

“DEVELOPMENT OF STRUCTURAL HEALTH MONITORING TECHNOLOGIES FOR WATERBORNE TRANSPORTATION INFRASTRUCTURE”

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ABSTRACT

In the U.S.A., riverways provide an efficient transportation method connecting inland cities and towns with major coastal ports and are thus an economic lifeline that facilitates the transportation of hundreds of billions of dollars in goods annually. Utilization of these rivers for commercial traffic requires an array of infrastructure primarily in the form of locks and dam, and maintaining their operability is of critical economic importance. Structural failure or unplanned maintenance of even just one lock or dam can lead to millions of dollars of economic losses each day. A significant issue is the fact that this infrastructure operates in challenging environments where visual inspection is difficult and very costly. To overcome the difficulties in inspection of this critical infrastructure, Dr. Eick's research group has been developing structural health monitoring (SHM) technologies to continuously collect data regarding structural condition and provide actionable information to asset managers and stakeholders about critical maintenance needs. In this talk, Dr. Eick will first provide an overview of the Inland Navigation System and explain the infrastructure necessary to realize commercial traffic on inland riverways. Dr. Eick will then discuss behavior and common degradation modes of this infrastructure, and how his group has developed SHM technologies to aid in maintenance decision making. This talk will particularly focus on approaches to detection of boundary condition degradation of large steel gates; non-contact, vision-based monitoring to measure static and dynamic structural response of lock and dam structures; and full-scale welded-component fatigue testing to characterize crack-propagation to aid in remaining life calculations.

BIOGRAPHY

Dr. Brian Eick is the technical lead and program manager for structural health monitoring at the Engineer Research and Development Center of the U.S. Army Corps of Engineers. He leads a multidisciplinary team in the development and implementation of technologies to remotely inspect and assess the condition of large-scale civil water-resources infrastructure. Dr. Eick received his M.S. and Ph.D. in structural engineering at the University of Illinois, Urbana-Champaign in 2015 and 2020, respectively, and his B.S. in structural engineering at the Illinois Institute of Technology in 2014. Dr. Eick is a registered professional engineer in the U.S. state of Illinois and is the chairperson for the international working group on structural health monitoring of port and waterways infrastructure for the World Association for Waterborne Transport Infrastructure (PIANC).