



Margaret Cooke

Good engineering should be collaborative, not competitive, Margaret Cooke tells **Helena Russell**.

Margaret Cooke's idea of a job well done is one where you can't tell she's even been there. If the client is more enthused by the benefits a completed scheme will allow them to deliver, than by any visual 'wow factor', she goes home happy.

Cooke is highly regarded for her expertise in conservation engineering and building reuse, the product of more than two decades as co-founder and director of Bath- and London-based Integral Engineering Design. She is also outspoken on the challenge of net zero.

'As an industry we need to be less ego-driven,' she says baldly. 'I get so tired of hearing people talk about the biggest, the longest, the deepest: engineering is not a competition and it's off-putting for a lot of people.'

'Reuse of buildings is the only way that we are going to be able to hit our zero-carbon target. Sometimes the skills that are needed are not just the technical ones that allow us to understand how we can repurpose structures with minimal intervention, but the ability to persuade architects to be more creative with how they use spaces.'

Taking a punt on engineering

Growing up with a father who was an engineer gave Cooke an understanding of what the job involved, but being told by someone when she was 16 that girls couldn't be engineers was the red rag that motivated her to prove them wrong.

Her decision to study engineering at Durham University was prompted partly by the fact that she didn't know what type of engineer she wanted to be, but also strongly influenced by the fact that the university's rowing team had won at the Henley Regatta the year before.

'My dad was a rowing Olympian,' she explains. 'He went on to coaching; I started rowing when I was about 15 years old, was good at it and absolutely loved it. So, in some ways the engineering degree was a bit of a sideline.' Even after graduating, Cooke was ambivalent about following that career path but thought she should give it a try.

'By pure chance, Alan Baxter was looking for graduate engineers – I applied and got the job, and loved it from the start,' Cooke recalls. Her

enduring memory – and the experience that drew her immediately into the world of conservation engineering – was the excitement of handling archive drawings, being captivated by their beauty, and the challenge of relating these documents to the structure that was on site. 'I enjoyed digging around under the floorboards and exploring the unseen parts of the building.'

It was a dramatic departure from Cooke's structural engineering education, which had been limited to a handful of lectures. 'My course at Durham was very academic; there were no practical courses and while I could design a beam entirely from first principles, I didn't know anything about British Standards,' she recalls.

Rowing, as much as her academic qualifications, helped her get the job; Martin Stockley, who recruited her, was also a keen sportsman and was confident that if she could apply herself to elite sports, she could certainly master structural engineering.

A colleague provided catch-up sessions at lunchtimes to bring her knowledge in line with her peers, indicating a supportive environment that proved invaluable when Cooke was selected to compete in the Welsh rowing team at the Commonwealth Games after just five months at the firm. 'It was an opportunity that I couldn't turn down, but training twice a day, every day for six months left me essentially asleep at my desk!' she jokes. 'They took a punt on me, which I think I repaid afterwards with enormous loyalty.'

She found herself specialising in conservation engineering and reuse of buildings right from the start: 'I found that really inspirational and exciting. I could see what engineering was for. There is less emphasis on maths and more on using all your senses.'

One of Cooke's earliest projects was putting ladies' toilets into the Palace of Westminster to accommodate the influx of female MPs in the 1990s. 'This was a really good lesson in the fact that it might be a Grade I listed, internationally important building, but it also has to function, it's not a museum,' she says. 'You have to be respectful of the fabric, but not precious, otherwise these buildings die.'

CAREER MILESTONES

1993	Graduated from Durham University with BSc(Hons) in Engineering
1993	Joined Alan Baxter as graduate engineer
1997	Joined Price & Myers as engineer
1998	Became Chartered Structural Engineer
1999	Joined Mann Williams as senior engineer; promoted to associate
2002	Founded Pilotis
2005	Merged with Mander Structural Design to become Integral Engineering Design
2009-19	Director of ModCell
2011	Became Conservation Accredited Engineer
2024	Moved to consultancy role at Integral Engineering Design
2025	Revived Pilotis as active consultancy

Going her own way

In 1997, on the verge of becoming chartered, Cooke moved to Price & Myers. 'I wanted to spread my wings and challenge myself a bit more,' she explains.

It proved the right move, says Cooke. 'Robert Myers taught me an awful lot about people management and how to bind a team, and he and Sam Price were generous about sharing their mistakes with us. They were absolutely solid on their engineering, but that didn't mean they got there on some kind of golden path, without wobbles or wiggles,' she says.

After a six-month break travelling in Australia, and thinking about settling down, Cooke decided to move back to Bath where her family still lived. She started as a senior engineer with Mann Williams, a Bath-based company. 'I learned more about the commercial side, contract management and fees side of the business than I had before, and I got my first computer!'

After her daughter was born in 2002, Cooke was keen to return to work part time, but UK legislation enshrining a parent's right to request flexible working was not yet in place. She and her

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employer were not able to agree an acceptable compromise, so they settled 'with a sum that was big enough to allow me to set up on my own'.

Setting up a business at such a young age with a six-month-old baby was a challenge, but she had little choice, not wanting to work for anyone else at this point. At the same time, Cooke was teaching at Oxford Brookes University one day a week, a role she had found via Tim Mander, an engineer she knew through mutual friends. They started travelling to Oxford together and would spend the journey comparing notes and chatting about work.

When Cooke won a project that she knew she couldn't manage on her own, he was the obvious collaborator, and before too long they had merged their practices to form Integral Engineering Design. 'We created a very effective

business that gradually grew to about 25.

'We were doing very different types of projects, but bonded over materials. I was using things like lime and cob and timber, because conservation requires all those sorts of soft materials, and Tim was way ahead of the curve in terms of sustainability, so he was using similar materials.'

The firm mostly 'grew' its own engineers from clever graduates. Having to occupy and inspire such staff was helpful in motivating the two directors to pursue interesting and challenging projects, and to keep them focused on doing what they enjoyed and doing it well.

Cooke recalls Kingsmead Primary School in Northwich as a particularly significant project for Integral in the early years; constructed in timber with a gull-wing roof, it had lots of sustainability features built in, such as a system to capture rainwater for use in the building to flush toilets. Integral worked with Bristol-based architect White Design Associates and the scheme was shortlisted for the Prime Minister's Better Public Building Award in 2005.

'We were also working with some of the big names, such as Bennetts Associates, Nicholas Hare, Purcell and

NATIONAL TRUST



FIGURE 1: Work at Chedworth Roman Villa was a key project for the development of Cooke's conservation engineering team

INTEGRAL ENGINEERING DESIGN



FIGURE 2: Middleport Pottery was another significant conservation project that helped to establish Cooke's reputation

Feilden Clegg Bradley Studios; we were punching above our weight,' Cooke says. 'It was a very strong team effort, especially when we were growing,' she adds. 'We became known for being good at what we did and we were also successful in convincing people we could do much bigger projects.'

Chedworth Roman Villa (**Figure 1**) in Gloucestershire was a breakthrough for Cooke's conservation engineering team as they gained the National Trust as a client. This led to further National Trust projects such as a new cafe at Dyrham Park near Bath, and connected Integral to new architectural practices. Middleport Pottery (**Figure 2**) was another game-changer, winning the prestigious Europa Nostra conservation award among many others.

Learning a hard lesson

Another significant part of Integral's work was research, particularly once Mander and Craig White of White Design Associates started investigating the possibility of making panels of straw and timber to use in modular construction. 'They cooked up an idea that straw could be compressed into panels, rendered and used as huge, prefabricated building blocks, producing a 3m square timber frame and taking advantage of its structural and insulating properties,' recalls Cooke.

A pilot of two panels incorporated into the School of Architecture at the University of the West of England in 2002 – and still in place – led on to research at the University of Bath.

Interest in their spin-off construction business ModCell, initially managed by

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Mander and Cooke along with Craig and Linda White, took off exponentially. When the workload rocketed, they employed a managing director and accountant, letting the business 'take its own sails and go'.

But things fell apart without warning. 'Everything seemed to be going OK right up to the moment that I was in the ModCell office late one Friday evening and found all the county court judgements in the bin,' reveals Cooke. The accountant had been taking money out of the business and falsifying accounts. 'That was a really nasty moment.'

Cooke dropped Integral for 18 months to try and work out what they could do. 'We had projects that were on site, clients that didn't want to pay us, and subcontractors that we still had to pay. It was a very, very steep learning curve for me.' The directors suffered financially, but she made sure that no-one else who worked on the project was out of pocket in the end.

What upsets her the most, she admits, is that a single, dishonest individual could undermine the huge potential of ModCell just as it had started to gain acceptance and certification.

More than a decade on, Craig White is

starting to try and promote the concept back to the market, reveals Cooke, but the experience is still too raw for her to contemplate any involvement.

Taking a step back

In recent months, Cooke has handed over her directorship to Chris Gross, 'a tremendous engineer' who is also Conservation Accredited. She has stepped back from Integral, being retained as a consultant for three days a week, which has freed up time for her to explore other opportunities. She is keen to impart her knowledge of conservation engineering to a wider audience to encourage wider reuse of buildings. 'The skills necessary for a heritage reuse project are just as applicable to a building from the 1960s or 80s; the way you assess and test a structure, analyse its strengths and weaknesses, assess where there may be risks, and see how you might reuse or adapt it.'

Sometimes it's as basic as persuading the client to let go of preconceived ideas and allow the building to dictate the outcome – putting the gym on the ground floor of the new-build element of a scheme rather than on the first floor of its fragile, listed neighbour, for example, to eliminate the need for strengthening. Or relocating a weighty archive at Middleport Pottery from the roof space down to the ground floor, not only making load-carrying simpler but also improving accessibility. 'You can't get to that point unless you are sitting alongside the client at the feasibility stage,' she says.

Cooke was a co-author of the IStructE publication *Design for zero* and recalls a classic example of 'do nothing' that was included as a case study. 'An M&E engineer was asked to put in a new lift because people complained it was too slow; he suggested adding a mirror, which made the lift seem much nicer and gave people something to do, and that solved the problem!'

Cooke talks about the recently completed renovation of Boston Lodge Works (**Figure 3**) for the Ffestiniog and Welsh Highland Railways in Wales, where Integral and architect Thread reduced the embodied carbon by 25% through clever use of the space. At the opening ceremony, the client was enthusiastic about the transfer of skills that the new facility would support, apologising afterwards for failing to mention the building itself. The whole team was flattered by this oversight, she says, as it perfectly demonstrated the quiet success they were striving for.



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FIGURE 3: Boston Lodge Works for the Ffestiniog and Welsh Highland Railways is a recent highlight in which clever thinking was central to reducing embodied carbon