

Use of Waste Materials in Concrete as Cement and Aggregate in India

Overview

Sustainable development requires an appropriate and effective use of all available resources, and this can be achieved fully by only adopting a zero-waste approach. The concrete construction industry, the biggest user of natural resources, therefore, must use all the materials which are presently treated as wastes and landfill and thereby depleting the resources for the future generation. The use of waste materials in concrete construction in India where construction development is growing fast, is particularly important and critical.

One of excellent features of concrete is that it can absorb the use of waste materials as a substitute for cement, filler and fine/coarse aggregates. However, the challenge is how the various wastes can be adopted in the production of concrete so that their use can possibly improve its performance. This will require an understanding of the fundamentals of concrete and the waste materials developed for use in concrete, and the construction requirements.

India is currently producing large volume of wastes with an estimated current figure of 1 billion tonnes/annum, which with a considerable period of growth ahead can easily reach 2 billion tonnes/annum.

For example, to generate electric power, India is using coal and producing fly ash, which is now accepted for use in concrete as a cement component. However, to what extent this can be achieved, resulting in durable/sustainable construction is unclear. India is currently producing both Portland cement and fly ash in similar quantities, about 250-300 million tonnes/annum each, and it should be possible to benefit from the use of high workability concrete in construction, using fly ash as cement component, as well as filler/fine aggregates. However, chemical/physical balance within concrete must be right to avoid long-term adverse effects i.e. carbonation of concrete leading eventually to corrosion of steel reinforcement.

Likewise, India produces large quantities of ferrous slags (about 50 million tonnes/annum), of which blast furnace slag forms the bulk and non-ferrous slags such as copper slag, which is also commonly used in the concrete industry, both as a component of cement or aggregate. Other wastes, which are the front runners, are rice husk ash at about 5 million tonnes, cement kiln dust (around 50 million tonnes), construction and demolition waste (around 100 million tonnes).

There are also the next generation of major sources of waste materials and to mention a few, sewage sludge incinerated bottom ash (SIBA), municipal solid incinerated bottom ash (MIBA), waste glass cullet and quarry fines/stone fines.

This course is designed to address sustainable construction and within it the zero-waste concept, fundamentals of concrete and its role in working with waste materials and in some instances with improvement in the performance of concrete construction.

Module	Duration: One Week (15th March 2021 – 19th March 2021) (Number of participants for the course will be limited to fifty)
Who Should Attend	<ul style="list-style-type: none">▪ Engineers, Architects and Researchers in Civil and Structural engineering from public works departments and government organizations including R&D laboratories.▪ Faculty, Scientists and Students (M.Tech./Ph.D.) from academic and technical institutions in Civil/Architectural engineering disciplines.
Fees	The participation fees for taking the course is as follows: Faculty and Scientists from Academic Institutions: Rs. 2,500/- Participants from Industry/Consultancy Firms: Rs. 7,500/- Students and Research Scholars: Rs. 1000/- Participants from abroad: US \$500 The above fee includes instructional material, laboratory usage and session tea. The participants will be provided with accommodation on payment basis.

The Faculty



Professor Ravindra K Dhir OBE is an internationally acknowledged scholar and practitioner in concrete science, technology and construction. He has organized multiple professional development courses, during last 30 years, that cover a very wide range of topics relating to concrete materials, concrete science, technology, design and construction, as well as related sustainability, recycling and environmental impact issues. He has established (i) an extensive outreach event programme which topped a £7m turnover, covering international Conferences/Seminars and CPD Courses, (ii) a £450k Centre for the Development of SMEs in Concrete Construction industry and (iii) £0.5m Knowledge Transfer Partnerships. He has also worked on numerous technical committees in the UK and America including President of the Concrete Society UK (2010-2011). He has to his credit more than 240 peer reviewed journal papers and 11 books. He has been a regular consultant to construction industry (material suppliers, ready-mix concrete, contractors, engineers and local government), from product development/assessment and structural appraisal, to investigation of non-compliance and structural distress.



Professor Jagbir Singh works in the department of Civil Engineering at Guru Nanak Dev Engineering College, Ludhiana. His research interest includes studying changes in concrete behavior for different types of constituent materials, improvement in sustainability properties of concrete by the use of waste material, effect and performance of concrete under fire, structural health monitoring and optimization of structures. He has published many research papers in peer reviewed journals and conferences. With the combination of industrial, academic and research experience, he works closely with the construction industry in the field of concrete technology.

Course Coordinator

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