Profile

Expedition Engineering director Julia Ratcliffe has travelled the globe creating elegant and practical structures in places and situations as diverse as New York and post tsunami Thailand. Her latest challenge is leading the team designing the Institution's new headquarters building. Jackie Whitelaw went to meet her in the first of a new series of profiles.

This year, the Institution will be moving, after 76 years, from its Victorian headquarters in London's Belgravia to a fresh home. The relocation to Bastwick Street in London's Barbican area (and what will be a thriving new centre for the capital when Crossrail opens in 2018) is an opportunity to create a modern auditorium and meeting spaces where structural engineers can exchange ideas for years to come.

Those engineers will, naturally, be taking a close look at the design and detailing that has gone into the Institution's new home. The company appointed for the job, Expedition Engineering, has a reputation for innovation and creativity and is confident that its work will withstand the inevitable scrutiny.

The director (and Institution Fellow) leading the design team for Bastwick Street, Julia Ratcliffe, is appreciating the chance to demonstrate the practice's skills and thinking. "It is a real honour to have been asked," she says. "What is important to us is to make sure the Institution gets best value from the investment and best use of the building for its members."

Expedition Engineering is working with Hugh Broughton Architects. "Together we are striving to bring in a few elements that reflect and express the work of structural engineers," Julia says.

The Institution has opted to refurbish an existing 1960s structure which puts it at the leading edge of current sustainable thinking with regards to building stock.

"Up until now the focus for meeting energy saving and CO_2 reduction targets in buildings has been directed at environmental engineers and architects. With stricter environmental legislation there have been significant reductions in energy use and it is our turn to tackle the issue of embodied energy in building structures," Julia says.

"There is already so much energy used in creating a frame, the worst thing to do is to demolish a structure and send it to landfill. It is much more creative to reuse valuable building stock. As structural engineers we need to challenge ourselves, clients and suppliers to minimise embodied energy and resources and make our buildings perform better."

Throughout her career Julia has consistently sought to set herself new challenges from her initial decision to train to be an engineer, to working and living in the US and travelling solo to more remote parts of the world to soak up new influences. Along the way she has worked on some iconic UK projects.

She went to a state school in Hertfordshire and discovered she was very talented at maths. Her teachers encouraged her to take the academic route and study the subject at Cambridge University. "But I was interested in making a difference; engineering offered me a route to do that." Travel also held great appeal and was a

major reason behind her choice to study for an MEng in architectural engineering at Leeds University which included a year at Pennsylvania State University.

It proved a good choice. “It was 1989, Leeds was an exciting place to be, there was still a maintenance grant and I was mixing with a wide range of people so I benefited from a diverse group of friends studying many different subjects.”

The year at Pennsylvania State in 1992, apart from being a lot of fun was the one that really committed her to structural engineering. “We didn’t get taught architecture differently because we were engineers,” she recalls. “I really engaged with that approach and enjoyed seeing how structural engineering and architecture work together. Because the US undergraduate system is not specialist I also got a good grounding in building services and lighting and so on. The knowledge of what helps other disciplines do their best work has aided me through my career in understanding how to make my work harmonise with the building as a whole.”

After a final year back at Leeds, Julia emerged with a distinction and it was time to find a job. There was a recession so she worked in bars, in childcare, a factory and as a carer for a woman with cerebral palsy. “I didn’t have the worry students have today about chasing internships and building a CV so they can earn enough to repay their loans. Those other jobs gave me a good perspective and understanding of how the world works.”

Luck, networking and obvious ability did help her land her first paid engineering employment at Oscar Faber’s St Albans office, almost immediately after she graduated.

The core training she received has stood her in good stead ever since, she says. “I am particularly grateful to Steve Gunning who took a lot of time in my first year of work to lead me through the process of engineering design.

Figure 2
Julia was Expedition Engineering’s lead structural engineer for the 166m high Intesa San Paolo Tower in Turin (currently under construction and designed in collaboration with local practice, Studio Ossola). Six external exposed steel mega columns carry the 30 office floors, a suspended public auditorium and three level public glasshouse. Lateral loads are shared between rod cross bracing between the mega columns and a central concrete core. The office floors sit on a three storey deep steel transfer structure contained within the rear wall and roof structure of the public auditorium suspended above the public lobby and car park levels.

"I started on site on a laboratory building and a number of refurbishment projects working from the London and St Albans offices. There was then a year seconded to Balfour Beatty taking responsibility under a supervising engineer for demolition and subcontract ground works for the refurbishment of a row of Grade II listed residences overlooking Regent's Park. Establishing credibility with the contractors was good for building confidence."

While on site she realised she wanted to work full time in London and opted to move practice to join Buro Happold in 1996 just as the Millennium commissions started to roll in. She was on the teams for the National Centre for Popular Music in Sheffield and the Lowry Centre, Salford. "I found I liked working on public buildings for people to use."

Itchy feet kicked in at the same time that Julia became Chartered in 1998 and Buro Happold did its best to feed her wish to travel. "I was due to go to a project in Malaysia but the Asian crash meant that was delayed. The company had a short term need for extra staff on the Dome ahead of the big celebration planned there for the year 2000 and I went there. It was fascinating to see architects, engineers, everyone focused on a single objective and seeing a team truly working together for a common goal. There was a real sense of purpose that was so exciting and I was fortunate to witness and be a small part of it."

More good luck followed when the consultant asked if she wanted to work in its fledgling New York office for three months. The experience was everything she'd hoped. "There were five of us in Buro's start up office, we all got on well and we were building a business doing everything from designing signs for the Mets baseball stadium to residential projects. They wanted me to continue which I readily accepted so headed back to the UK while working visas were sorted out. In early 2001 I returned to New York for two years. That ended up being almost five."

2001 is a sad date for New York and she didn't want to talk about 9/11. "I wasn't there, I was in the UK on the day and it is not my story to tell apart from that I was living and working downtown at the time," she says. "I think it will always make me feel very close to the city."

Aged 30 Julia was leading the structural design of a project for Buro Happold working with Grimshaw Architects for the £90M Rensselaer Polytechnic Institute performing arts centre in upstate New York, taking the job from scheme design to the start of construction. Included was a 1300 seat concert hall and 400 seat theatre.

Figure 1
In Thailand with charity Habitat, Julia's role was to develop designs for house construction that could be built by homeowners and unskilled volunteers. In addition to the standard RC frame with block infill walls prescribed by the charity, she developed designs using locally manufactured cement stabilised interlocking earth blocks; a more sustainable solution.

"One of the big challenges was that the building was on a 1 in 3 hill formed of weak clay on the edge of the college campus. We had to work closely with the team and client to optimise the configuration of the spaces while taking into account the hillside retention.

"A big part of the job was working with the architect and the supply chain to make sure no one was putting a premium on what the architect valued in order to create an uplifting space."

Julia gained her Professional Engineering licence with the State of Connecticut during her time in the US. "I thought it was important to establish my credentials as a British engineer in the US industry."

After five enjoyable years she needed a change of scene if only for a while and took a six month leave of absence to travel and carry out aid work. After volunteering in Honduras she went round the world visiting old friends and colleagues. Then, in 2004, the Indian Ocean Tsunami happened. "I wanted to volunteer and a friend put me in touch with Habitat for Humanity in South East Asia. They wanted me to go to Khao Lak in Thailand where I worked for six months designing and overseeing construction of houses (Figure 1).

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"Through meeting other volunteers I'd reconnected with Europeans and realised it was time to go back to London rather than the US. But I'd liked our small office in New York and the nimbleness of that size of business and knew by then that I didn't need a big company behind me." So on her return to the UK at the beginning of 2006 she joined Expedition Engineering.

"Before leaving Buro Happold I did one last project supporting its work with CARE Pakistan on the review of the design of prefabricated transitional shelters after the Kashmir earthquake of 2005. "It was shocking to visit and see the buildings that had caused the greatest loss of life were often recently constructed places of assembly such as schools and community buildings. I was very affected as an engineer."

Back in London and in her new role, Julia plunged straight into schemes to construct affordable housing in Baker Street and work on hotels in Beirut and London with architects like Make and Rogers. A highlight was to be appointed lead structural engineer on a new bank headquarters in Turin designed by Renzo Piano Building Workshop. "It has been such a pleasure working with them to develop the design of the 40 storey tower with six basement levels including a three storey public glass house on top. The engineering, although epic in magnitude, is very delicately expressed; it's about the human scale, a hierarchy of elements that resolve into something people can relate to" (Figure 2).

When the job went out to contract in 2010 and while the contract was in the ground Julia took the opportunity for a sabbatical visiting southern Africa and Madagascar. "Travel is invigorating, it recalibrates my creativity," she says.

She came back just in time for her 40th birthday and the offer of a directorship at Expedition Engineering. "Becoming a director was a big commitment but I was ready. The company is not afraid of taking the difficult route and asking why something is being done. That's me too. I am a good fit here." And according to her client for the new Bastwick Street building, a good fit for the Institution as well.