



The Institute of Concrete Technology

Women in Concrete

An ICT Roundtable on Career Opportunities and Progress

Construction as a sector of the economy, and the concrete industry in particular, has long been viewed as a male preserve, the gender balance overwhelmingly in favour of men. And perhaps this is not surprising, given the site conditions and manual nature of occupations most closely associated with it in the popular imagination. It is, however only part of the picture. There is a wide range of work associated with concrete and its constituents and while still few in number, an increasing number of women are find career satisfaction in the industry, fulfilling roles in research, design, production and sales, some at the highest level. Indeed at several recent academic conferences on cement and concrete research, the split between the sexes as been 50:50.

There appears to be a new momentum towards ensuring open opportunities for, and a welcoming attitude towards, new entrants to the industry, irrespective of demographic classification, and to reduce gender-specific barriers. Witness new ranges of PPE in appropriate sizes and designed for the female figure, and employer-led schemes in some of the major concrete firms explicitly aimed at encouraging women in the workforce to share their experience and promote improvement – schemes such as Tarmac's Women in Cement group and Aggregate Industries' Women in Construction conference.

It seemed an opportune moment for the ICT to reflect on this topical issue and to enquire into the experience of women. Is Concrete Technology attractive as a discipline and the industry it embodies one in which women feel comfortable and can prosper? We asked the ladies in our membership for some comments on their experience in this sector and their aspirations for the future. Several replied and these represent a reasonable cross section of personal and occupational backgrounds.

Their response is re-assuring – up to a point. For those few who have persevered, concrete seems to have been rewarding. Personal experience has been as varied as the individuals' circumstances might suggest, but there seems to be a fair degree of convergence in their views on the opportunities for women in concrete. And while it has to be acknowledged that the proportion of women within the membership remains conspicuously small, there are grounds for optimism that this is changing.

Representative of the membership

Agnieszka J. Klemm, FICT

A member of ICT since 2000, Agnieszka was elected a Fellow in May 2015 and has served on Council since 2016.



Agnieszka has worked in academia, both in Poland and in the UK, for the past 30 years. She is currently a Professor in Construction Materials at the Glasgow Caledonian University. Her main research interests cover aspects of building performance including materials durability and prediction of degradation during service life, environmental impact of durable materials including contribution of re-used materials to more sustainable constructions.

Her experience in higher education teaching was gained at the Technical University of Lodz, Poland, the University of Strathclyde, and the Glasgow Caledonian University. Over the years in GCU I have initiated and continuously developed new areas of multidisciplinary research focused on materials engineering, which has attracted a lot of interest from both academia and industry.

Noushin Khosravi, AMICT

Noushin is an Associate Member of the ICT, in the process of applying to upgrade to MICT.



Noushin is part of the Special Services team at Mott MacDonald, an international engineering and development consultancy. The Special Services team provides capability in a range of services including construction materials technology, and across several sectors, but principally transportation. Noushin is an expert in concrete technology with experience in structural design and the successful delivery of complex research programs. She is particularly involved in durability design and the specification of construction materials for new assets, and the assessment of existing assets to make sure that they continue to perform well.

Her role is very diverse, involving, for example, durability assessment of structural materials, mainly concrete but others too. Her working includes assessing deterioration mechanisms like sulfate attack, advising on the use of supplementary cementitious materials, reviewing and writing specifications, construction quality checks, investigation and assessment of construction defects, evaluation of options for repair and maintenance, evaluation of fibre reinforced and sprayed concrete, and the assessment of aggregates and for different applications. Currently Noushin is working on the Thames Tideway project in London.

Oshin da Costa, AMICT

Having recently arrived in the UK, Oshin joined the ICT in April 2019 as an Associate Member.



Oshin now works as a Quality Control Technician for Chryso, a supplier of chemical admixtures to the construction industry, including ready-mixed concrete producers.

Her responsibilities are to ensure all raw materials and production samples are QC-checked against specification limits, and to maintain the company's QC processes and associated records. She conducts concrete trials for CE compliance and organises prepared samples for external chemical analysis. She also produces development formulations for laboratory analysis and production performance.

Toe Hanthar Htay, TechICT

Studying at Stage 2, Toe is currently a Technician member, though will be eligible for Affiliate membership when she passes the exams.



Having worked for a ready-mixed concrete producer on a hydro-power dam, then as Target Market Concrete Engineer for Sika in Myanmar, Toe is now with YTL Concrete (S) Pte Ltd where she acts as QA/QC Officer in the quality control department. YTL Concrete is one of YTL Corporation's subsidiary companies, producing concrete throughout the island of Singapore.

There Toe manages the mix designs and quality control for day-to-day concrete production. She liaises with clients and contractors to meet their requirements and resolve technical problems. Her role includes the testing of constituent materials, monitoring of equipment and administering certification.

Q: What attracted you to the role you are currently in?

Asked what had drawn them to their involvement in concrete, each offered a personal response, but the element of intellectual curiosity and the desire to learn more seems common to all. “I have always loved working with concrete and its constituent materials” says Oshin, “and have a great thirst to understand the production and performance of different types of admixture.”

Their undoubted enthusiasm for concrete also extends to an awareness of a higher purpose. After Toe’s first job on a hydro-power project prompted an interest to learn more about concrete technology, she says “concrete is more than a mixture: its wide range of technology can create a modern city”. She also takes inspiration from the great examples of the past: “my most admired concrete structure in the world is the Pantheon in Rome. The Romans has found lightweight concrete technology even in AD 127!”

Sharing the desire to learn, Agnieszka draws on her family background in universities and points to an “incessant curiosity and a willingness to understand the complex physical/chemical processes responsible for the fascinating microstructure of concrete were always my strong driving forces. She adds, in relation to her present role: “commitment to produce and disseminate research, as well as its incorporation into teaching, has been always placed on top on my professional agenda.”

Noushin’s introduction to concrete technology was more tangential and to some, perhaps, surprising. “Initially, my interest in sustainability was the main reason that I chose this field. I was fascinated with the MSc. course at the University of Dundee because it could give me a chance to learn about environmental management and concrete technology. Then my PhD was linked to the renewable energy industry and I could use my expertise to assess the concrete structure options for wave energy convertors. My current role is also very relevant to my background in civil engineering and concrete technology as well as relating to sustainability aspects of the construction industry.”

Q: What aspects of technology do you find you employ regularly in your field?

As you can imagine, with diverse roles come quite different aspects of the subject. Working in academia, Agnieszka commented on her research, in which the “objective is to develop multifunctional composites with substantially improved mechanical properties and durability.”

This research is substantially motivated by the idea of “tailoring” concrete properties at the nano- and micro-scale, in order to develop “smart”, crack free, self-healing materials. Such “smart” cementitious materials will require precise design in terms of content, processing and application. Consequently the specific goal is to make a leap forward into a new era of cementitious materials modified by superabsorbent polymers (SAP) and supplementary cementitious materials (SCM) (industrial by-products) and possibly microencapsulation of biological agents.

For Noushin, advising on major infrastructure projects, techniques include the development and use of statistically-based probabilistic models for deterioration modelling and durability assessment, specifying laboratory and field-testing to assess the performance of specialist types of materials to meet requirements, and the use of finite element modelling software for structural assessment.

Q: Any specific moments where your knowledge of concrete helped resolve an interesting or tricky issue?

Asked for specifics, each had her own, very different example to cite. Agnieszka referred to “the successful completion of a number of consultancies involving the development of new repair technologies (for industrial floors) and application of materials new to the construction industry (internal curing by SAP)”. She cites work for Rolls Royce that resulted in six technical reports, which presented “an interesting opportunity to apply [her] expertise in an unfamiliar field, in a manner specifically tailored to the needs of the company”.

Noushin also chose consultancy: “Recently I have been working with Transport for London (TfL) to help them develop a specification for concrete for trackbed repairs on the underground system. The concrete is being used as part of a Mechanised Renewal Vehicle process and needs to be produced and placed in the depths of the London Underground network in the very limited periods while the trains are not running. It needs to be quality controlled, accurately batched, tested, placed, finished and gain 15MPa strength at 1 hour. Finding a solution for such a fast setting concrete which suits deep tube tunnel environment was an interesting and tricky issue, but very rewarding.

When working on a dam project earlier in her career, Toe recalls facing a problem. “On one sunny day, with ambient temperatures around 38°C, all the concrete we sent to the site set very fast. After five or seven trucks we noticed and stopped production. WE checked the admixtures and tested the specific gravity. Then we checked all the tolerances of the batching system and load cells. All were satisfactory and left only the cement to check. We contacted the cement factory and traced all the records they sent us. As we suspected, it was a cement problem: a one-minute power shutdown during grinding not acted on and the cement just delivered to site. Just one minute had caused the faulty set in the fresh concrete. This was my unforgettable lesson in concrete production!

Q: What drove you to apply to be a member of the ICT?

Asked what prompted them to apply for membership of the ICT, each had a personal motive, though professional networking was common to all. Agnieszka values the “excellent opportunities for networking and engaging more with industry” which have allowed her to establish “a strong network of researchers and practitioners”. Likewise Noushin has found professional contact helpful, applying for membership when she “found it necessary to connect to the wider concrete industry. At the time I wanted to be informed of the employment opportunities and the ICT was a good platform to provide this information”. She finds she has “been able to establish a very good professional network through the ICT. Having such a great network has helped me in my day to day activities”. Oshin comments that the ICT consists of “well established concrete professionals and is definitely a large platform for me to build my professional network.” She is also keen to extend her knowledge of concrete and is attracted to the various qualifications the ICT offers. For her part, Toe is currently studying for the Institute’s qualifications and, looking ahead, she has confidence that membership will help with her career development. In this respect, Noushin adds, “the fact that the ICT is registered with the Engineering Council and could provide a route to becoming a chartered engineer was another reason”.

Q: What benefits do you feel you gain from being a member?

In addition to building professional networks and extending knowledge – opportunities which Agnieszka characterises as providing “an invaluable inside view” – employment opportunities are identified. “It has greatly helped with my job hunt”, says Oshin, while Toe notes that employers in the sector are more welcoming of applicants who are members of the ICT. In addition, Noushin likes the complimentary Yearbook and Oshin values the regular newsletters.

Q: Which events that the ICT offers have you, or do you regularly, attend?

ICT events are applauded, but attendance is more selective. Agnieszka, for one, has been active: “I have had the pleasure of presenting my research outcomes not only at the Annual ICT Convention, but also on various scientific conferences sponsored by ICT. In August 2016 I also organised a one-day workshop on “Application of Superabsorbent Polymers in Concrete Construction” which attracted representatives from various branches of the construction industry including cement, concrete and aggregate producers.” Oshin attended her first Convention in 2019; Noushin has also attended the ICT’s annual convention in recent years and looks out for relevant talks arranged by the Institute. Toe, however, based in Southeast Asia, has less opportunity to attend events in the UK though she keeps an eye open for announcements and would like to attend if she has the chance in future. She does suggest the ICT invests in Webinars and creates a greater presence on social media to make the Institute more accessible for members around the world.

Q: What advice would you give to other women who are considering a career in concrete?

“First of all”, asserts Agnieszka, “that there is a place for women in concrete and more and more girls have been deciding recently to study civil engineering courses. Not everyone is keen to work on a building site, but there are many other roles which could be considered, including academia and design.” Referring to the variety of roles suitable for individual interests and aptitudes is a recurring theme which Noushin expresses in a positive manner:

Historically, the concrete industry has been dominated by males; however, this is no longer the case. It welcomes women and there are many opportunities for us to develop our careers in this field. Regardless of the gender, if anybody is fascinated by this material, with its simple recipe but surprisingly rich and sophisticated microstructure, I would encourage him/her to consider a career in concrete technology. There is a wide variety of different aspects to working with concrete, ranging from the practical (getting out on site and troubleshooting during construction) to the more advanced and numerical (like service life modelling, thermal modelling and structural analysis).

In encouraging “more women to establish their career in concrete”, Oshin singles out “a lot of scope for research and development”. Toe also refers to the variety of opportunity, while holding up the value of research: “If you just look on the surface, you will think the work of lady engineers who are working in the concrete sector is hard. Actually, what we doing is more than you might think: it’s not only casting the concrete on construction sites, but also research on materials and innovations for our modern living”.

Such attitudes are hard won, and Agnieszka is keen to build on progress to date:

Based on my experiences and reflecting on gender balance issues, I am now engaging in numerous activities bringing colleagues together in a joint effort to encourage and support a young generation of female students and staff in STEM.

I truly believe that there is a place for women in the construction industry and more specifically in concrete technology.