

Profile



One of **Will Arnold's** highlights after being named Young Structural Engineering Professional of the Year was judging the Structural Awards. But he had to do that from Rwanda, as he explained to Jackie Whitelaw.



Arup senior structural engineer, Will Arnold, 31, was named Young Structural Engineering Professional of the Year in 2017.

The prize meant he was welcomed into the elite group who judge the Institution's prestigious Structural Awards, which opened his eyes to the extraordinary work being done by the profession around the world.

'It was awe-inspiring to see what goes on in our industry,' he says. 'And I was so grateful to have the chance to be involved.'

He's hoping to be asked to repeat the experience again this year, so he can meet some of his fellow judges in person. For 2018, Arnold was connected by phone to the judging panels because he was working in Rwanda. He had been seconded there to MASS Design Group to lead the structural design of the Rwanda Institute for Conservation Agriculture (Figure 1).

His Institution award helped him get the posting, he believes. And during his year on the project, he has been leading a team of 10 engineers who are designing 57 buildings, totalling 22 000m² of floor space. The project creates a facility that will teach the latest agricultural techniques to Rwandan farmers so that they can produce food efficiently and sustainably to feed a growing population. Twenty-one of the buildings are now on site and Arnold will wrap up his role in February this year when the last knockings of the design are complete.

He is at pains to point out that his move to Rwanda was a two-way knowledge trade that has benefited his own career as much as that

of the team he's led at MASS.

'While I applied for the role partly because it sounded like meaningful work, it was also a big step up for me in terms of responsibility. The job has involved managing a team, working closely with architectural design leads and inputting into project planning at the highest level.'

He adds that even as the most experienced structural engineer in MASS's office, he still learnt as many technical aspects as he taught (Figure 2).

'I've also reconnected with a ton of engineering basics, as I've had to revisit codes and textbooks – you can't blag it when you are out on your own without any specialists or old hands to ask.'

A dose or two of luck

Arnold has been with Arup since he graduated, but getting there wasn't a straightforward journey – it required some luck – and he has used the experience of 'going with the flow and making the most of it' throughout his career ever since.

He learned about the firm relatively early on, at the age of 14, when at a birthday party a family friend mentioned that he had worked at the company which had designed the Sydney Opera House.

'I thought that sounded brilliant. I was good at maths and physics at school and from then on I decided I wanted to be an engineer. I'm one of those people, who once something is set in my mind, I go and do it.' After completing his degree at the University of Bath, where he briefly flirted with switching to architecture but was persuaded to focus his creativity on engineering, Arnold entered the job market at the height of the recession.

He had had a shortlist of four firms to apply



Figure 1
Rwanda Institute for Conservation Agriculture will teach latest agricultural techniques to farmers

"I THINK WHAT IS MOST EXCITING IS BUILDINGS THAT LAST IN TERMS OF USEFULNESS"

to, including Arup, that would let him pursue his ambition of designing buildings as part of a holistic multidisciplinary team. However, none of them offered him a job and, in fact, only one wanted to see him even for an interview. 'I was a bit down and a contact did help me find a position with another firm, but I knew it wasn't really right for me. Two weeks before I started though, out of the blue, I had a call from Arup to say they had found an opening in a team working for their structural materials specialists, and could I come for interview in three days' time? I got the role and I'm still a little guilty that I ditched the other company in short order, but this was my dream job, so I hope they understood.

'I've since found out that I got the interview by pure chance. The vacancy was identified long after all other interviewed candidates had either been rejected or accepted, and as I happened to be near the top of the list of candidates not yet approached, I was offered the interview. Lucky for me!'

Arnold worked for a year with the specialists, which he says proved to be a



Figure 2 Teaching in Rwanda meant reconnecting with structural engineering basics



Figure 3 BSKyB Hub in London confirmed Arnold's desire to work in multidisciplinary teams

lucky gift. 'I was surrounded by extraordinary, highly intelligent people, and since moving into the building engineering team, I've realised they are just the group of people you want to know well and turn to for advice when you are stuck.'

He knew a move to one of the building engineering teams was going to be his next step, but which one was still an unknown. Serendipity took a hand again. Arnold was one of the few people in the London office during the three-day week gifted to the UK by the wedding of Prince William to Kate Middleton in 2011.

'Director Ed Clark came to ask if someone could do a small piece of work on a sculpture. I was there, so I got the chance to work on the Timber Wave for the London Design Festival. I thought this was pretty cool, so at the end of the project asked if I could go and work for Ed full time.'

Learning to see the whole picture

Once in Clark's team, Arnold worked towards his Institution chartership. This included the design of BSKyB's The Hub in London with Amanda Levete Architects (Figure 3). At BSKyB, Arnold worked on the fully exposed building structure from feasibility to practical completion, as well as being resident engineer during the structural construction.

'We created an amazing open-plan work space, flooded with daylight and with the lightest structure we could conceive. The experience confirmed that my instincts had been right about wanting to work in a multidisciplinary team and understanding the bigger picture – how all the design decisions affect the finished structure. As a building designer, you have influence, on the aesthetic, the materials, and drivers such as sustainability and carbon reduction, which is what I wanted when I set out to be an engineer.'

The next project in his career was pivotal in developing an understanding of the engineer's role, as he stepped up to work on the Macallan Distillery and Visitor Centre in northern Scotland. The architect was Rogers Stirk Harbour + Partners, and Arnold was working with Arup's extremely eminent Bob

Lang (now retired). Arnold and Lang worked closely together to develop the structural design of the 13 000m² doubly curved timber roof that forms the main architectural feature for the building (Figure 4). The architects wanted a faceted timber roof on a 3m x 3m grid to give a handmade look for an industrial building.

All of Arnold's engineering instincts told him to strongly advocate for a more efficient curved glulam roof that would best use the strength of timber along its grain. 'It was me being naive,' Arnold says, 'but Bob was very tolerant. He didn't tell me just to get on with it, but patiently took me on a journey to understand that solely delivering the purest engineering solution was not always our job; different projects have different priorities. And on Macallan, the details of the faceting roof would be crucial to the success of the project. I really valued being able to have the debate and it helped me understand how to have an appreciation of all the drivers at play in a building's design.'

'Bob took the time to sit with me and help me work that out for myself. There's a culture at Arup of being able to challenge, to ask questions even of the most eminent engineers and they help you to find the right answer. And it's hugely important to the development of young engineers, I believe. If your objections or questions are simply shut down, your abilities to learn lessons, grow and explore are stifled.'

'Looking back, it was the same at BSKyB, I was allowed to work things out for myself and if I got it wrong, I was helped to make it right.'

Projects to be proud of

Arnold was given another perspective on the role of the building engineer when he worked with Arup's William

Algaard and Renzo Piano Building Workshop on the Fubon Tower and Museum in Taipei, Taiwan. This 240m tall mixed-use skyscraper could have been just another tall building, but the team instead set themselves an ambitious target of building a tower that was 30% lighter than the other tall structures in Taipei, despite having to withstand the same earthquake and wind loads – some of the highest in the world.

'Most towers there are heavy, carbon-intensive buildings,' Arnold says. 'Our structure hit our 30% target with a final weight of 178kg/m², making it more elegant yet with the same resilience. It changed my view about what makes structures exciting to work on.'

'I've always wanted to work on projects that I could be proud of. Initially, I thought that would be the biggest, longest, craziest-shaped buildings. Now I think what is most exciting is buildings that last in terms of usefulness, whether that is less material in construction, less water or energy in use, or where the scheme unlocks new public spaces.'

Or, as in Rwanda, where the buildings will help ensure food security for an entire country.

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Figure 4 Engineering Macallan Distillery's faceted timber roof was learning curve for Arnold