Wheel/Rail Interface Optimization: Toronto Transit Commission Program Design & Initial Findings
TTC WRI OPTIMIZATION

Overview

- Project Background
- Project Objectives
- Project Approach
- Project Work Completed
- Project Interim Results
Project Background

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Project Background

- TTC Recognized several opportunities for improvements on its subway and LIM systems
  - Wheel life being dominated by the slid flats
  - Non-optimal lubrication
  - Rail surface damage on Subway and SRT (Lim System)
    - RCF, Corrugation, Rail Wear
  - Wheel/Rail Noise
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Project Background

- Treat the issues as being related instead of treating each separately
- **Attack project as a team with complete participation and active involvement of all departments**
Project Objectives

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• Project Objectives

✓ Reduce System Noise
✓ Improve Wheel Life
✓ Minimize and Control Rail Surface Damage
✓ Improve System Lubrication Network
Project Approach

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Project Objectives:

- ARM developed a project based around a systems approach with the Wheel/Rail Interface at its core.
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- Project Approach:
  - Inspection of Existing Conditions
  - Education of Staff
  - Measure acoustics across system
  - Assess compatibilities of Wheel & Rail Profiles
  - Evaluate current state of Friction Management
  - Develop a Maintenance & Monitoring Plan
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System Assessment/Maintenance & Monitoring

Wheel/Rail Profile Compatibility

System Noise

Friction Mgt

ARM

Project

Team

Don Eadie

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Work Completed

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• Vehicle Inspection

Axle Alignment

Wheel Truing

Wheel Condition
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• Track Inspection

- Corrugations
- Restraining Rail Wear
- RCF
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• Lubrication Review

Flange Lubricator Efficacy

Reservoir Condition

Grease Application
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• Education
  – WRI Principles Course
  – 4 One Day Classes
  – Nearly 100 Attendees
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Acoustic Measurement Setup

Radar Speed
MIC
Laptop
Power/DAQ
Example Acoustic Measurements

- Awt, dBA
- TCI, decibels
- Speed, kph

770 Hz $\rightarrow$ 23 mm=0.9”

Track joints (every 39’)

Distance from Platform, ft
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Reporting Based on Acoustic Measurements
Including Grinding Priority Report
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• Wheel/Rail Profile Analysis
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• Wheel/Rail Profile Analysis
Project Interim Results

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• Wayside Lubrication Opportunities for Improvement
  – Large reservoir tanks where the grease may sit more than a year
  – Lubricator placement in curves
  – Older equipment that lacks accuracy to control grease application compared to current technology
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• Recommended Gage Face Lubricator Actions
  – Standardization of equipment
  – Proper placement of lubricator in curves
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• Vehicle Mounted Lubricator Opportunities for Improvement
  – Current mounting locations provide insufficient wheel flange coverage

• Solid Stick Applicator
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• Recommended Train Mounted Friction Management
  – Solid Sticks Placed Optimally Throughout Trainset

Solid Stick Applicator
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• Top of Rail Friction Control
  – Reduce rate of RCF occurrence and growth
  – Reduce rate of corrugation occurrence and growth
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