

**Department of Structural Engineering  
University of California, San Diego  
SE 290 Seminar  
T.R. Higgins Lecture sponsored by AISC**



Professor Robert J. Connor  
Civil Engineering Department  
Purdue University

**“Towards an Integrated Fracture-control Plan for Steel Bridges”**

Monday, November 5, 2018  
12:00 pm - 12:50 pm, Pepper Canyon Hall, Room 122  
<https://structures.ucsd.edu/seminars>

**Abstract**

There has been considerable research and interest in the topic of fracture-critical members (FCMs) during the past decade. As a result, the entire concept of what constitutes a FCM is being revisited and many long-standing ideas and opinions related to this classification of members is being shown to be overly conservative. Significant advances in the understanding of fracture mechanics, material and structural behavior, fatigue crack initiation, fatigue crack growth, fabrication technology, and inspection technology have allowed other industries to address fracture in a more integrated manner. After years of research, new stand-alone AASHTO-ready guide specifications that give codified direction on how to perform 3D system analysis to verify system redundancy, as well as guide specifications to evaluate internal member-level redundancy of mechanically-fastened built-up members, have now been developed and adopted by AASHTO. Additional research demonstrating the benefits of exploiting the improved toughness of modern HPS grades of steel has been completed. Through these advances, it is now possible to create an integrated FCP, combining the original intent of the 1978 FCP, with modern materials, design, fabrication, and inspection methodologies. Further, an integrated FCP will provide economic benefits and improved safety to owners by allowing for a better allocation of resources by setting inspection intervals and scope based on sound engineering rather than based simply on the calendar. In summary, an integrated FCP encompassing material, design, fabrication, and inspection can make fracture no more likely than any other limit state; ultimately, allowing for a better allocation of owner resources and increased steel bridge safety. This presentation presents background to the current views of FCMs and suggestions about how to move forward.

**Biography**

Robert J. Connor is a Professor of Civil Engineering and is Director of the S-BRITE Center at Purdue University. Dr. Connor has been working in the area of fatigue, fracture, and other performance and durability issues related to steel bridges for over 25 years. He has published articles in conference proceedings and technical journals, mostly related to fatigue and fracture issues in steel structures, field inspection, and failure investigations. Dr. Connor has been the principal investigator on a number of NCHRP Projects, having successfully completed five (5) NCHRP Projects as PI and three as Co-PI. Dr. Connor's research interests include fatigue and fracture of steel structures, field testing and remote monitoring of structures, bridge inspection reliability, and risk-based inspection methods. He was the recipient of the George S. Richardson Medal in 2016, an AISC Special Achievement Award in 2012, and was the first recipient of the Robert J. Dexter Memorial Lecture Award in 2005. In 2018, he was selected by AISC to receive the T.R. Higgins Lectureship Award.

*Sponsored by Chia-Ming Uang  
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