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A Vision for the Future of Corrosion Resistant Structures—A Special Session Honoring Professor Carolyn Hansson

SP-366

Editors: O. Burkan Isgor, David Tepke, Ceki Halmen, and Neal Berke

American Concrete Institute
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A Vision for the Future of Corrosion Resistant Structures—A Special Session Honoring Professor Carolyn Hansson

Professor Carolyn Hansson's remarkable journey began in England, during the turbulence of the Second World War. Despite the hardships of wartime and the limitations imposed by rationing, Carolyn was raised in a nurturing environment by parents who instilled in her a deep respect for learning and perseverance. These values would guide her through an exceptional academic and professional life.

As the sole woman at the Royal School of Mines, Carolyn studied metallurgy at Imperial College, where she later earned her PhD, focusing on superconductivity and crystal structures at liquid helium temperatures. Her postdoctoral path led her from industrial research at Martin Marietta Laboratories to academic positions at Columbia University and the State University of New York at Stony Brook, and later to Bell Laboratories in 1976.

Her pivotal shift into corrosion science began in 1980 at the Danish Corrosion Centre, where she worked on a new type of cement and corrosion of steel in concrete. From Denmark to Canada, Professor Hansson continued her research at Queen's University and later at the University of Waterloo, building an enduring legacy in the field of steel corrosion in concrete structures.

Over the decades, Carolyn's contributions to corrosion research have shaped and guided generations of engineers and scientists. Her pioneering studies—on electrical resistivity of concrete, quantifying reinforcement corrosion rates, and understanding the complex role of chlorides—remain foundational in the field. Her investigations into corrosion inhibitors, electrochemical chloride extraction, effects of concrete cracking on reinforcement corrosion, and corrosion-resistant steels continue to influence global practices in infrastructure resilience.

This Special Publication celebrates more than 60 years of Professor Hansson's contributions as a scientist, educator, and mentor. The papers collected here, presented at the 2025 Spring Convention in Toronto, reflect not only the lasting relevance of her work but also its future promise. Her vision stands as both a mirror to the past and a beacon for innovations yet to come in corrosion-resistant construction.

O. Burkan Isgor
David Tepke
Ceki Halmen
Neal Berke

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Remarks on the Last Sixty Years of Advancement in Corrosion of Metals in Concrete during Carolyn Hansson's 60 Year Career

David G. Tepke and O. Burkan Isgor

Synopsis: A review of corrosion literature on corrosion of steel in concrete clearly shows that Carolyn Hansson's work and vision mirrors the exponentially increasing interest on the subject since 1980s. During the time Dr. Hansson has been contributing to the scientific community, significant advancements have occurred in understanding and controlling corrosion of metals in concrete. This paper discusses some of the key advancements over the last six decades as Dr. Hansson was making her mark on the industry. The recognition of the role of corrosive environments, development and roles of committees in providing forums for experts, service-life modeling, electrochemical control, and other topics are discussed. Finally, a perspective on where the industry may be going in the future years is offered.

Keywords: reinforcement corrosion, chloride, chloride threshold, chloride binding, carbonation, inhibitor, cathodic protection, electrochemical chloride extraction