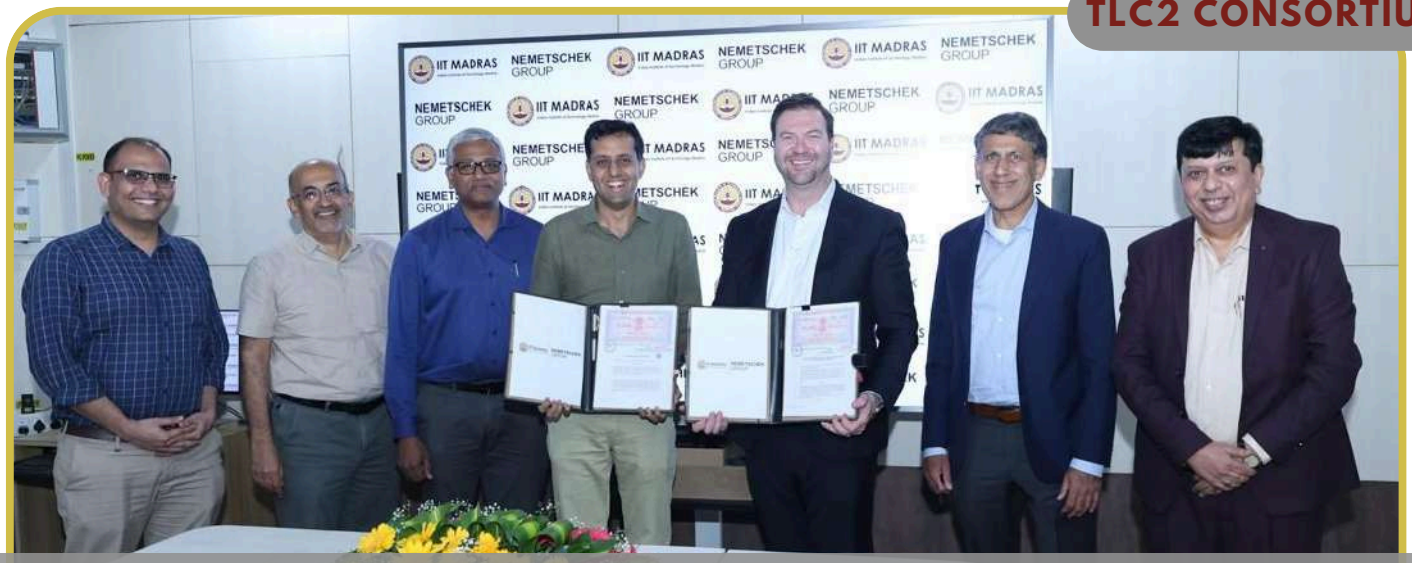
Centre of Excellence on Technologies for Low Carbon & Lean Construction

# NEWSLETTER

NOVEMBER

## TLC2 CONSORTIUM




Mr. Pete Nicholson. Sr. Vice President, (3rd from right), Mr. Raghi Iyengar, Vice president (2nd from right) and Mr. Deepankar Bhattacharyya, Sr. GM – Education (right), from Nemetschek Group with the TLC2 professors (L-R) Profs. Nikhil Bugalia, Koshy Varghese, Manu Santhanam and Ashwin Mahalingam during MoU signing at IIT madras on November 17 2025

Nemetschek India, a leading provider of Architecture, Engineering, Construction, and Operations software solutions, has joined the TLC2 Consortium as Platinum member. This affiliation represents a significant milestone in fostering collaboration and driving innovation within the construction software sector. We anticipate that the expertise and insights contributed by the Nemetschek Group will greatly enrich the consortium's initiatives.

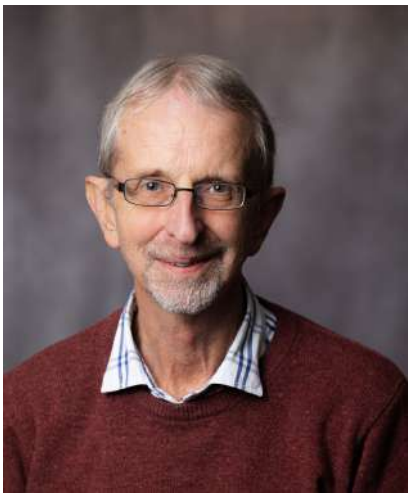
## OUTREACH

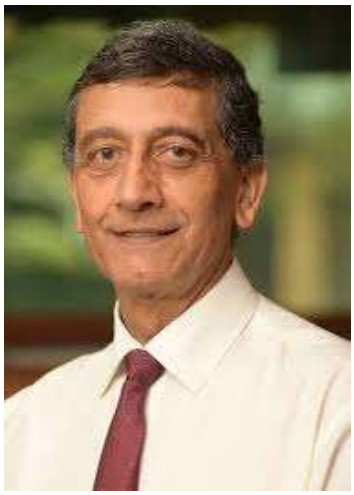
TLC2 Professors Ravindra Gettu, Surender Singh, and Aritra Pal visited the University of Mauritius to explore potential collaborations in the areas of Construction Materials and Construction Management. They engaged in productive discussions with the acting Dean of Engineering, Prof. A. Mudhoo, the Head of Civil Engineering, Prof Y. Baguant-Moonshiram, and other faculty members from the Department of Civil Engineering.

## GUEST COLUMN

In this edition, we are delighted to share an informal conversation with Prof. Mark G Alexander, Emeritus Professor, Department of Civil Engineering, University of Cape Town and Distinguished Professor, IIT Madras and Prof. Yunus Ballim, Emeritus Professor, School of Civil & Environmental Engineering, University of the Witwatersrand, Johannesburg.

From left, Prof.Mark G Alexander and Prof. Yunus Ballim





# GUEST COLUMN

Meet Prof. Mark G Alexander and Prof. Yunus Ballim, Visiting Professors at IIT Madras and our collaborator at CoE on TLC2.

Mark Alexander is an Emeritus Professor of Civil Engineering and Senior Research Scholar at the University of Cape Town. His teaching and research focus on cement and concrete materials engineering, encompassing both fundamental and applied investigations related to design and construction. He holds a leadership position within the Concrete Materials and Structural Integrity Research Unit (CoMSIRU) at UCT, where his work addresses marine concrete durability, low-carbon cements, and related challenges. He previously served as President of RILEM, and as President of the Concrete Society of Southern Africa from 2018 to 2020. Prof. Yunus Ballim is an Emeritus Professor, School of Civil & Environmental Engineering, University of the Witwatersrand, Johannesburg. His research interests include cement-based materials, and much of his work revolves around Wit's strategic teaching and learning plan, which he developed in 2009 in consultation with his colleagues.
Prof. Mark and Prof. Yunus recounted their professional journey from its inception in South Africa to the present, discussing their research interests, the current state of sustainability, and their collaborative endeavors with IIT Madras.

*How did you get into the field of civil engineering, and what keeps you motivated?*

Prof. MA: Largely because of working in the civil engineering construction company in the months before I began my university studies. I found the whole construction world fascinating.

Prof. YB: I was attracted to general engineering studies, as an applied sciences discipline, because it offers opportunity to use the basic sciences in development of implementable solutions to technical problems. However, the particular attraction of Civil Engineering for me, was the idea that, for unit intellectual effort, the impact of our solutions, designs and construction work reaches a much larger part of society and, mostly, is blind to social class classifications. For example, a bridge, a road, a water supply system or a public hospital brings increased dignity to the lives of the poor and wealthy citizens who are within reach of such infrastructure. I obtained my first degree in Civil Engineering in 1981 and this idea of my possible contribution to social development has sustained my involvement in the discipline over these many years.

*What/who motivated you to choose concrete and building materials as your research domain?*

Prof. MA: To some extent, by chance. When I decided to do postgraduate studies, I elected to work with a highly renowned researcher who became my guide and mentor in the field of concrete and building materials. Previously I had been in water engineering, but found the whole materials field very stimulating.

Prof. YB: I undertook my final-year investigation project under the guidance of Prof (then, Mr.) Mark Alexander in concrete materials.

The following year, I was encouraged to undertake my MSc studies by Prof GE Blight who, together with Prof Alexander, supervised my research work in concrete materials engineering. They both have acted as inspiring guides for my work in cement and concrete research. My six years of industrial work was mainly in concrete construction and manufacture of concrete products. Given this research and practical emperience, my intellectual engagement remained in cement and concrete materials science and engineering, where I have found a bottomless well of interesting research and development questions that continues to sustain my interest.

*Your favorite teacher /professor*

Prof. MA: As mentioned above, my supervisor and mentor for my postgraduate studies, and my early academic career, was Prof Geoff Blight of the University of the Witwatersrand. He was a very inspiring teacher and supervisor and it was a great privilege to work with him for as long as I did.

Prof. YB: I was much inspired by the late Prof Geoff Blight who taught me as an undergraduate and co-supervised my MSc and PhD research work. He was a remarkable intellectual and academic and, over his research life, Prof Blight earned five Doctoral degrees from three universities.

*What contribution to your field are you most proud of and why?*

Prof. MA: It is difficult to answer this because all of my contributions have been team efforts. But probably the most important contribution that we have made has been in changing the culture of concrete practice in South Africa to incorporate aspects of durability and sustainability.

Prof. YB: In South Africa, my PhD research work started the idea that long term durability of concrete could be better controlled by an early-age measure of the fluid-flow properties of the near-surface zone of a concrete structure. This idea evolved into my development of the early versions of the water sorptivity and oxygen permeability as Durability Index tests. Through collaborators and fellow researchers around the world, the approach has been generally accepted and has evolved into guidelines and national specifications for improved durability of reinforced concrete structures.

*Your Current Research Interests*

Prof. MA: My current research interests are still fairly broad.

Prof. YB: Because of my shift to leadership roles in South African higher education, my research moved more strongly to the area of heat flow in concrete and computational analysis. My interests here required much less experimentation and field work and I was able to undertake the computational development work when time permitted. I have also sustained my interest in the geological characteristics of aggregates on the engineering performance of concrete and I am currently working on a project to develop a fundamental understanding of the relationship between aggregate type and compressive strength.

*What area of cement and concrete research do you think needs more attention?*

Prof. MA: Undoubtedly, we must understand better the performance and response of the composite material called concrete to the varied environmental conditions to which it is exposed, particularly in an era of rapid climate change. We must understand how concrete behaves in situ and in the long term.

Prof. YB: While there are important research developments in alternative supplementary cementitious materials such as calcined clay, I think that we should be doing more research, in parallel with these developments, to consider the impacts of these materials in the general engineering and durability properties of concrete. Also, from an engineering building and construction point of view, we need more research on improving the quality, repeatability and reproducibility of concrete materials and construction methodologies, to allow for higher levels of confidence and more efficient concrete structural designs. This should allow a significant reduction in the amount of concrete used in reinforced concrete structures.

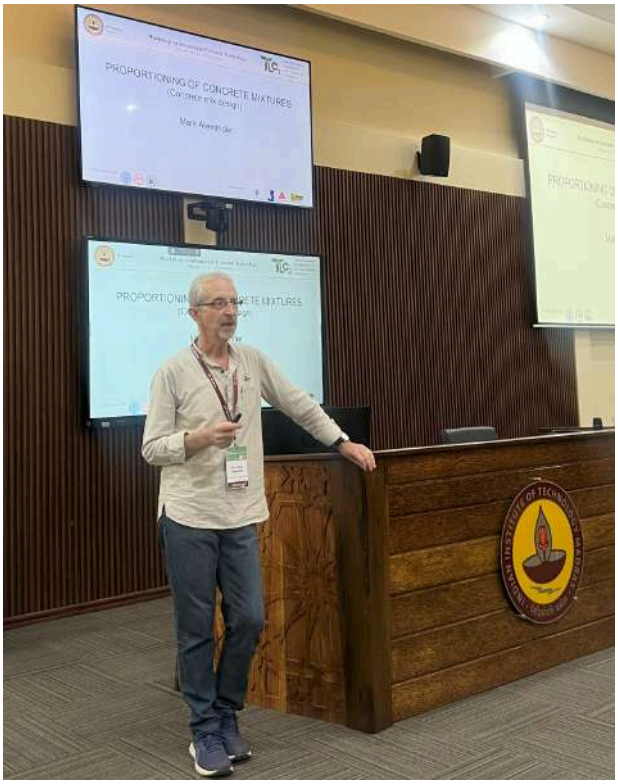
*Tell us about your collaboration with IIT Madras*

Prof. MA: This aspect has been a great pleasure and privilege for me, to be associated with IITM and to have ongoing collaborations with my colleagues in BTCM. It has been stimulating and rewarding intellectually and from research perspective. I greatly admire the way the group at IITM are going about their research, their vision and energy, and the way in which they work so easily with many people.

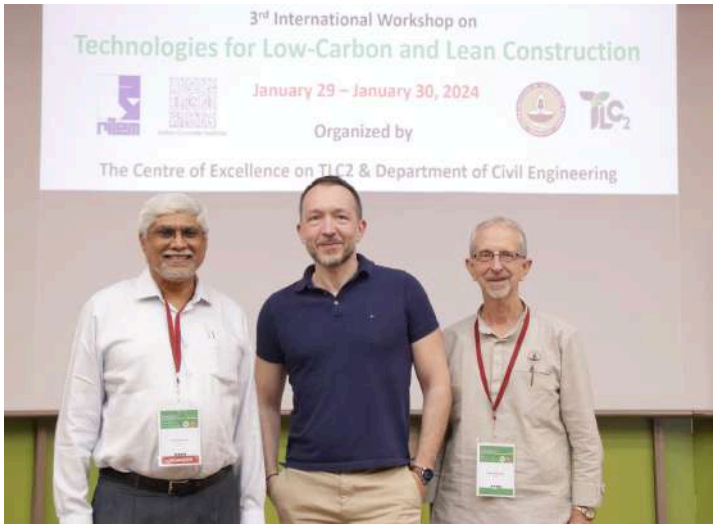
Prof. YB: My collaboration with IIT-Madras started in 2005, when Prof Manu Santhanam and I were awarded funding from a South Africa-India collaboration programme. Since then, I have been a regular visitor to IIT-M, visiting at approximately 3-year intervals. We have also hosted a number of visits from IIT-M staff and PhD students at our university in Johannesburg.

This sustained collaboration has allowed us to become comfortable with each others' research interests and strengths and, where possible, to complement research ideas and initiatives across the institutions. My long-standing collaboration with Prof Alexander and the research team at University of Cape Town, and our joint partnership with IIT-M has enriched the research and student development work that we have engaged over these past 20 years. My own research ideas have been wonderfully stimulated by my regular visits to IIT-M.


Prof. Yunus Ballim with Prof. Pillai and research scholars in University of the Witwatersrand




Prof. Mark delivering lecture in IIT Madras Zanzibar Campus




Three RILEM past presidents together in one frame: (L-R) Professors Ravindra Gettu, Nicolas Roussel and Mark Alexander

*Your idea about sustainable concrete – South African and Indian Context, and way forward*

Prof. MA: The word 'sustainable' has in many ways been stripped of its meaning. We have to get back to basics: what is good concrete, what are good concrete practises, and how can we best use this material to meet the needs of society while minimising our environmental and other impacts? These are pressing questions for both India and South Africa.

Prof. YB: Together with compacted soil, concrete remains one of the few truly democratic engineered materials in the world. This is largely because its two important ingredients – calcium and silica – are the most abundant on the earth's surface. But this also means that there may be a tendency to use Portland cement and concrete inefficiently, and to unnecessarily increase its embodied carbon levels. We must place greater emphasis on education in the effective use of cement-based materials – and ensure that our education programmes reach all levels of users, from the knowledgeable materials engineer to the small house-builder, who relies only on the unexplained promise that if water is added to cement, it will harden by tomorrow. Cumulatively, small users of bagged cement in South Africa and in India, make up a significant proportion of total cement sales and the cause of environmental sustainability will be well-served if we also pay attention to the ways in which this sector uses concrete-making materials.

*Overview of the Industry-Academia relationship in South Africa: How do they work together?*

Prof. MA: Sadly, this relationship has become somewhat fractured in recent years, brought about by huge changes in the cement industry whereby the industry has turned inward and last its sense of national importance and as a part of the larger ecosystem in construction. This is also because of the international pressures including cement-dumping and international takeovers which do not bode well for development of local expertise.

*Some notable projects that were executed through the support of the Industry and Academia partnership*

Prof. MA: We have had impact in many areas: the durability index approach which is now incorporated into most of our national infrastructure projects; rehabilitation and repair of major structures such as dams; and use of industrial 'waste' materials such as recycled aggregates in concrete. We've also had major impacts in understanding concrete deterioration phenomena such as AAR and acid attack in sewer environments.

*What benefits does the industry get from such collaboration with Academia? In the short term and in the long term?*

Prof. MA: In the past, there were definite spin offs to industry from our work, and some of it is ongoing. Amongst the informed leaders in the industrial sphere, they still value our input, but with the changes in the industry, that relationship has deteriorated. From outside, we need to rebuild those relationships.

*How do you see the field of cement and concrete research evolving in the next 5-10 years?*

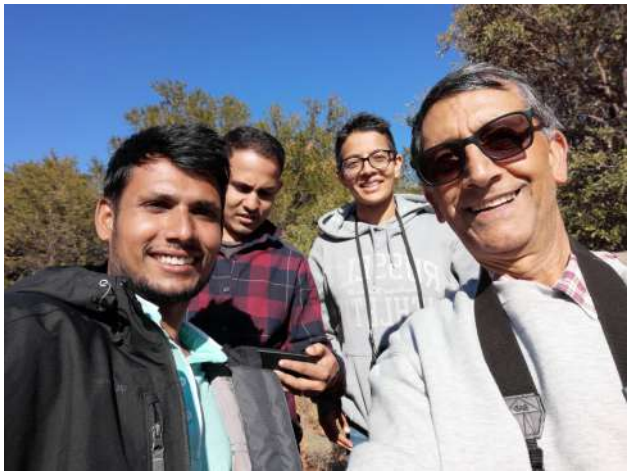
Prof. MA: The answer to this question depends very much on the field in which one is working. For us it will be largely working in low carbon materials and an infrastructure renewal and life extension.

Prof. YB: I think that research will continue to focus on viable alternative supplementary cementitious materials that can effectively be used with Portland cement. Limestone-calcined clay has opened a door to the possibility of other similar materials being developed through research, on the path to more environmentally sensitive, durable and sustainable concrete structures.

*Advice to young engineers interested in Material science*

Prof. MA: A challenging and rewarding career that can have major impacts globally in the next 30 years where we need to solve the problems that we are currently experiencing.

Prof. YB: The material science and engineering aspects of cement and concrete offers a wonderful area of intellectual engagement, in which the problems may seem intractable, but they do yield to our sustained and collective research push. The opportunities are wide and varied and they offer the keen research engineer an opportunity to make important contributions to human society and to the natural world.



Prof. Yunus with IITM research scholars