

Research in Progress

Development of Improved Inspection Techniques using LiDAR for Deteriorated Steel Beam Ends

Research Need

There is an emerging need for MassDOT to leverage the strength of LiDAR point cloud data and incorporate such a promising technology into their bridge inspection practices if it is deemed feasible.

Goals/Objectives

1. To evaluate the accuracy and repeatability of LiDAR in quantifying key parameters for evaluating the residual capacity of the bridge, including the out-of-plane imperfection of the beam web, the surface area of corrosion, through lab experiments.
2. To develop and validate automated or semi-automated point cloud processing methods, e.g., extraction of surface corrosion areas and measurement of the corresponding surface distortion.
3. To develop practical and yet effective operational on-site procedures for collecting critical data from in-service steel beam ends using LiDAR, including pre-/mid-/post-inspection setup, optimal sensor parameters and scanning configurations, etc., through lab and field experiments.
4. To propose updates to the MassDOT Bridge Design Manual for the estimation of the remaining capacity of steel beams, based on the research results.

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Project Information

This project is being conducted as part of the Massachusetts Department of Transportation (MassDOT) Research Program with funding from Federal Highway Administration (FHWA) State Planning and Research (SPR) funds.

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May 2022

Expected Project Completion Date:

November 2023

Methodology

1. Review of LiDar-based bridge inspection methods and practices.
2. Lab experiments for developing appropriate algorithms for point cloud processing and mapping of corrosion.
3. Field experiments for residual thickness losses assessment using LiDar.
4. Develop and validate the automated or semi-automated LiDAR point cloud extraction method.
5. Develop a new protocol for LiDar-enriched bridge inspections.

