Profile

After years designing for cold climates, first with the multiple award-winning Halley VI ice station and then Spartak Moscow's Otkritie Arena football stadium, AECOM's head of sports engineering, Peter Ayres, is now bringing some of his cool to the extreme heat of Qatar to create a chilled stadium for the 2022 World Cup. He talks to Jackie Whitelaw.

David Beckham last year set out to ply his trade on every continent on the planet. Peter Ayres beat him to it; not playing football – Ayres makes no claims to being a sportsman – but through his own profession of structural engineering. Just to make the connection with Beckham a little bit closer though, much of Ayres's work in recent years has been in designing football stadiums and arenas around the world.

His Otkritie Arena for Spartak Moscow football club in Russia is to be a 2018 World Cup venue; he is currently working on the Al-Wakrah stadium for the 2022 World Cup in Qatar; and as AECOM's building engineering global sector leader for sport he is about to celebrate his team's success on the design of the park and venues for the Rio Olympics, which take place this year.

Despite all that, Ayres, at 51, is best known not for stadium design but the world's first fully relocatable polar research station, Halley VI. As a keen music fan Ayres recognises that Halley VI is his equivalent of a seminal album; "my 'London Calling', if you like".

He is comfortable with that. Halley VI was an extraordinary project – a one-off, inventive and way outside the norms of structural engineering. It also gave Ayres the chance to complete his I-spy continents challenge after 30 years of working on schemes around the globe by actually going to the remotest of them all, Antarctica, for six weeks as part of the commission.

It wouldn't have come about if Ayres had not gone and determinedly grabbed the opportunity with both hands, which is something he has done throughout his career. Or to put it in his own words: "I have always been a bit pushy."

Firm foundations

He was the first person in his family to go to university, chose to attend Sheffield "because all the best bands played there" and found himself studying in 1983 under the best structural engineering lecturers and researchers of their era, namely David Nethercot, Pat Kirby and Ian Burgess. His future career path was set.

He joined Oscar Faber in 1986, liking the multidisciplinary nature of the business. The economy was just coming out of recession and Ayres was the first graduate the consultant had taken on in a long while. This turned out to be a huge bonus; two years later the firm took on 10 or 20 new recruits, but with experience under his belt Ayres was ahead of the game and taking on early responsibility.

His first project was the Bexleyheath Boys Brigade headquarters in London, a simple portal frame but for someone in his early 20s a big step forward. Within just a couple of years though, Ayres had the confidence to chase for a job that seemed tailor made.

Getting noticed

"My first big break came in 1989 with the Sheffield Arena," he says. "I walked into my then director and early mentor Phil Benson's office and demanded to be put on it – I was a Sheffield University boy, my girlfriend was there, it would save the company money."

Ayres was getting noticed by the business which, following his success at Sheffield, wanted him to go out to Singapore for a couple of years where the company was building a number of high-rise structures. "I couldn't go for that long – my wife Fiona by that time was a successful professional in her own right and couldn't just up sticks. So I made a nuisance of myself and talked the firm into letting me go for just a few months," Ayres says.

"I knew that working overseas, especially when you are a young engineer, is like trebling your experience. You have to take responsibility, you are often working with a team less qualified and experienced than you are used to. And you learn to work faster, and harder.

"When I came back I was in my late 20s and a fully fledged project engineer."

Throughout the 1990s he worked in the UK, slogging through the recession early in the decade by picking up work on the prison

programme and acting as associate, then regional, then fully fledged director in 2001.

He learned a lot, but in some ways he feels he missed out a bit in those years. "I never worked under a big structural figure like Tristram Carfrae, for instance; I always had to figure things out for myself."

Making a name

But then came the takeover of Oscar Faber by AECOM and Ayres's horizons opened up. "That was very good for me," he remembers. "I can understand why some people get nervous about mergers and the big company processes that come with them, but I saw it as opening up a whole new canvas on which to be creative."

Ayres got to know people all round the world through the AECOM network while at the same time proving himself as a builder of the business. As director of the head office structures team, he set about changing the focus to more design-led and international work, and grew the business by 50% while maintaining double-digit profit.

It was delivering the numbers that allowed him to take a step into the unknown with Halley VI (Box 1).

"I was a director, I was turning in the figures, so when my colleague Michael Wright came in one day and said he'd been at the launch of a competition for a building in Antarctica and, with architect Hugh Broughton, had discussed the possibility of doing something, I could give it my attention.

"To be fair, my first reaction was 'you're not serious'. But they persuaded me. AECOM had within it previous experience of working in the Antarctic and I thought 'this would be fun'."

Ayres, now focused on winning the work, made a point of building a relationship with the client; not exactly in their face, but almost. "Other teams treated it as a conventional competition and occasionally met the client. We met them 19 times, sucked up their knowledge and tried to make them feel we were already part of their team.

"The whole job became a bit of an obsession. I was called jokey names like 'Penguin Pete', but Halley VI has become a major calling card for me and for the AECOM team," Ayres says.

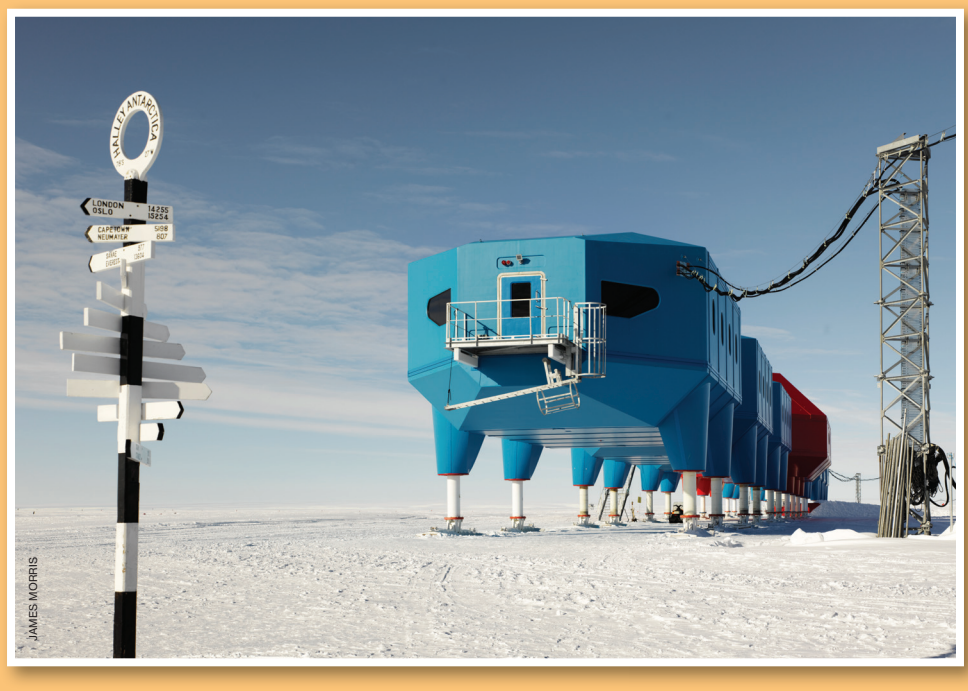
Sporting success

Not least, success in the Antarctic proved their capabilities for dealing with structures in extreme cold and led to a big breakthrough for the sports business – Spartak Moscow's new stadium (Box 2), the first to be privately built in Russia.

"Actually, an old friend rang to say he had a client – the oil oligarch owner of Spartak Moscow – who was worried his stadium was costing too much and wanted to know what he should look out for.

"I said, 'why don't I come and have a look?'" Which Ayres did,

Box 1



JAMES MORRIS

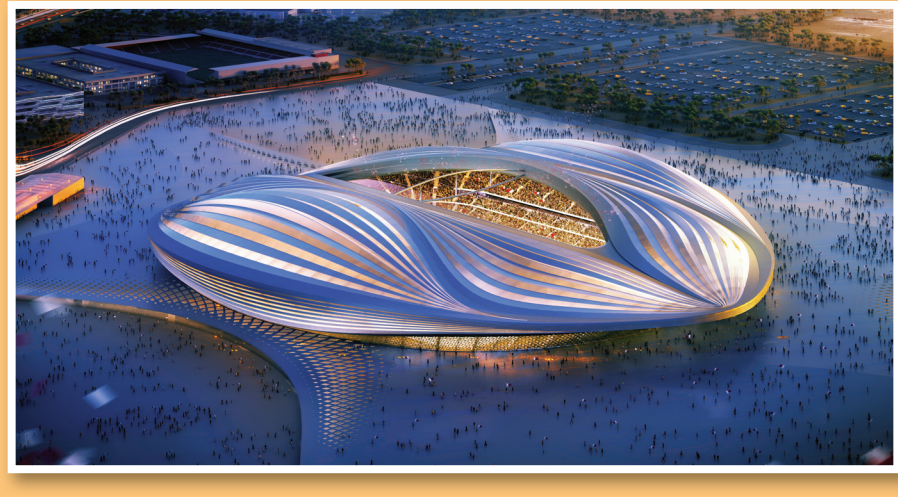
Halley VI research station

Halley VI is one of the most challenging, technically complex buildings ever delivered. It is the world's first fully relocatable, permanently manned Antarctic research station and redefines polar engineering. Ayres's design is packed with inventions, innovations and technologies transferred from other industries, including giant ski-based foundations for relocation; mechanically operated legs which allow the building to re-level on the moving ice and to climb up out of the snow; and a highly insulated, integrated, prefabricated glass-reinforced polymer (GRP) building envelope.

Box 2

Otkritie Arena (Spartak Moscow)
Ayres and his team drew on the lessons learned in Antarctica, employing the snow modelling techniques to study and optimise roof loads, leading to cost savings for the client. Ayres personally developed the stadium roof concept, which responds to the extremes of the Russian climate and to new Russian regulations on security and robustness.

Box 3



Al-Wakrah Stadium
Ayres's team developed new parametric design tools for the Spartak Moscow project and have refined them since to use for the Al-Wakrah Stadium in Qatar. The tools integrate the architectural and engineering models, with geometry and scheduling now a semi-automated process. This has optimised design workflows so that the parametric design process is embedded within the 3D model production as part of the Building Information Model (BIM) deliverables, resulting in improved productivity and an ability to design structures with highly complex geometries.

taking with him friend and old colleague Michael Lischer, formerly of HOK Sport, now Sport Concepts, with whom he had worked on Sheffield Arena. It was another moment where Ayres was able to take advantage of, in a favourite phrase, "an opportunity where the one-eyed man is king". There was a lot he didn't know about the Russian market, but he did know about stadiums and about designing for cold: –40°C was the ask for Moscow. He was the right man for the job.

The project was "quirky" – there were the challenges of the Russian design institutions, and meetings with the client's brother, who was the project manager, and his old army friend, who was the project director. And it pushed Ayres and the AECOM team to take parametric design tools to the next level, creating bespoke tools to optimise the design of the seemingly simple but really highly complex interlocking mega-truss roof that is capable of handling heavy snow loadings.

Pushing boundaries

With the cold conquered, it was time for Ayres to tackle heat. FIFA had presented that challenge to the engineering sector by selecting Qatar as the host for the 2022 World Cup. Cooling stadiums so football can be played in the summer heat has been the focus of Ayres's recent attention.

He is working with architect Zaha Hadid and AECOM's sports architecture group on the Al-Wakrah stadium (Box 3). The roof is in two symmetrical halves, with each side having three shell shapes inspired by the hulls of local dhows. Ayres led on the cooling work and says that inside the stadium the desired temperatures are very achievable, all proved by a mass of advanced computer modelling.

First in line is passive cooling – making sure the pitch and spectators are in the shade. The second line of offence is to run chilled air through the back of the seats; at the lowest level it feeds out onto the pitch, creating a chilled blanket on the pitch.

The work has been fascinating, he says. And it is critical to the development of sport worldwide. "The trend is for sport and events to move to parts of the world where they have happened less often. We are pushing what can be done and it will be more and more in demand."