Dear Readers,

We are proud to present to you the September which has been curated by Prof. (Dr.) B. B. Das with Sustainability at its core.

Dr B. B. Das is a Professor of Civil Engineering at NITK Surathkal. After completing his PhD from IIT Bombay in 2007, he worked for two years as a Post- Doctoral Research Associate at the Centre for Innovative Materials Research (CIMR), Lawrence Technological University, Southfield, Michigan, USA. Before joining NITK, he was the centre head for NICMAR at Goa and Indore. In an era when environmental concerns were at the forefront of global discussions, Prof. Das recognized the urgent need to revolutionize the construction sector and developed Sustainable Construction and Building Materials Laboratory (SCBM Lab) in 2018 at NITK Surathkal. He has co-authored around 150 scientific and technical publications (SCI/SCOPUS) in the areas of concrete technology.

We hope our readers enjoy reading this edition. We are excited to hear your valuable feedback, please write to us at: icj@adani.com

Production Editor
Indian Concrete Journal

Dear Readers,

In this edition of September 2025, I am pleased to share with our community 5 enriching research papers oriented to sustainability as their common narrative.

In the first paper, Dhandapani and Santhanam[1] evaluates ternary composite cements–fly ash-limestone, slag-limestone, and calcined-clay-limestone–for sustainable, low-carbon concrete in India. Findings show calcined clay and slag pairs perform synergistically with up to 20 % limestone, matching or exceeding binary blends in strength and durability. Fly ash works best with limited limestone (10–15 %). All ternary mixes exhibit improved chloride resistance over ordinary Portland cement, especially after extended curing. The authors urge Indian standards to include robust provisions for these ternary binders to facilitate broader adoption in industry, aiding carbon reduction in cement production while SF improve ductility and post-crack capacity. Hybrids exhibit a synergistic effect: they outperform single-fiber mixtures in flexural toughness and Second paper[2] investigates the residual compressive strength of M50 concrete specimens–both cubes (150 × 150 mm) and cylinders (100 mm diameter, 200 mm height)–subjected to elevated temperatures (200–800 °C), varying heating durations, and cooling regimes (gradual vs sudden quench). Approximately 180 laboratory specimens were tested, and experimental results were compared with non-linear FEM simulations using ANSYS 2022. Findings reveal strength initially rises up to ~400 °C under gradual cooling, then declines sharply, especially beyond 600 °C. Cubic specimens retain higher compressive strength than cylinders, and gradual cooling outperforms quenching. FEM predictions agree within 10% of experimental data, validating the modeling approach.

Third paper[3] explores the use of hybrid fiber-reinforced concrete (FRC)–combining amorphous metallic fibers (AMF) and hooked-ended steel fibers (SF)–in elevated, pile-supported slabs. AMF significantly enhance initial crack resistance and flexural strength residual strength. For a similar total fiber content, hybrid mixes enabled approximately 20 % slab-thickness reduction compared to SF-only mixtures under Ultimate Limit State. The findings suggest that AMF+SF hybrids offer superior performance and economy in applications demanding both serviceability and ultimate strength

The next paper[4] assesses mechanical properties of locally sourced Dendrocalamus strictus (Nakar bans) bamboo splints and examines the flexural behavior of bamboo-reinforced concrete (BRC) beams per Indian standards using sand-coating, coir rolling, and epoxy treatments. Sand-coated bamboo exhibited a three-fold increase in bond strength over untreated splints, yielding 76 % higher load-bearing capacity (95.86 kN vs. ~54.3 kN) and significantly lower deflection (6.8 mm vs. 12 mm). Experimental neutral axis locations (11–73 mm) closely matched the theoretical 37 mm. Results suggest treated bamboo is a promising sustainable alternative reinforcement.

The following paper[5] of this special issue finds the strength properties of Ternary Blended Concrete (TBC) made of 70 % Ordinary Portland Cement (OPC), 24 % fly ash, and 6 % silica fume to reduce the environmental impact of concrete production. TBC grades M20 to M40 were tested for compressive, split tensile, and flexural strengths over 7–91 days. The results show that adding fly ash and silica fume to concrete boosts its long-term strength and durability from 7 to 28 days and up to 91 days. The study used the XG Boost algorithm to predict mechanical parameters of Ternary Blended Concrete (TBC), achieving strong correlation values ($R^2 > 0.7$) for compressive, tensile, and flexural strength.

With Best Regards,

Prof. Bibhuti Bhusan Das

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REFERENCES

[1] Dhandapani, Y., and Santhanam, M. (2025). "Towards adoption of composite cements in india, produced using slag-limestone, fly ash-limestone and calcined clay-limestone combinations", *The Indian Concrete Journal*, Vol. 99, No. 9, pp. 6-25.

[2] Shaik, F. A., and Balakrishnan, B. (2025). "Validation and failure mechanism identification of reinforced concrete beam-slab systems with secondary beams using nonlinear finite element analysis tool", *The Indian Concrete Journal*, Vol. 99, No. 9, pp. 26-34.

[3] Jose, S., and Gettu, R. (2025). "Use of hybrid steel fibre-reinforced concrete in construction of elevated slabs", *The Indian Concrete Journal*, Vol. 99, No. 9, pp. 35-44.

[4] Shah, J. K., and Rathod J. D. (2025). "Evaluation of mechanical properties of bamboo with different surface treatments and flexural behavior of bamboo reinforced concrete", *The Indian Concrete Journal*, Vol. 99, No. 9, pp. 45-54.

[5] Kumar, A., Kumar, V., and Kumar, S. (2025). "Compressive and tensile strengths of ternary blended concrete and their xgboost prediction", *The Indian Concrete Journal*, Vol. 99, No. 9, pp. 55-65.