

**Special Issue on Durability of Concrete Structures**  
**On the occasion of Ton Siemes' 60<sup>th</sup> birthday**

## **Editorial**

This Special Issue of HERON presents studies on degradation and related properties of concrete. It would have been impossible without the work of Mr. A.J.M. (Ton) Siemes and the inspiration he provided to the authors. Ton has been a conceptual thinker in this field for over 25 years and a teacher and mentor in the work and professional development for all of us. We dedicate this Special Issue to him on the occasion of his 60th birthday on January 9, 2007.

Ton Siemes, who was the first civil engineer graduating in materials science at Technical University Delft, has led the way for a modern approach of design of concrete structures for service life. He introduced the concept of reliability analysis of deterioration of concrete in the 1980's [Durability of buildings: a reliability analysis, 1985, HERON Vol. 30 (3) 2 - 48]. Ton was an active member of joint CIB committee W80/RILEM TC 140 where these ideas were further developed. He was instrumental in launching and successfully completing the European research project DuraCrete, which produced the first practical method for performance based service life design of concrete structures. Ton published in a wide range of fields, such as alkali-silica reaction in concrete [Alkali-silica reaction in the Netherlands: Experiences and current research, 2002, HERON Vol. 47 (2) 81-86], low tensile strength [Unexpectedly low tensile strength in concrete structures, 2002, HERON Vol. 47 (2) 111-124] and, of course, durability [Design of concrete structures for durability - Example: chloride penetration in the lining of a bored tunnel, HERON Vol. 43, no. 4, 227 - 244]. He taught many of us, who had not been educated in structural design, that the engineering community would not accept "materials science based methods" without a firm basis in the concepts of structural design, such as limit states and reliability. Ton retired from active work at TNO in 2005.

The articles presented in this Special Issue cover the following topics. The first paper concerns testing for compliance to the service life design of a finished structure. This work is fully based on DuraCrete, but takes it beyond the design into the phase of "realisation". The second article deals with the important influence of spatial variability on durability

and repair. It discusses correlations between various parts of structures, which for example are relevant for bored tunnels made of a large number of precast lining elements. Such issues were met when DuraCrete was applied for the first time to practical service life design in The Netherlands, on the Westerscheldetunnel. The third paper is about monitoring of processes that, in the course of time, may cause corrosion in concrete structures. Monitoring with embedded sensors is increasingly used in aggressive environments all over the world. The innovative idea here is that the benefits of monitoring can be illustrated by using a risk based approach and can be expressed in monetary units. The fourth article describes a microscopy study of trass in concrete, which is an "old" component added to concrete for improving its properties including durability. The material investigated was obtained during a study of existing structures in order to validate and improve the DuraCrete model for chloride induced corrosion that was recently reported [Durability of marine concrete structures – field investigations and modelling, 2005, HERON, Vol. 50 (3), 133-143]. Finally, the fifth contribution deals with some effects of polymer fibres in concrete, in particular on the microstructure after fire testing and on durability as measured by chloride migration testing. This work was a spin-off of the construction of the Westerscheldetunnel, mentioned above. Testing for durability of this “new” material was proposed and supervised by Ton Siemes.

We hope that this Special Issue is valuable for the readers, both in presenting some state-of-the-art work in various topics and in illustrating the fruitful and much appreciated contribution given to the world of concrete by our colleague Ton Siemes.

A.C.W.M (Ton) Vrouwenvelder, R. B. (Rob) Polder, editors