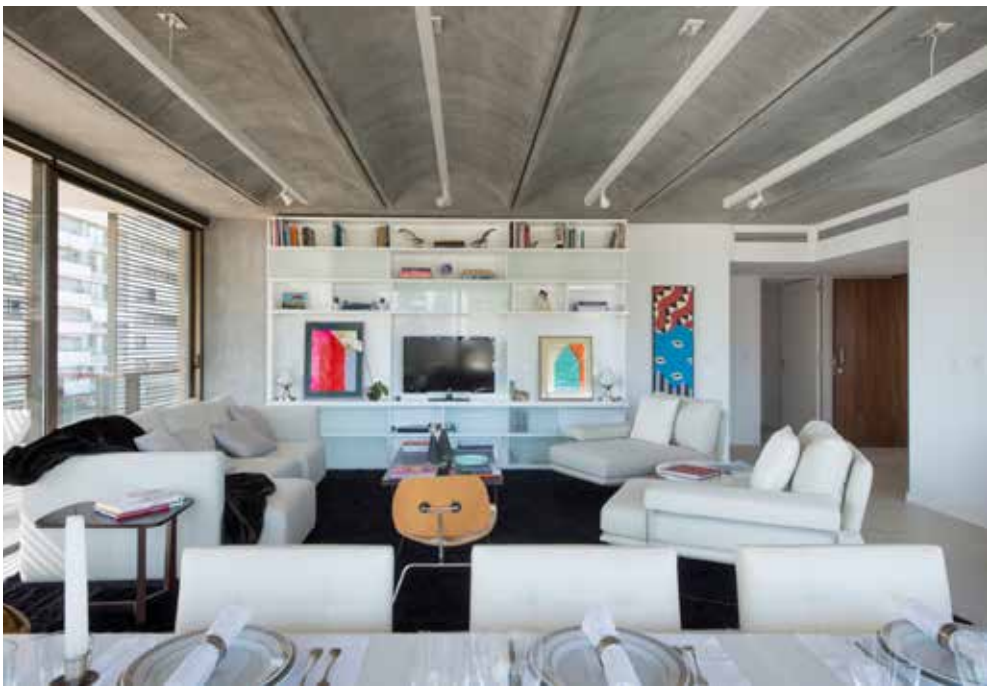
In each of these buildings, a cast concrete structure is exposed internally and five of them also have concrete facades. Significant numbers of buildings on the shortlist for these years also include visual concrete. The Stirling Prize is not necessarily a reflection of the wider picture, but it does give an indication of where value or architectural merit is currently perceived to lie.

So what's behind the renewed popularity of concrete, and the choice to leave it exposed? In conversations with architects and within Concrete Quarterly's own coverage, some common themes start to emerge…

1. It wins awards

It is clear that good architecture leads by example and that celebrated, aspirational design influences new work. A string of great concrete projects is arguably bound to inspire more. Architects often refer to other buildings as a source of inspiration. The Kunstmuseum in Liechtenstein by Morger Degelo Kerez was cited by Chipperfield as one inspiration for the concrete of the Hepworth Gallery, for example. Aesthetics plays a big role, but there is also the confidence factor: prior examples

GOOD DESIGN LEADS BY EXAMPLE – A STRING OF GREAT CONCRETE PROJECTS IS ARGUABLY BOUND TO INSPIRE MORE



ABOVE The Aleph apartment building in Buenos Aires by Foster + Partners **LEFT** Burntwood School in London by AHMM

Photos: Timothy Soar, Nigel Young/Foster + Partners

demonstrate that a high-quality result is achievable, practically as well as economically.

2. It's a good source of thermal mass

Of course, the creation of architecture exists within a broad context of building legislation, finance, climate, local environment, construction techniques, innovation and knowledge. One aspect that has significantly changed the way that buildings are constructed is the much greater importance of energy efficiency, and the ambition, backed by subsequent regulation, to reduce reliance on air conditioning and improve thermal performance.

The benefits of leaving a heavyweight concrete structure exposed so as to tap into its thermal mass are much more widely understood than they were 20 years ago. This is arguably the most influential factor in the trend for internal visual concrete.

Combined with the right ventilation strategy, revealing the underside of a concrete structural floor creates a concrete soffit. This provides an excellent source of passive radiant cooling for the space below. It is also a great way to avoid the monotony of endless suspended ceiling tiles, and to offer "a sense of generosity" and greater daylight penetration without increasing floor-to-floor heights, as recently noted by Rab Bennetts in his Five Insights publication. The essence of this strategy can be found in each of the award-winning projects listed above, as well as numerous other contemporary examples. For example, in CQ 247 (Spring 2014), Hopkins described the use of exposed concrete at Brent Civic Centre as "essential to the environmental strategy".

In many ways, the research and evidence published by Bennetts Associates has played a key role in the contemporary use of exposed concrete for its thermal mass – although at the Powergen headquarters, the practice's earliest test bed completed in 1994, the coffered concrete ceilings were actually painted white.

3. It lasts and lasts

Thermal mass was a factor in the choice of exposed concrete for the Greenwich School of Architecture, but according to Heneghan Peng's Roisin Heneghan it wasn't the main reason. "Primarily we wanted a robust and durable interior with an exposed frame to allow us to make use of every inch of space available," she said in CQ 250 (Winter 2014).

A similar approach was adopted by Nicholas Hare Architects for St Paul's School CQ 245 (Autumn

2013), where it used concrete "to create a tough, hardwearing environment that needs no painting". Robustness and durability emerge repeatedly as attractive benefits of exposed concrete, especially for schools and public buildings, a rationale described succinctly by Paul Monaghan in CQ 256 (Summer 2016). Westminster Academy, he said, "looks the same as it did 10 years ago. If the walls had been painted it would look knackered."

This enduring quality is not just practical, but poetic. "The wonderful thing about concrete is that it has a solidity which flies in the face of our increasingly disposable modern world,"

CONCRETE HAS A SOLIDITY THAT FLIES IN THE FACE OF OUR INCREASINGLY DISPOSABLE MODERN WORLD

CLOCKWISE FROM TOP LEFT Powergen Headquarters in Coventry by Bennetts Associates; Everyman Theatre in Liverpool by Haworth Tompkins; The Hiscox Building in York by Make; St Paul's School science building, west London, by Nicholas Hare Architects

Photos: Peter Cook, Philip Vile, Make Architects, Alan Williams

STRUCTURAL EXPRESSION AND 'HONESTY' IN CONSTRUCTION DOES HAVE AN ENDURING ATTRACTION

explained Hugh Broughton in CQ 255 (Spring 2016). "It is reassuring both in its monumentality and in the certitude that it's going to be there for a really long time."

4. It has integrity

The concepts of structural expression and authenticity reoccur throughout architectural history. They were much in evidence in the UK in the 1950s, 60s and 70s. Concrete buildings celebrated the industrialisation of their making process, unencumbered by today's requirements for thermal bridging and insulation. Concrete columns, beams and floorplates were expressed externally, along with "raw" concrete facades.

At this time, modern construction was exemplified by exposed reinforced concrete, a material capable of mass production, and therefore essential to solving the post-war housing crisis and delivering the social reforms of the time. Perhaps the current appeal of visual concrete is in part a nostalgia for the idealism of that period?

Whatever the reason, structural expression and "honesty" in construction does have an enduring attraction, which extends beyond the architectural community. Foster + Partners, for example, convinced the client for The Aleph apartments in Argentina to expose the concrete with the argument that "the purer architectural expression of the building structure was to leave the concrete visible", (CQ 246, Winter 2013). At Hiscox's HQ in York, architect Make said that the expression of the concrete structure of the building in the large entrance space was adopted "as a means to express their brand

values [of] integrity and honesty" (CQ 256, Summer 2016).

5. It has many faces

Concrete is an inexpensive and widely available building material associated with the most basic agricultural buildings or utilitarian spaces such as storage and plant rooms. But specified carefully and executed correctly, it can create beautiful, luxurious surfaces – so far from an "industrial" aesthetic that it is barely recognisable as concrete. This versatility is another often quoted advantage of visual concrete, as contributors to CQ's regular Lasting Impression column have noted, including Stanton Williams' Alan Stanton (CQ 248, Summer 2014) and Euan Macdonald of Hawkins Brown (CQ 259, Spring 2017).

Concrete has sculptural potential, and the ability to form both vertical and horizontal planes. The best expression of the craft of concrete is perhaps architectural precast concrete cladding, often created using advanced factory techniques. Intricate textures and patterns can also be realised with elaborate moulds, such as Níall McLaughlin's facades for the 2012 Olympic Athletes Village based on the Elgin Marbles (CQ 237, Autumn 2011), or ACME's Victoria Gate scheme in Leeds (CQ 259, Spring 2017), both bespoke, unique concrete creations. Other early examples include the work of Bill Mitchell or the organic facade of Christchurch and Upton Chapel in Lambeth from the early 1960s.

Perhaps it is this potential for individuality that is at the heart of concrete's visual appeal. Not just the opportunity for creativity or its ability "to be moulded into almost any shape", as described by Jonathan Parr, Foster + Partners' project architect for Queen Alia Airport in Jordan in CQ 244 (Summer 2013), but that each part of the surface is unique. Concrete is, after all, made from natural materials, and its surface expresses these natural variations and how the constituents have come together. The "naturalness" of concrete is a contemporary architectural aspiration. It can be illustrated by the exposed aggregate of Mole Architects' Houseboat like a weathered sea wall (CQ 260, Summer 2017) and the strata-like layers of Peter Zumthor's Bruder Klaus Field Chapel. At the Everyman Theatre, Haworth Tompkins used concrete as part of a palette of "natural and self-finishing materials … to keep it informal and friendly" (CQ 248, Summer 2014). As ZHA's Johannes Hoffman said when describing the practice's extension to St Antony's College in Oxford: "We really like concrete because it has this natural quality, it can be crafted and it ages gracefully." (CQ 253, Autumn 2015).

What of the future? Innovations in concrete itself and new forms of the material will no doubt further broaden the opportunities of visual concrete – such as light-transmitting structural walls or photo-luminescent structures. Extraordinary lattice-like structures in ultra-high-performance concrete (UHPC) are already challenging preconceptions of what is achievable. Simon Allford of AHMM summed it up nicely in his Lasting Impression column in CQ 251 (Spring 2015): "The magic of concrete is its history. It's an ancient material, invented essentially by the Romans, but it's almost as if every era rediscovers it and refines its use."

CLOCKWISE FROM LEFT The Houseboat, Poole by Mole Architects; Victoria Gate shopping centre in Leeds by ACME; MuCEM in Marseille by Rudy Ricciotti

Photos: Rory Gardiner, Jack Hobhouse, Florent Revest/CC BY-SA

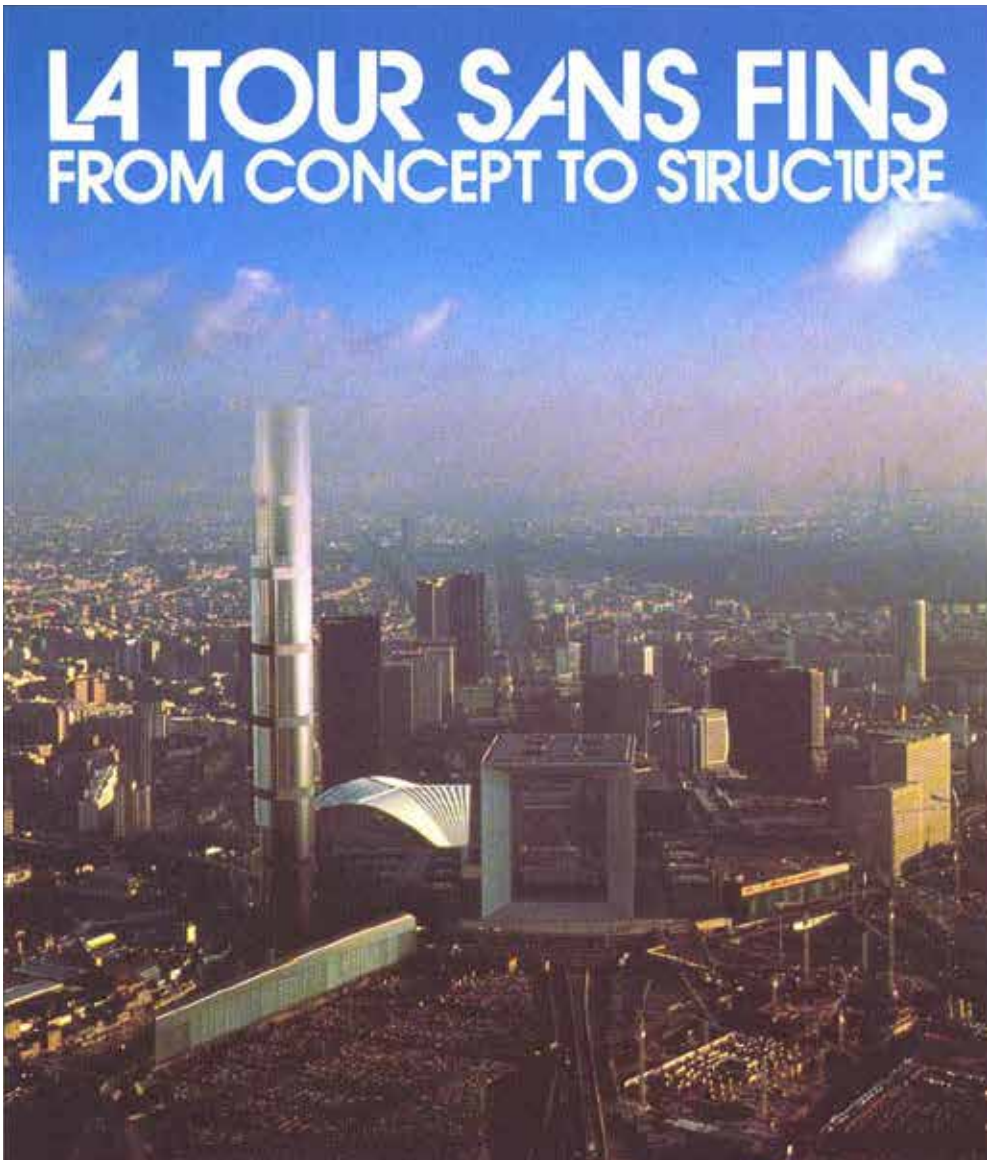
STAND-OUT MOMENTS

Jenny Burridge's trip through the Concrete Quarterly archive brings back memories of a beautiful Scottish bridge and the British engineer who worked out how to build a 'tower without ends' in Paris

Concrete Quarterly may have styled itself as an architecture magazine, but it was always at least as much about structural engineering – after all, these subjects can no more be separated editorially than they can in real life.

In its earliest issues, CQ was preoccupied with postwar rebuilding and the creation of giant structures such as power stations, factories, roads and bridges: all the vital infrastructure that urgently needed to be rebuilt to restore a battered Europe to prosperity. As that prosperity did return, the emphasis shifted from necessity to more ambitious feats of engineering. Designers were free to let their imaginations run wild, and concrete was more often than not the material to which they turned – even if the vagaries of the economy meant that it didn't always work out.

Going through the CQ archive, I came across a project I recognised because I had worked on it. In Spring 1992 (CQ 172), the late, great, lamented engineer Tony Fitzpatrick, who I worked with at Arup, talked about the design of a tower in Paris, la Tour Sans Fins ("the tower without ends"). This was intended for Paris' La Défense area, though it was never built.

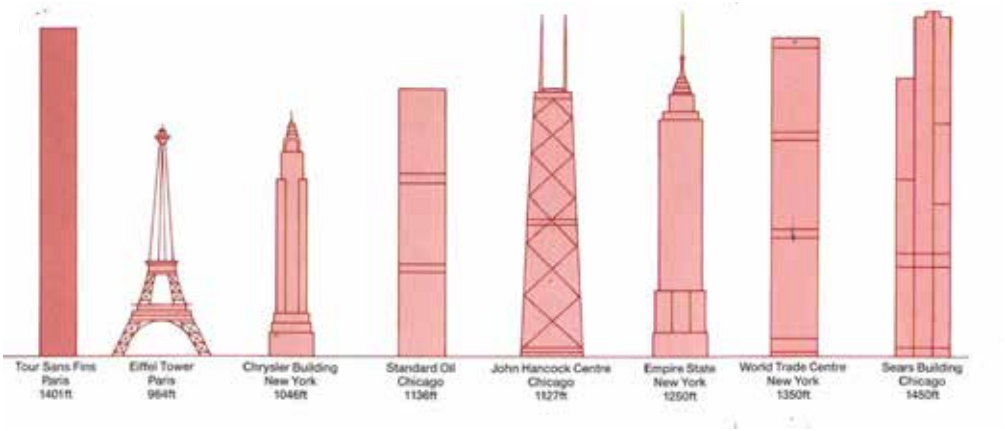


OPPOSITE CQ's 1992 feature by Tony Fitzpatrick on the Tour Sans Fins

RIGHT How the 426m-high tower compared with the tallest buildings in the world in 1992

BELOW RIGHT Two sections showing the reducing thickness of the concrete tube (left) and the atrium spaces (right)

BOTTOM RIGHT A model of the tower alongside the recently completed Grande Arche and Bernard Zehrfuss and Jean Prouvé's 1958 CNIT exhibition hall; and a wind tunnel test



Initially the concept was for a 500m-tall, 30m-diameter circular tower, but this was considered unachievable as the slenderness (height-to-width ratio) for such a tower would be 16.7. For comparison, buildings can be considered "tall" with a height-to-width ratio of about 7, which is where the building will start to react dynamically to the wind. After some discussion with the building's architect, Jean Nouvel, the height was reduced to 426m and the diameter increased to 43m, a slenderness ratio of 10.

The solution for the stability of the tower was to produce a pierced concrete tube as an exoskeleton, with two sections of cross-bracing on opposite sides of the building. The rest of the elevation was a punched frame around the windows. The windows could be larger higher up the building so that at the top the structure would look and be much slimmer. Its name was intended to suggest that the tower just got lighter and lighter until it disappeared, looking like there was no real end to it. The tower was also set into the ground in a way that would look as if it disappeared below the earth.

ITS NAME WAS INTENDED TO SUGGEST THAT THE TOWER JUST GOT LIGHTER AND LIGHTER UNTIL IT DISAPPEARED, LOOKING LIKE THERE WAS NO REAL END

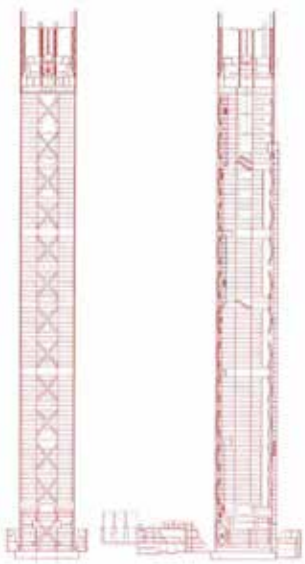
Tony's article went through the stages from concept to detailed design, including the wind tunnel tests that were done at the CSTB research laboratory in Nantes. These were done in two stages. A set of more simple tests on 13 models gave information and data that could be plugged into the analysis programme. These then informed the final design and a larger, more precise model, which was also tested in the wind tunnel.

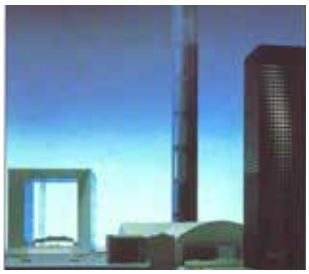
The results of the wind tunnel testing showed that the design was still fairly dynamic in its response and might cause the occupants to start to feel queasy, a common effect from the lateral movements at the top of a tall tower. The response could have been to further stiffen the tower's structure, but instead the decision was made to incorporate a tuned mass damper at the top of the tower. This would reduce the oscillations of the tower and bring the movement within acceptable limits.

Tony described this as "an inherently elegant approach" as it uses the tower's own momentum to control its movement. The proposed tuned mass damper was to be a large mass set on a pendulum near the top of the tower, a relatively inexpensive solution.

The tower was never built. When recession hit in the early 1990s, the client decided it was too risky a project and they put the design away, hoping to bring it out later. That never happened. But when the Millennium Bridge in London started to wobble on its first day, Tony was the engineer responsible for resolving the problem. He used dampers to solve it, and he thought back to the Tour Sans Fins when he came up with the solution.

Concrete buildings have taken on ever more elaborate and structurally ambitious forms, and concrete towers have become even higher, even more slender. Nearly a quarter of a century after the Tour Sans Fins, in Summer 2015 (CQ 252), we featured a tower with a concrete exoskeleton and not one but two tuned mass dampers: 432 Park Avenue in New York. Designed by Rafael Viñoly Architects and structural engineer WSP, it's also a very slender tower, 432m tall and just





28.5m wide at the base. This gives a height-to-width ratio of 14.9, almost as slim as the original proposal for the Tour Sans Fins. The difference between the two buildings is that 432 Park Avenue is a residential building and has a concrete core at its centre and a punched concrete tube as its exoskeleton. This is inherently more stiff than just the concrete exoskeleton, which is important because residential towers cannot simply be evacuated in high winds as commercial ones can. The Tour Sans Fins was envisaged as an office building and therefore needed much longer spans for the floors and a more open structure.

Right now, there is a boom in concrete tower construction in cities around the world. Concrete is overwhelmingly the construction material of choice for tall buildings, for its strength, mass and durability – qualities that are enabling skyscrapers to reach ever greater heights and achieve ever more impressive technical feats. This is particularly the case for residential buildings, where the inherent acoustic and fire separation that concrete provides becomes even more important.

Aside from towers, for a structural engineer, bridges are one of the most exciting kinds of project. One of my favourites is the Kylesku Bridge in the north-west of Scotland, covered in Winter 1984 (CQ 143). I normally try not to inflict my love of structures on my poor husband, but we drove up the coast from where we were holidaying in Ullapool to see this bridge. "We've driven all this way just to see a bridge?" "But it's beautiful!"

The bridge replaced a ferry, which could only run in daylight hours and in reasonable weather conditions. The alternative was an 80-mile detour. So as part of the Highland Regional Council's

THE WIDTH OF THE WATERWAY IS 130M AND THE CHANNEL IS VERY DEEP. SO THERE WAS NO POSSIBILITY OF PUTTING A CENTRAL SUPPORT

improvement of the road up to Cape Wrath and round to Thurso, this bridge was commissioned and the design undertaken by Ove Arup and Partners. It was built by Morrison Construction.

The width of the waterway is 130m and the channel is very deep. So there was no possibility of putting a central support in either the permanent or temporary case. The design used V-frames of reinforced concrete hollow-box sections to give a much reduced central span and to add extra lateral stability to the bridge. The wind loading for the structure is probably the highest for any road bridge in Britain.

The structure was prestressed concrete, with the outer spans and part of the main span cast in situ on a travelling gantry. The 40m central section of the main span was precast on site and lifted by jacks into place from a barge.

The bridge was designed to be as maintenance-free as possible, which is one of the reasons concrete was used for the structure. There are no bearings or joints along its length, but only at the two abutments where they are easily accessible. The use of integral bridges is now common, but was much less so in the 1980s. This reduces maintenance by eliminating one of the elements that need frequent inspection and replacement.

I recommend going to see this bridge – the scenery is spectacular and the bridge enhances rather than detracts from the view. My husband now remembers the drive from Ullapool taking all day, but according to Google maps, it should only be an hour.

OPPOSITE 432 Park Avenues uses two tuned mass dampers and has a height-to-width ratio of 14.9

BELOW The main span of the Kylesku Bridge was precast on site and lifted by jacks into place from a barge

Photos: CIM Group and Macklowe Properties, Geni/GFDL CC-BY-SA

Photo: Nigel Young/Foster + Partners

70 YEARS OF CONCRETE QUARTERLY

A new exhibition at the Building Centre explores the social and architectural history of concrete structures over seven decades, and the magazine that was founded to document it

The first issue of Concrete Quarterly was published by the Cement and Concrete Association in July 1947, priced one shilling. Over 70 years and 260 issues, it has documented the many advances in architecture and engineering that have taken place since the postwar period, and influenced debates on important social issues such as new towns, high-rise living and sustainability. And of course, it has told the stories behind some of the world's greatest buildings, from the Royal

TOP TO BOTTOM American Air Museum, Cambridgeshire by Foster + Partners; the Royal Festival Hall by Robert Matthew; and Sydney Opera House by Jørn Utzon

Festival Hall to Sydney Opera House to the Shard.

This rich history is the subject of an exhibition at the Building Centre in London, which runs from 7 August until 30 October. Organised by the publisher of CQ, The Concrete Centre, in partnership with the Built Environment Trust and supported by Aggregate Industries and Graphic Relief, it presents highlights from CQ's archive as well as showcasing The Concrete Centre's work.

Seven decades

Like the magazine, the exhibition aims to inspire and inform. Led by photography from the archive, it looks back at the last 70 years of concrete architecture and engineering, with a decade-by-decade review of trends in design through key projects and voices.

Lasting Impression

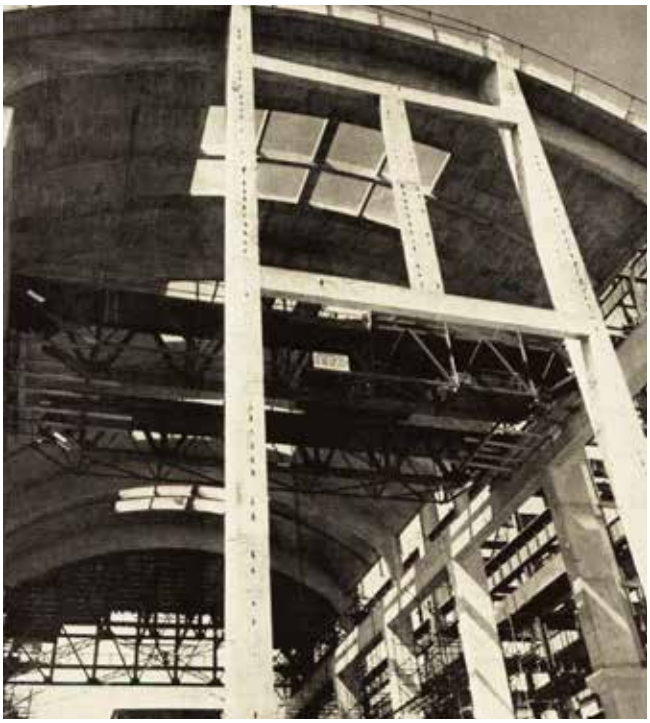
Inspired by one of CQ's most popular regular features, the Lasting Impression video installation invites leading designers to talk about their recent work and the projects that have most influenced them.

CQ Focus

The Focus installation reflects CQ's role as a provider of best-practice guidance with a changing exhibit on the latest developments in concrete products and construction techniques. To complement the exhibition, The Concrete Centre is also organising a programme of events throughout the autumn (see overleaf).

For more details, go to concretecentre.com/CQ70

70 Years of Concrete Quarterly: The Exhibition takes place from 7 August until 30 October in Gallery 2 at The Building Centre, Store Street, London WC1E 7BT



ABOVE Skelton Grange Power Station in Leeds featured in Issue 7, Winter 1949

WITH PEACE CAME CONCRETE: THE ORIGINS OF CQ

After 1945, swaths of Europe faced reconstruction on an unprecedented scale – in Britain more than 450,000 houses had been destroyed or rendered uninhabitable by bombing raids. But it wasn't simply a case of rebuilding what had been: this was a chance to create a new society.

It was a period of relentless activity as architects and engineers led the charge into the future, designing schools, hospitals, factories, new towns, indeed entirely new ways of living. People would travel by motorways, some would live in towers, all would have access to electricity and decent sanitation. There would be new power plants, sewage works, state-of-the-art collieries.

Concrete was the obvious material with which to shape this world. While timber and steel were both under ration, concrete was cheap and relatively plentiful. It was also undeniably modern, and had benefited from the single-minded inventiveness of wartime. The new technique of prestressing was quickly employed on railway viaducts, aircraft hangars and factory roofs, as well as the long-span bridges that made the new motorways feasible. Housebuilders such as Wimpey and Wates, which had built the concrete pontoons for the Mulberry harbours at the D-Day landing beaches, were now turning methods such as factory building and mechanised lifting to address the housing emergency.

This was the modern world rising from the rubble in 1947 – the world that Concrete Quarterly was founded to record.

EXHIBITION PARTNERS

mpa The Concrete Centre

The Concrete Centre provides guidance, seminars, courses, online resources and industry research for the design community
www.concretecentre.com

Built Environment Trust provides support for educational, research and cultural activities to explore and encourage innovation in the built environment
www.buildingcentre.co.uk

AGGREGATE INDUSTRIES

Aggregate Industries quarries, manufactures and supplies a wide range of heavy building materials to the construction industry
www.aggregate.com

graphic relief

Graphic Relief creates stunning surfaces using a variety of textures, patterns and effects
graphicrelief.co.uk

ACKNOWLEDGEMENTS

70 Years of Concrete Quarterly: The Exhibition is presented The Concrete Centre in partnership with the Built Environment Trust, and supported by Aggregate Industries and Graphic Relief. The images in this exhibition are reproduced from the Concrete Quarterly archive, except where otherwise stated. The Concrete Centre wishes to thank the Concrete Society and its library, which holds the CQ archive, as well as Artifice books on architecture for providing additional scanning.

Curation: Nick Jones and Guy Thompson
Focus curation: Elaine Toogood
Design: Nick Watts Design and The Opcyon Design Company
Project management: Claire Ackerman, Jenny Watt and Katie Puckett

JOIN THE CELEBRATIONS!

ABOVE Cafe Concrete, 1970s style. Drinks at the National Theatre, Issue 112, Spring 1977

COME TO OUR EVENTS

The Concrete Centre is organising events throughout the autumn to accompany the exhibition. All take place at The Building Centre in London. Events are free to attend but booking is recommended at concretecentre.com

THURSDAY 14 SEPTEMBER 18.00 – 20.00

Building High, Digging Deep

This evening seminar will cover some of the practical design and construction considerations for tall buildings, including the stability of tall structures and the design of deep raft for the foundations. The winners of the Structural Concrete 2017 student competition, sponsored by Laing O'Rourke, will also be announced at this event.

WEDNESDAY 20 SEPTEMBER 18.00 – 20.30

The Concrete Quarterly lecture: the workplace past and present, from Centre Point to White Collar Factory

Rick Mather Architects presents a preview of the remodelling and refurbishment of Centre Point tower, which has given this concrete icon a new lease of life. AHMM and AKT II will also discuss the design and collaboration behind the recently completed White Collar Factory on City Road – a novel workplace environment concept, featuring exposed concrete, core cooling and smart technology.

TUESDAY 3 OCTOBER 09.00 – 16.00

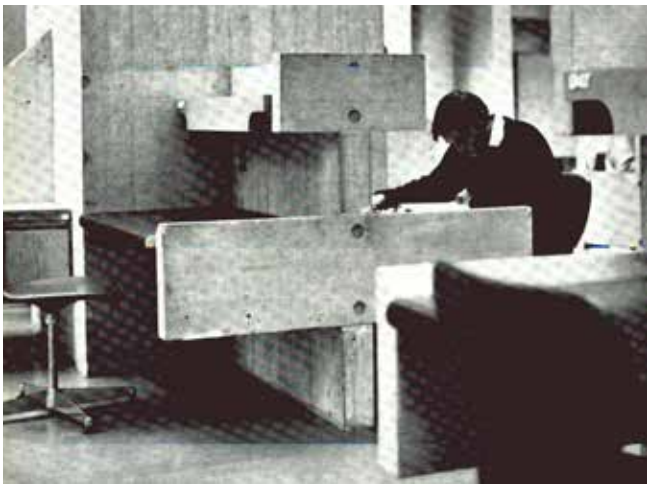
Cafe Concrete @ Store Street

A full day of free, back-to-back CPD sessions alongside the exhibition, providing guidance and insight related to visual and innovative concrete, following on from last year's highly popular Cafe Concrete @ Coin Street pop-up event. Delegates may stay for as many sessions as they like – the space and programme will be formatted to enable visitors to drop in or stay for a while. Last years' event was attended by over 200 architects, engineers and members of the wider supply chain.

MONDAY 30 OCTOBER 09.30 – 16.00

2017 Housing Conference

A one-day conference focusing on the design and delivery of long-lasting, high-performance homes, presented by The Concrete Centre and the Modern Masonry Alliance. This event aims to provide delegates with practical guidance on design considerations such as fire performance, flood resilience, noise, thermal comfort and thermal bridging, and health and wellbeing, and an understanding of concrete and masonry solutions for housing. It will also present exemplar projects and give delegates an insight in the UK's current and future housing needs.
concretecentre.com/cq70



READ THE BOOK

The Concrete Centre is publishing a book, The World Recast: 70 Buildings from 70 Years of Concrete Quarterly, written by Nick Jones with an introduction by Hugh Pearman. It will be published in September 2017 and distributed worldwide by Artifice books on architecture. Focusing on 70 key buildings from the magazine's archive, The World Recast tells the story of concrete architecture and engineering since the postwar period with stunning photography and eyewitness testimony. It charts the genesis of some of the modern world's greatest monuments and its boldest ideas, from the ethereal beauty of Ove Arup's Brynmawr Rubber Factory to the sleek modernism of the Pirelli Tower, the structural ingenuity of Sydney Opera House and the digitally enhanced imagination of Zaha Hadid. To pre-order a copy, visit the Publications Library at: **concretecentre.com**

SIGN UP FOR CQ – IN HARD COPY

Concrete Quarterly is now available in hard copy through a new subscription service. For an annual payment of just £25 (excluding VAT), you will receive a hard copy of CQ each quarter. For more details, go to: **concretecentre.com/cq**

TWEET YOUR FAVOURITES

Can anything beat Mr Billings' majestic dinosaur (and hat), as featured in Issue 118, Autumn 1978? The complete Concrete Quarterly archive is free to access at **concretecentre.com/archive**. Tweet your personal highlights from the archive to **@thisisconcrete #CQ70**

TOP Trinity College Library, Dublin by Ahrends, Burton and Koralek, Issue 75, Winter 1967
ABOVE Mr Billings' dinosaur, Milton Keynes, Issue 118, Autumn 1978
ABOVE RIGHT Concrete & Cement Association garden party, Issue 46, Autumn 1960
RIGHT A sandblasted artwork by Carl Nesjar and Pablo Picasso at the Government Building in Oslo, Issue 44, Spring 1960

ADMIRE OUR ARTWORK

Graphic Relief has created a set of bespoke concrete tiles to mark Concrete Quarterly's 70th anniversary, which will be on show at the exhibition at The Building Centre. The fibreglass reinforced concrete tiles are cast from a polymer relief mould. Designed by CQ art director Nick Watts, each represents a decade and features an iconic building or style.

LASTING IMPRESSION 2087

In each issue, Concrete Quarterly asks architects which buildings of the past have influenced them the most. But which of today's buildings will be tomorrow's icons?

HEPWORTH WAKEFIELD, YORKSHIRE, UK
by David Chipperfield (2011)
Nominated by Catherine Croft, Twentieth Century Society

"I love the solidity of the Hepworth Gallery, its sense of robustness and permanence. It was the first use of coloured self-compacting concrete in the UK, and although there's a bit of me that thinks concrete should rely on its aggregate and formwork to make it look good, the greyish-purpley effect certainly suits the jostling cluster of trapezoidal concrete blocks on the edge of the fiercely swirling River Calder. Chipperfield has said that he likes the way the pigment gives an unfamiliarity to the material, and that he was aiming to produce a surface which would look interesting both at a distance across the water and close up. I am surprised that I've chosen such a smooth building, I'm a fan of the craggiest Brutalism, but this building has such assurance and confidence, and a profound rejection of superficial fuss."

JEWISH MUSEUM, BERLIN, GERMANY

by Daniel Libeskind (2001)

Nominated by Chris Loyn, Loyn & Co

"A building that really made a difference to me was Daniel Libeskind's Jewish Museum in Berlin. The particularly fascinating thing was that it touched all the senses. He plays not only with sight, but with balance, by tipping things, with acoustics and with temperature. You enter a cell space, through these heavy doors that slam shut and it's just a vertical shaft of raw concrete that's unheated. I was there in winter and it was very cold – you honestly felt that you were in a cell. It was so dark that at first you couldn't see that there were any other people in there. They were just sitting on the floor absolutely spellbound, by the terrible reality of the Holocaust.

The museum is a sort of promenade, a journey you go through. At one point, you have to walk across an installation called

Fallen Leaves. There are thick steel discs, and each one has the features of a screaming face cut out in a childlike way. Quite terrifying! You step on one and it echoes and resounds around this vast space. You're being observed, because there are windows from the linking corridors looking down into the space as you're treading on the faces. I felt really shamed trying to walk across it, I was tiptoeing. It took 44 steps to walk across and I said 'sorry' 44 times. For a building to be talking as directly as this was absolutely unbelievable."

LEFT Loyn's own painting of the Jewish Museum in Berlin

BMW CENTRAL BUILDING, LEIPZIG, GERMANY

by Zaha Hadid (2005)

Nominated by Paul Monaghan, AHMM

"In the last ten years, I'd say Zaha Hadid has probably done the most to push concrete forward. She reinvigorated its use, going back to an approach where concrete is treated in a more plastic manner, a much more sculptural play of forms. When I saw her BMW headquarters in Leipzig, there were such big brushstrokes of architecture that you suddenly realised that she had moved to a different level and was able to create big architecture in a very innovative and unusual manner."

Photos: Jaap Oepkes, Torsten Seidel, Hélène Binet

ROLEX LEARNING CENTRE, LAUSANNE, SWITZERLAND

by SANAA (2010)

Nominated by Deborah Saunt, DSDHA

"SANAA's Learning Centre in Switzerland is absolutely amazing, it blows your preconceptions of what is possible with concrete out of the water. It's iconic because it expresses not only the ideas of the architect but a moment in time when the ideal of fluidity and technology came together. People had been drawing spaces that flowed into each other in an impossibly beautiful way – people like Oscar Niemeyer and even Zaha – but SANAA pushed the technology that little bit extra. I'd never been to a building before where you saw concrete behave in a way that seemed impossible.

I was working in Lausanne when they were building it and I discovered that I could watch the interviews for all the architects who competed for the project, so I saw Zaha present, and Herzog & de Meuron, and SANAA. Kazuyo Sejima talked very poetically about the ideal of this flowing landscape that could house all of these different functions seamlessly and unite public access and learning in a way that had never been dreamt of before. Then at the end of the presentation, she said, 'But you want to know how I'm going to build it' and she did this brilliant five-minute presentation all about the concrete technology that she had been testing on other projects.

The building marries the best parts of architecture and design – it's amazingly strong visually but it also took a gear change in technology to make it possible."

Photos: Francisco Berreteaga, EPFL-Alain Herzog

IGLESIA DE IESU, SAN SEBASTIÁN, SPAIN

by Rafael Moneo (2011)

Nominated by Rab Bennetts, Bennetts Associates

"Rafael Moneo's work, like that of Louis Kahn, embodies many of the architectural values we hold dear, combining powerful volumes with an innate understanding of structure and materials. Among his recent buildings, the Iglesia de Iesu has an external modesty that belies a truly inspirational interior. It will surely be seen in years to come as one of his great works.

Flooded with light from the continuous gap between soaring walls and the floating plane of the roof, the plan is projected upwards towards the sky, revealing that the conventional form of aisle and crossing has an informal, mesmeric twist. This irregular main volume is contained within a regular rectangle, with intimate side chapels completing the enclosure.

The substance of Moneo's approach to construction is evident, but here its subservience produces an emotional, contemplative response that upholds its religious purpose. The stark white walls and roof contrast with the simple oak furnishings, but a richer materiality would have diminished its clarity."


CONCRETE QUARTERLY
spring 1998

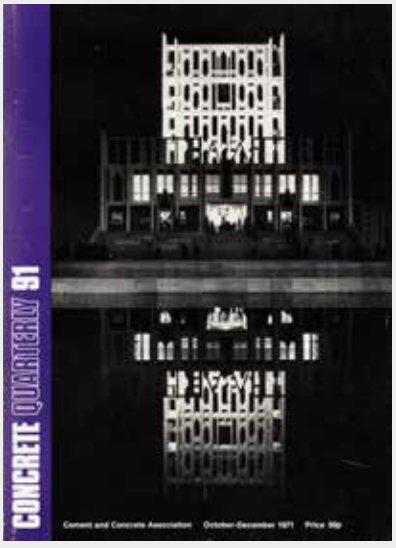

Concrete Quarterly
7


CONCRETE QUARTERLY 208

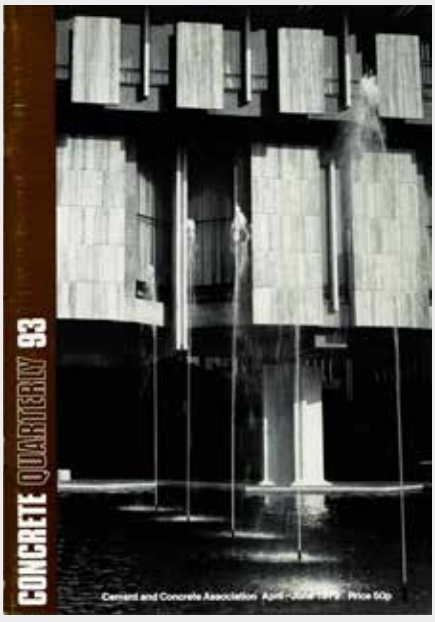

Concrete Quarterly
88

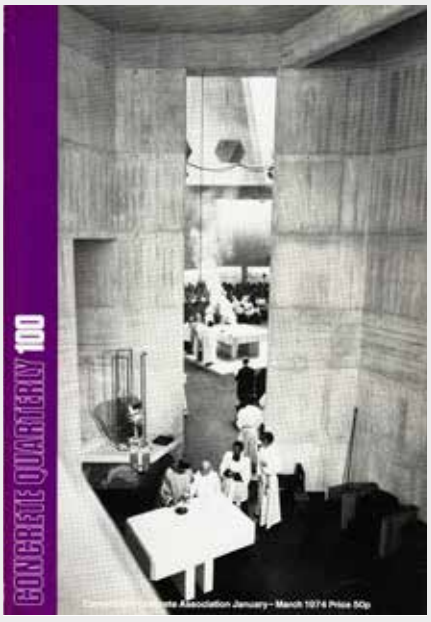

93


Concrete Quarterly
98


CONCRETE QUARTERLY 91
Cement and Concrete Association October-December 1971 Price 50p


CONCRETE QUARTERLY


CONCRETE QUARTERLY 93
Cement and Concrete Association April – June 1979 Price 50p


CONCRETE QUARTERLY 100
Cement and Concrete Association January – March 1974 Price 50p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AUTUMN 2012 | OLYMPICS SPECIAL | ISSUE NUMBER 241
JUST ADD WATER
Zaha Hadid's aquatics centre scores a perfect 10 for use of concrete – from its tricky foundations to its six majestic diving boards
SUPER BOWL
How the Olympic stadium designers used 12,000 tonnes of concrete to create 80,000 of the best seats on Earth
HOMES OF HEROES
The concrete-clad housing at the athletes' village is set to begin its new life as London's most sustainable neighbourhood

The complete Concrete Quarterly archive is free to access at **concretecentre.com/archive**

Tweet your personal highlights from the archive to **@thisisconcrete #CQ70**

ABOVE Concrete paving in Kings Square, Gloucester – from Issue 101, Summer 1974