MarTREC UTC Project Information Form
USDOT Tier 1 University Transportation Center
Agency ID or Contract Number 69A3551747130

Project Title: Fatigue Crack Control in Waterway Lock Gate Pintle Locations Subjected to Multi-Modal Fracture
Project Abstract (Brief Description): The proposed research project will address multi-mode fatigue cracking within critical lock gate pintle locations. The lock gate pintle is a ball-and-socket joint that is crucial for proper gate operation, but is subject to frequent fatigue cracking. Fatigue crack repair within pintle locations is particularly challenging due to the complex multi-axial loading conditions (combined axial and torsional loads) that occur during gate opening and closing. The project proposed herein will analytically investigate multi-axial stress demands within common pintle geometries during operation, and develop bonded fiber reinforced polymer (FRP) retrofits capable of controlling multi-mode fractures (fractures that originate from both tensile and shear stresses). The project contains two integrated research components: 1) a detailed analytical crack investigation to develop FRP retrofit strategies; and 2) a multi-axial experimental fatigue investigation exploring FRP retrofit effects on multi-mode fatigue fractures. Outcomes of the proposed project include an implementable pintle fatigue retrofit strategy for US Army Corps of Engineers stakeholders, ultimately improving waterway infrastructure reliability. Additionally, novel multi-mode fatigue data for composite materials will be generated and advanced research training will be provided for an engineering graduate student (providing knowledge transfer to industry upon completion).
Describe Implementation of Research Outcomes (or why not implemented) - Place any photos here *To be determined upon conclusion of the project*:
Impacts/Benefits of Implementation (actual, not anticipated) *To be determined upon conclusion of the project:*
Web Links: martrec.uark.edu
Budget (Funding) Amounts & Source(s) (US DOT +Match(s) =Total Costs): $116,999 from MarTREC and $59,348 from academic salary. Total $176,347
Project Start and End Dates: August 2018-February 2021 Project Complete
Principal Investigator(s) and Contact Information: Gary S. Prinz University of Arkansas (Dept of Civil Engineering) (479) 575-2494 prinz@uark.edu 0000-0003-2579-3214
Principal Investigator Institution (University): University of Arkansas