Dear Readers,

We are proud to present to you, the latest edition of the Indian Concrete Journal (ICJ) that encompasses papers of researchers who are passionately working towards low-carbon and sustainable construction. This edition curated by Dr Ravindra Gettu and Dr Radhakrishna G. Pillai from Indian Institute of Technology (IIT) Madras bring to our readers information about new concretes as well as applications with low-carbon or the embodied energy, along with performance.

Dr Ravindra Gettu is the V. S. Raju Chair Professor of Civil Engineering at IIT Madras. After completing his PhD degree from Northwestern University (USA) in 1990, he was the Director of the Structural Technology Laboratory of the Technical University of Catalonia in Barcelona, Spain, until 2004, after which he joined IITM. He has co-authored more than 500 scientific and technical publications in the areas of concrete technology, effective use of admixtures, self compacting concrete, fiber reinforced concrete and sustainability. He is the Immediate Past President of RILEM, the International Union of Laboratories and Experts in Construction Materials, Structures and Systems, based in France, and Fellow of the Indian National Academy of Engineering and RILEM. He is also an elected Foreign Member of the Russian Academy of Engineering. He was a co-honoree at the Gettu-Kodur Symposium on Advances in Science & Technology of Concrete, organized by the India Chapter of the American Concrete Institute, Mumbai, in December 2018. He has consulted for many leading construction materials manufacturers and projects, and works closely with the industry to promote technology implementation.

Dr Radhakrishna G. Pillai is a professor in the Department of Civil Engineering at (IIT) Madras. He earned a B.E. degree in Civil Engineering from the M. N. Regional Engineering. College (now MNNIT), Allahabad. Then, he earned M.S. and Ph.D. degrees in Civil Engineering at Texas A & M University, USA and has been passionate to combat corrosion of steel in reinforced and prestressed concrete structures. Beyond teaching in the areas of construction materials, concrete technology, and maintenance/repair of concrete structures, recently, he has been extending his research towards the extension of the residual service life of concrete structures through durable repair techniques such as cathodic protection. Most of his projects contribute to address the practical challenges and enhancing standards and specifications. He is also an active volunteer contributing to various association bodies like the Indian Concrete Institute (ICI), the NACE International Gateway India Section (NIGIS), and the International Union of Laboratories and Experts in Construction Materials, Systems and Structures (RILEM).

We hope you will enjoy reading this edition. We look forward to your feedback that will enable us to get similar themed editions curated for our readers.

Marking the birth anniversary of India's iconic engineer, Sir M. Visvesvaraya - a source of inspiration for engineers contributing significantly to the development of our great nation! We wish you all a very Happy #EngineersDay!

Best Regards,

The Production Editor


Dear Readers,

The Indian Institute of Technology (IIT) Madras has recently launched a the Centre of Excellence on Technologies for Low-carbon and Lean Construction (TLC2). This centre, headed by our colleague Prof. Manu Santhanam, aims to conduct research and disseminate information about technologies that lead to reduced or zero carbon emissions and wastage during construction. The initiatives considered include the use of concrete with low portland clinker content, increasing the life or durability of the structure so that there is more efficient usage of the materials, employment of automation so that there is minimum wastage of resources and time, and prefabrication to reduce construction time and improve the quality. In this special issue of the Indian Concrete Journal, we bring to you five technical papers presented by researchers who consider new concretes or applications in order to reduce the carbon or the embodied energy, along with providing the performance required in the application.

The first paper, by Manu Santhanam and co-authors, discusses the use of limestone calcined clay cement (LC3) to obtain high durability under chloride environment, for the fabrication of tetrapods for breakwater construction and in 3D printed concrete. They show how this new type of cement can be used in a wide range of applications and argue that it can be used in the field based on the extensive research carried out as well as the standardization of LC3.

The development of environmentally friendly concrete by the Japan construction companies is summarised in the paper of Masaro Kojima and Daijiro Tsuji. Their focus is on having environmentally friendly products with 60 to 70% less CO_2 emissions compared to those with conventional concrete by utilising large amounts of ground granulated blast furnace slag along with optimised binders. The response considered in such applications include slump retention, heat of hydration, strength development, shrinkage, durability and fire resistance. The specific applications that are discussed in the paper include cast in place piles, mass concreting and walls of a building.

Foamed concrete with flyash and polypropylene fibers is treated in the third paper by Indu Siva Ranjani Gandhi and co-authors. They show how the shrinkage and thermal characteristics of this lightweight concrete improve due to the use of unconventional materials. They discuss the preparation of the surfactant needed and the process to be followed for the foam generation. The properties studied include the compressive strength, drying shrinkage and thermal conductivity. They make a strong case for the use of flyash instead of sand to improve the compressive strength as well as the insulating properties of the concrete. Polypropylene fibers are used to reduce the drying shrinkage and limit cracking.

The work of Ashwin Mahalingam and Anisha Picardo compares the embodied energy of precast concrete elements with those made by cast-in-place concreting. They show, using a case study, that the energy embodied in precast floor slabs is about 10% lower than in conventional concrete floor slabs, inspite of the higher energy requirement due to transportation in the case of precast construction. Their analysis leads to the conclusion that precast concrete floor slabs use less raw materials, lead to lower wastage and faster construction, all of which contribute to reducing the embodied energy.

The final paper of this special issue is written by a group of researchers from Argentina and India, led by Raul Zerbino. They study the strength and impact resistance of concrete that could be used in pavements and is made incorporating coconut coir fibers. They use a new testing method, which uses growing impact loading to study the resistance of the concrete to impacts. They conclude that it is possible to design concrete with discarded coconut fibers, having slump and strength similar to that of plain concrete or concrete reinforced with polymer microfibers. The results of the impact tests confirm a positive effect of the incorporation of a small amount of 50 mm long fibers.

We thank the opportunity given in guest-editing this ICJ themed edition that enables us build awareness and promote sustainable construction widely in India. We count on the support of all our readers – researchers, academia and practicing professionals including influencers to share the findings and application knowledge in your community groups to make a positive impact in the construction sector.

Best Regards,

Dr Ravindra Gettu and
Dr Radhakrishna G. Pillai

Guest Editors

The Indian Concrete Journal