FTA

REPORT SUMMARY

Automated Track Video Inspection Pilot Project

Background

Automated/autonomous track inspection using state-of-the-art techniques (high-resolution track and right-of-way imaging, contactless, and other type of inspection technology) coupled with a data management system enables transit agencies to enhance and strengthen their track inspection and safety program. Automated/autonomous track inspection technologies could minimize the inherent dangers faced by traditional walking inspectors by allowing the survey of tracks from a safe area (for example, placing them on the inspection vehicle or in front of computer screens) as opposed to on the right-of-way. In addition, automated/autonomous inspection methodologies increase the operational frequency of inspection and cover significantly greater distances while decreasing the adverse operational impacts to the system that walking inspection teams create.

Objectives

The main objectives of this project were to:

- Improve the safety of transit workers, specifically right-of-way safety for rail transit workers, through demonstration of advanced track inspection techniques that limits the inspector's exposure to rail right-of-way by visually inspecting the condition of the tracks from a safe location
- Enhance the quality of inspection by increasing the inspection frequency and reporting of defects.
- Establish an optimum frequency of track and infrastructure inspection adequate to maintain the state of good repair of the track's and infrastructure's assets.
- Provide the Division of Track Supervisors, managers, and MTA-NYCT's executives with superior objective and detailed inspection tools for the identification, prioritization, planning, and execution of maintenance, repairs, and reconstruction of track systems.
- Maximize asset (Track Geometry Car) functionality, performing full track system inspections with the TGC4 car inclusive of the power rail system and the field side of the running rails.

Findings and Conclusions

Vehicle-based video automated track inspection systems are successful in augmenting the capabilities of detecting and confirming defects found by the TGC4's measuring systems.

Vehicle-based video automated track inspection systems, as envisioned in this project, are indeed successful in augmenting the capabilities of detecting and confirming defects found by the TGC4's measuring systems. These video systems have the potential to provide a more detailed and comprehensive picture of the actual location where the defect can be found.

The Metropolitan Transportation Authority (MTA), through MTA-New York City Transit (NYCT), in partnership with Plasser American Corp. (PAC) of Chesapeake, Virginia, the manufacturer of highly-sophisticated track maintenance and inspection machinery, including MTA-NYCT's Track Inspection Cars, used its TGC4 Track Inspection Car, already equipped with track geometry and other measuring systems and Right-of-Way, Rail View, and Gauge Side Rail View video systems, to achieve the objectives of this project by installing new Field Side Rail View (of the running rail) and Power Rail (Third Rail) View video systems to complete the spectrum of measurements and video inspection of major track components that can be performed by the TGC4. The project also enhanced and modified the existing video software to provide for proper identification, reporting, and comparison tools for defects found by any onboard video systems. This software enhancement was a critical part of the research study, aimed at improving the efficiency of the video review process.

The data collected and analyzed by the Automated Track Inspections group of Track Engineering of MTA-NYCT led to the conclusion that once-a-month automated video inspection, complemented by the analysis of all the other measuring systems on board the TGC4, has the potential to detect most of the pertinent defects or conditions on this segment of the MTA-NYCT's Flushing Line between Times Square and Queensboro Plaza.

One of the advantages of the use of the TGC4 video systems is the transfer of marked defects from the base or original video file to future video inspection files. The Compare Viewer software plays back and transfers marked defects from one video inspection run to the next without the need for a lengthy review process. One of the disadvantages is that the current software is not able to detect defects automatically without human intervention—although such software does exist.

Benefits

Automated/autonomous track inspection technologies are not entirely new to the intercity passenger rail and railroad industry, but transit agencies have not fully leveraged the existing or state-of-the-art track inspection technologies and incorporated their capabilities into their rail operations. Such systems (automated/autonomous track inspection technologies coupled with a data management component) would minimize the exposure of track inspectors to the right-of-way and provide warnings of sudden changes in the infrastructure, allowing the agency to monitor the rate of deterioration at any location, thus enabling a more accurate prediction of when track components need to be repair or replaced.

Project Information

FTA Report No. 0049

This project was conducted by Antonio Cabrera, P.E., and Marcelo Vargas, P.E., of the Division of MOW Engineering of the Department of Subways, MTA-NYCT, and by Gunther Oberlechner, Ph.D., and Bernhard Metzger of Plasser American Corporation, Chesapeake, Virginia. For more information, contact FTA Project Manager Roy Wei Shun Chen at (202) 366-0462, RoyWeiShun.Chen@dot.gov. All research reports can be found at **www.fta.dot.gov/research**.