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Editorial

The previous issue of *Bridge Structures* contained six papers that were presented at the 1st International Conference on Fatigue and Fracture in the Infrastructure which was held in Philadelphia, Pennsylvania, USA, on August 6–9, 2006. This issue of the journal continues on the theme of fatigue and fracture with six other papers that were presented at the conference.

The issue leads off with a paper by McGormley *et al.* on the "Fatigue retrofits of the I-435 Missouri River Bridge", which presents the details of the retrofit and its impact on extending the remaining fatigue life of this critical infrastructure link. The I-435 Bridge over the Missouri River at Kansas City, Missouri, in the United States, consists of twin two-girder structures. Inspections by the Missouri Department of Transportation (MoDOT) in 2003 detected numerous cracks at the floor beam and lateral member connections throughout the 30-year-old bridge. A comprehensive fatigue study was carried out to investigate the extent and cause of cracking and to evaluate possible long-term retrofit solutions. Based on the study findings, a retrofit plan was implemented which addressed details susceptible to distortion-induced cracking, end restraint cracking, and crack growth from embedded defects. Large-hole and loosening type retrofits were utilized to reduce the possibility of crack extension. Steel box girder bridges with composite concrete decks were commonly fabricated in Ontario, Canada with a "cut-short" welded stiffener detail that was used to connect intermediate vertical cross bracing to the girder webs. The bracing members, consisting of single angles, were attached to the ends of the stiffeners with fillet welds. The vertical web stiffener would usually be terminated above the girder bottom flange with a 20–50-mm web gap. Often, the fillet welds attaching the stiffener and the web would terminate short of the stiffener end, resulting in an even longer web gap.

In "Estimating remaining fatigue life of 'cut-short' stiffeners in steel box girder bridges", Lipkus and Brasic describe a method for the evaluation of remaining fatigue life of the "cut-short" stiffener detail. The Interstate 79 Neville Island Interchange Bridge Complex located north of Pittsburgh, Pennsylvania, in the United States, carries four through lanes of the Interstate over Neville Island and the main and back channels of the Ohio River. The mainline bridge consists of a tied through arch span and 26 dual parallel approach spans. These mainline dual approach spans are continuous units comprised of two welded steel plate deck girders, welded steel plate floorbeams, and rolled steel wide-flange stringers. In addition, the complex includes eight ramp bridges consisting of both straight and curved continuous dual welded steel plate girders, welded steel plate or rolled wide-flange floorbeams, and rolled steel wide-flange stringers. These structures, built and opened to traffic during the early to mid 19970s, are owned and maintained by District 11-0 of the Pennsylvania Department of Transportation. Miller and Ahmadi discuss the "Design and construction of fatigue-prone detail retrofits for Interstate 79 Neville Island interchange bridges".

Over the last 16 years, acoustic emission monitoring was utilized on a considerable number of railway bridges operated by Canadian National (CN). Recently, investigation into developments in ultrasonic impact treatment (UIT) has prompted the use of this technology on fatigue susceptible welded details on CN bridge structures. Recently, investigation into developments in ultrasonic impact treatment (UIT) has prompted the use of this technology on fatigue-susceptible welded details on CN bridge structures. UIT was first applied to one of CN's larger bridges in 2001, with the expectation that this treatment would considerably extend its fatigue life expectations. Cavaco presents the "Measures taken to mitigate the effects of fatigue on critical railway bridges at Canadian National" to ensure the continued safe operation of the railway network. The base welded connection of high mast tower and pole luminaries on bridge structures has displayed significant in-service fatigue sensitivity. In addition, laboratory research has shown that the commonly used base welded connection details provide a fatigue resistance aligned with either Category E for the full penetration weld type connection or Category E' for the fillet welded socket type connection.

Many transportation agencies with these common structures for roadway and bridge lighting have experienced significant base connection cracking and total failure after short service lives. In "Base connection retrofits for high mast towers and pole luminaries used for roadway and bridge lighting", Koob reports on a mechanically fastened steel strengthening jacket retrofit which was field installed on the bases of six high mast towers and 800 pole luminaries. The goal of the base retrofits is to increase the service life of these structures.

On the theme of bridge lighting, Azzam and Menzemer investigate the "Fatigue life assessment and comparison of two types of bridge-mounted welded aluminum light

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pole support structures". The authors demonstrate the importance of base plate thickness on the through thickness bending of the tube wall, which can be effective on mounted bridge poles due to open terrain wind dynamic loads.

Along with the papers presented in the previous issue of *Bridge Structures*, each of the papers in this issue presents the *state-of-the-art* in fatigue and fracture analysis and retrofit of bridge details.

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