

14th World Congress on **Healthcare & Technologies**

July 22-23, 2019 | London, UK

**Corneliu Bob***University Politehnica of Timisoara, Romania***About the deterioration of concrete structures due to the shrinkage and temperature variation**

A negative characteristic of using concrete as building material is due to its volume instability during time passing: There is the concrete property to shrink and crack during its drying process. There are two stages of concrete shrinkage:- Plastic shrinkage and cracking due to cement composition and /or environmental conditions during casting (rapid early drying) of concrete; it is developed after the concrete was made (30 minutes to 6 hours.). An original explanation concerning plastic shrinkage and false setting is presented. The types of damages are: diagonal cracks in roads and slabs, random cracks in reinforced slabs, cracks over reinforcement in slabs. Long term drying shrinkage which produced cracks due to the water release from fresh concrete into the environment; it is measured starting 24 hours, since the concrete was made and cast, to months. Cracking are produced in thin slabs and in walls due to inefficient joints and insufficient curing. Few case studies are to be presented: Large platforms, bridge pillars, a slab of multi storey frame structure.

Temperature variation on concrete structures

As well as the concrete shrinkage, the temperature variation will induce into building elements the volume instability which will create internal stress. An interesting case of a reinforced concrete basin under temperature variation is to be presented. For basins, made of prefabricated elements, the deteriorations were not relevant, but for a basin erected with monolith connections, very sensitive damages (cracks and large deformations) were observed due to temperature variation. Other types of concrete cracks are produced by: Plastic settlement; early thermal contraction; construction, formwork and sub-grade movements, etc. The concrete cracks of structures represents a real problem for owners and engineers due to diminishes of strength, stiffness and durability of constructions (see Fig.). In such cases the rehabilitation or demolition of structure elements, represent the necessary solutions.



Recent Publications

1. C. Bob: "Plastic shrinkage and false setting" (in Romanian), A 12-a Conferinta de betoane, 1984,Iasi.
2. C.Bob: "Concrete basins under temperature variation"(in Romanian), Zilele Academice Timisene,2005, Timisoara.
3. H.F.W.Taylor,C.Famy,K.L.Scrivener,:"Delayed Ettringite Formation", Cement and Concrete Research , Vol.31, Issue 5, May 2001.
4. J.Stark, K.Ballman : "Delayed Ettringite Formation in Concrete "Bauhaus-University, Weimar/Germany, 2007.
5. P.L.Popovic,J.P.Donnlely : "Repair of Continuum Parking Garage", Assessment, Maintenance and Rehabilitation of Structures and Settlements , Vrsac, Serbia,2017.

Biography

Corneliu Bob has graduated at the University Politehnica of Timisoara, Romania in 1961 and PhD civil engineering in 1971 at the same University. In 1990 he became professor of R C structures and completed his PhD as scientific coordinator at the civil engineering from faculty in Timisoara. From 1996 till 2004 he was the head of the National Building Research Institute, Timisoara. He has also been very active in the Romanian Associations for Civil Engineering as National Association Engineering for Structural Analysis, Bucharest, Romanian Concrete Commission, Romanian Academy of Material Science. Since 1992, he became the member in the permanent committee as a chairman of the IABSE romanian group and member of the SED editorial board. The field of interest of works is rehabilitation of structures, analysis and design of structures, durability of buildings, new special concrete types. In the last period he has had a lot of important works on the "Building Sustainability". He also played an important role in development of assessing of existing structures and in design of new buildings and he has devoted great energy in promoting the role of students and young engineers as designers and researchers.

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