FTA’s Track Inspection and Track Asset Management Research and Demonstration

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Agenda

• Automated vs. Autonomous
• Research and Demonstration Overview
• Team Roles and Responsibilities
• Phased Technical Approach
• Schedule of Activities
• Phase I Overview
• Phase II Overview
• Project Goals and Deliverables
• Benefits
Automated vs. Autonomous

Federal Transit Administration (FTA) Office of Innovation, Research and Demonstration’s vision is to demonstrate improved safety by enhancing conditional awareness through the integration of *autonomous* inspection systems.

**Automated Inspection**  
Measurements collected by specialized equipment with operators trained to collect data and conduct inspections

**Autonomous Inspection**  
Process of inspecting track from revenue trains using unattended instrumentation with minimal direct involvement.
Research and Demonstration Overview

- MARTA partnered with ENSCO Rail to fulfill FTA’s vision to demonstrate Autonomous Track Inspection System (ATIS) technologies in an operating transit environment.

- MARTA and ENSCO Rail will install ATIS on revenue service equipment and demonstrate benefits such as:
  - Limiting exposure of track inspectors and maintenance crews to right-of-way activities;
  - Migrating scheduled/reactive maintenance to predictive maintenance using data analytics;
  - Achieving a higher level of transit service as characterized by worker safety, cost efficiency and overall ride quality.
Team Roles and Responsibilities

Sponsor, Demonstration Guidance

Grantee, Demonstration Site Manager, Operational Subject Matter Expert

Technology Developer, Designer, Fabricator, Installer

Demonstration Oversight and Technical Subject Matter Expert
Phased Technical Approach

Phase 1:
- Installation of Autonomous Track Geometry Measurement System, V/TI Ride Quality Monitor and Third Rail Thermal Imaging System on Revenue Service Equipment;
- Establish Location Determination System for Underground Surveys;
- Evaluate Benefits of Autonomous Inspection.

Phase 2:
- Addition of Rail Profile Measurement and High Resolution Track Component Imaging Systems;
- Establish Office-Based Approach for Review of Measurements/Video;
- Evaluate Benefits of Autonomous/Video Inspection;
- Determine Performance Measures/Asset Condition Assessment Using Data Products/Office-Based Review Approach.
Schedule of Activities

June 2019       Phase I System Installation
July 2019       Phase I System Commissioning
August 2019     Phase I Demonstration Testing
September 2019  Phase II Start
February 2020   Completion of Phase II Design
April 2020      Phase II System Installation
May 2020        Phase II Demonstration Testing
Phase I Scope

Autonomous Track Geometry Measurements

Vehicle/Track Interaction Monitor to identify track issues that impact ride quality

Thermal Imaging System to identify third-rail issues
• ATIS to be installed on MARTA work train
Phase I Technology Overview

• Autonomous Track Geometry Measurement System
  – Fully digital non-contact geometry measurement system
  – Autonomous system measures and reports class based track geometry exceptions in real-time
Phase I Technology Overview

- **Autonomous Track Geometry Measurement System**
- **Data Products**
  - Geometry exceptions are delivered via email with GPS coordinates to track inspectors and maintenance crews
Phase I Technology Overview

- Vehicle/Track Interaction Monitor
  - Provide near real-time detection of unsafe track conditions caused by track geometry deviations
  - Wheel/rail impacts caused by battered and broken joints
  - Short chord track surface conditions caused by mud spots and pumping joints
Phase I Technology Overview

- **Thermal Imaging System**
  - New inspection configuration directed at third rail
  - System will identify areas of concern including “hot spots” in traction power system
Phase II Scope

Autonomous Rail Profile Measurement System

Track Component Imaging System to identify defects in the rail, ties and fasteners
Phase II Technology Overview

- Autonomous Rail Profile Measurement System will be installed during Phase I installation
Phase II Technology Overview

- Track Component Imaging System will be installed during Phase II installation
Project Goals and Deliverables

• Establish a process that will utilize ATIS data to facilitate preventative maintenance based on frequent inspections from revenue service vehicles.
Project Goals and Deliverables

- Assessment of effectiveness of identifying/remediating defects through use of traditional and new approaches

  Manual Inspections
  Conducted During Track Walks

  Automated Inspections
  From Dedicated Inspection Vehicles

  Autonomous Inspections From Revenue Service Vehicles
Benefits

• Evaluation of rapidly emerging inspection technologies for use in transit applications:
  • Autonomous inspection technology
  • Component image assessment
  • Office-based evaluation (a “Virtual Track Walk”)

• Demonstration of role of autonomous inspection products for:
  • Asset inventory and condition assessment
  • Performance measures/indicators
  • Input into Asset Management Plans
  • Improved State of Good Repair
Questions?

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