

RESEARCH PROBLEM STATEMENT

DATE: 09/25/2020 **PROJECT AREA:** Design

TITLE: MMFX Steel for Bridge Deck Reinforcement

PROBLEM STATEMENT:

ARDOT has implemented epoxy coated steel for all bridges as a corrosion prevention method. Epoxy coated reinforcement has been shown to provide better design life for concrete bridge decks. Epoxy coated steel can still become corroded, especially when the coating is damaged during transportation or construction. A recent development is MMFX steel for rebar. MMFX has a different microstructure than standard carbon steel which leads to improved corrosion resistance and yield strength while maintaining adequate ductility. The result is an alternative to epoxy coated steel that may be more corrosion resistant and can reduce the total volume of steel in a bridge deck, reducing congestion and installation time. MMFX has been used in Oklahoma bridges but has yet to be used in Arkansas. The proposed work would be an exploratory study into the use of MMFX steel in Arkansas including laboratory work on corrosion, response of reinforced concrete to flexural loads, a cost analysis of a bridge deck reinforced with MMFX, and a field study of a bridge utilizing MMFX steel.

- OBJECTIVES:**
1. Comprehensive literature review of MMFX specifications, past research, and implementation.
 2. Cost comparison of select bridge projects, showing potential increase in cost if using MMFX with a reduced volume of steel as well as potential service life increase
 3. Compare life-cycle cost between carbon steel, epoxy coated reinforcing steel, MMFX reinforcing steel, and potentially other applicable anti-corrosion steels.
 4. A bridge project to be selected to use MMFX steel in Arkansas for long-term monitoring

FORM OF RESEARCH IMPLEMENTATION AND RETURN ON INVESTMENT:

This project will provide ARDOT with an understanding of the peculiarities of using MMFX steel in bridge decks. Recommendations provided from this project will help ARDOT decide if MMFX is suitable for its bridge decks and in what situations it is most practical. This will include quantitative studies of corrosion of MMFX in ARDOT concrete and the strength properties of concrete reinforced with MMFX. Life-cycle cost will be used as a metric to decide on the benefits of using MMFX rebar for ARDOT bridge design. Installation labor cost per unit weight of MMFX steel is similar to epoxy coated rebar. Initial capital cost difference is in the material cost.

Estimated Project Duration: 24 Months

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Standing Subcommittee
Ranking

2/4

Advisory Council
Ranking

8

Statement Combined with
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