The research initiative conducted over the past decade in Missouri resulted in numerous demonstration projects and case studies to examine alternative rapid repair strengthening systems. These projects serve as a test bed to implement and study the long-term performance of these non-corrosive materials and develop/examine non-destructive testing devices.

Objectives:
Fiber-reinforced polymer (FRP) technology continues to make strides in both new construction applications and strengthening applications of structurally deficient bridges in the United States primarily due to its corrosion resistance, high strength to weight ratio and in many cases rapid installation processes.

This provides an overview of composites usage over the past decade in the State of Missouri, USA for repair and strengthening. These techniques include external strengthening applications of structurally deficient bridges using techniques such as manual wet lay-up systems, pre-cured plate and strip systems, near surface mounted systems, and mechanically fastened systems.

Utilization of Non-Corrosive Materials in Missouri: Location Map

NDT Device Development for FRP:

Advantages of FRP Reinforcement:
- High longitudinal tensile strength (varies with sign and direction of loading relative to fibers)
- Corrosion resistance (not dependent on a coating)
- Nonmagnetic
- High fatigue endurance (varies with type of reinforcing fiber)
- Lightweight (about 1/5 to 1/4 the density of steel)
- Low thermal and electric conductivity (for glass and aramid fibers)

Advantages of FRP Reinforcement

Case Studies:

Bridge T-298, Pulaski Co., MO
System: Manual Wet-Layup
Built: 1956

Bridge P-962, Dallas Co., MO
System: Manual Wet-Layup, SRP
Built: 1946

Bridge P-596, Morgan Co., MO
System: NSMR, Manual Wet-Layup
Built: 1937

Bridge T-530, Crawford Co., MO
System: Manual Wet-Layup, Plates
Built: 1948

Bridge T-495, Iron Co., MO
System: Manual Wet-Layup
Built: 1937

Credits / References:
Program Contributing Faculty at Missouri S&T: Prof. G. Chen, Prof. G. Galecki, Prof. N. Maerz, Prof. S. Watkins, and Prof. R. Zoughi.

Website Technical Report Location: Http://utc.mst.edu