Federal
Railroad
Administration

Autonomous Track Geometry Measurement System (ATGMS)

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Federal Railroad Administration

Autonomous Track Geometry Measurement System

Objective:

Improve safety by reducing derailments due to track Geometry defects

Goal:

Develop a system for autonomously and automatically measuring track geometry from a revenue vehicle at track speed

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Autonomous Track Geometry Measurement System

Background:

- Track Geometry Defects are one of the leading causes of train derailments.
- Track Geometry is inspected visually at regular intervals by railroad inspectors
- Track Geometry is also recorded by major railroads using dedicated inspection cars at various intervals
- FRA regional offices routinely performs visual track inspections and its HQ safety staff makes routine track geometry measurements through their ATIP program and provides the data to the railroads.

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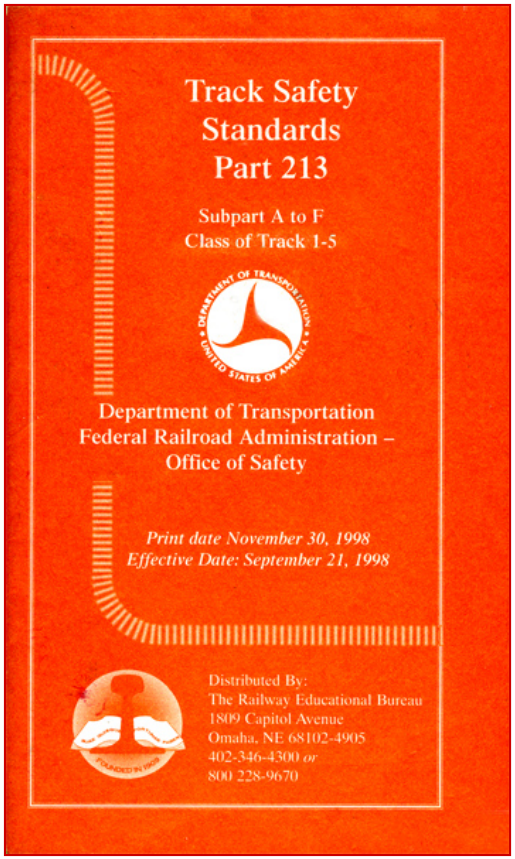
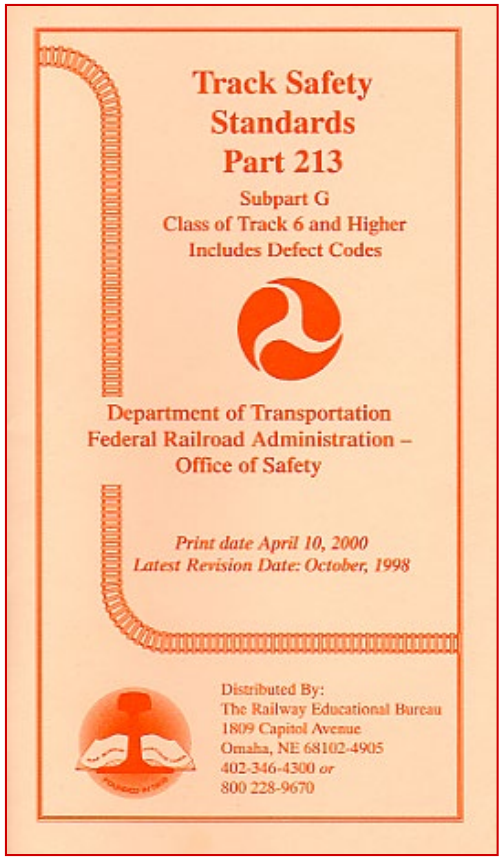
Track Safety Standards



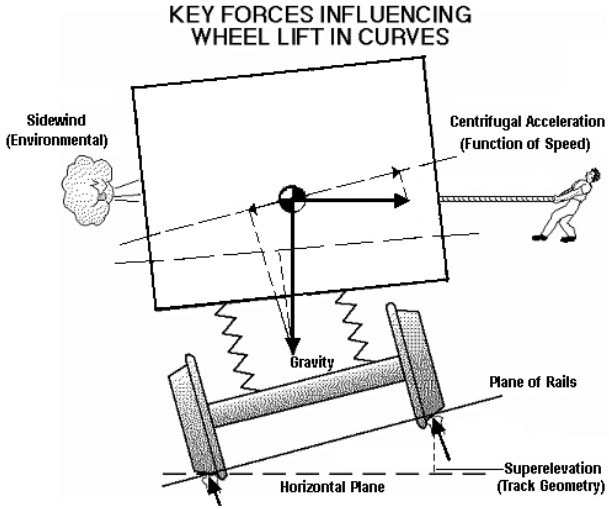
Track Class and Maximum Speed

Track Class	Maximum allowable speed for freight trains	Maximum allowable speed for passenger trains
Excepted	10	N/A
1	10	15
2	25	30
3	40	60
4	60	80
5	80	90
6	110	110
7	125	125
8	160	160
9	200	200

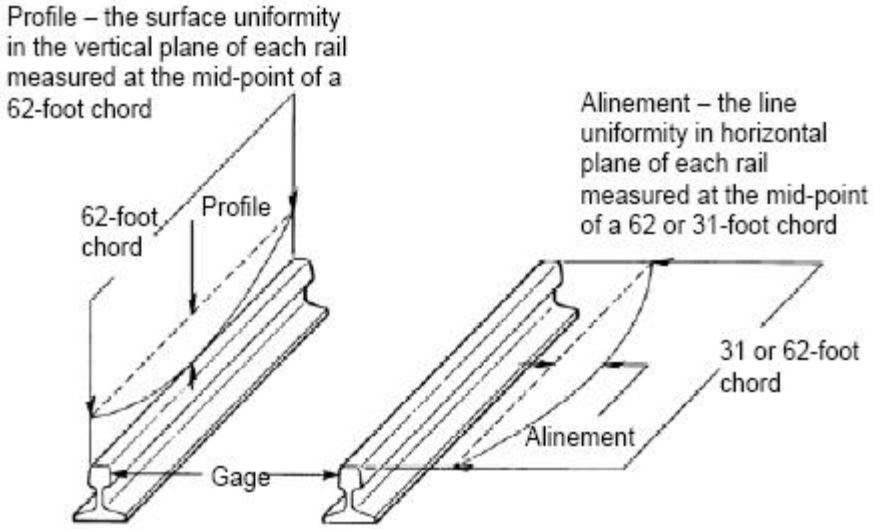


Track Geometry

Curvature, Superelevation



Gage, Alinement, Profile



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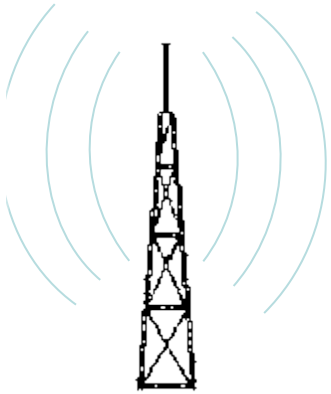
Autonomous Track Geometry Measurement System

Onboard Unit

Location Determination
- GPS /DGPS or
- DGPS with Inertial Navigation

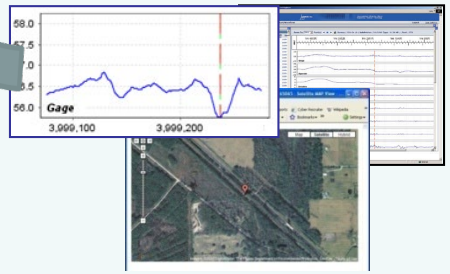
Processor
- Data collection/analysis
- Remote diagnostic capabilities
- Remote software enhancements
- Remote/self-recovery

Measurement Sensors



Communication Link

Processing Server



Inspection Results

Database

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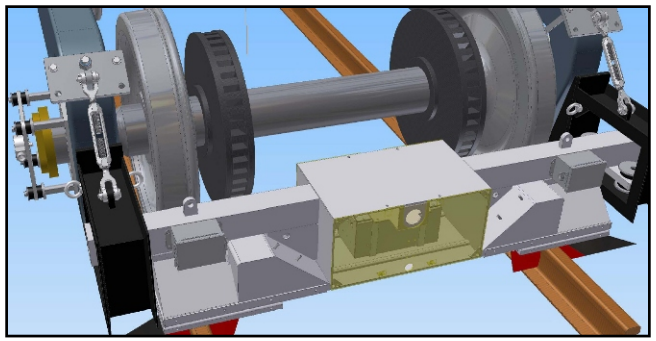
Autonomous Track Geometry Measurement System (ATGMS)



- Track conditions can be monitored every time the car with the ATGMS moves on track.
- Normal business and traffic will not be interrupted for testing by dedicated test cars.
- The system offers an effective reduction in complexity, size and cost of traditional geometry systems without compromising performance.

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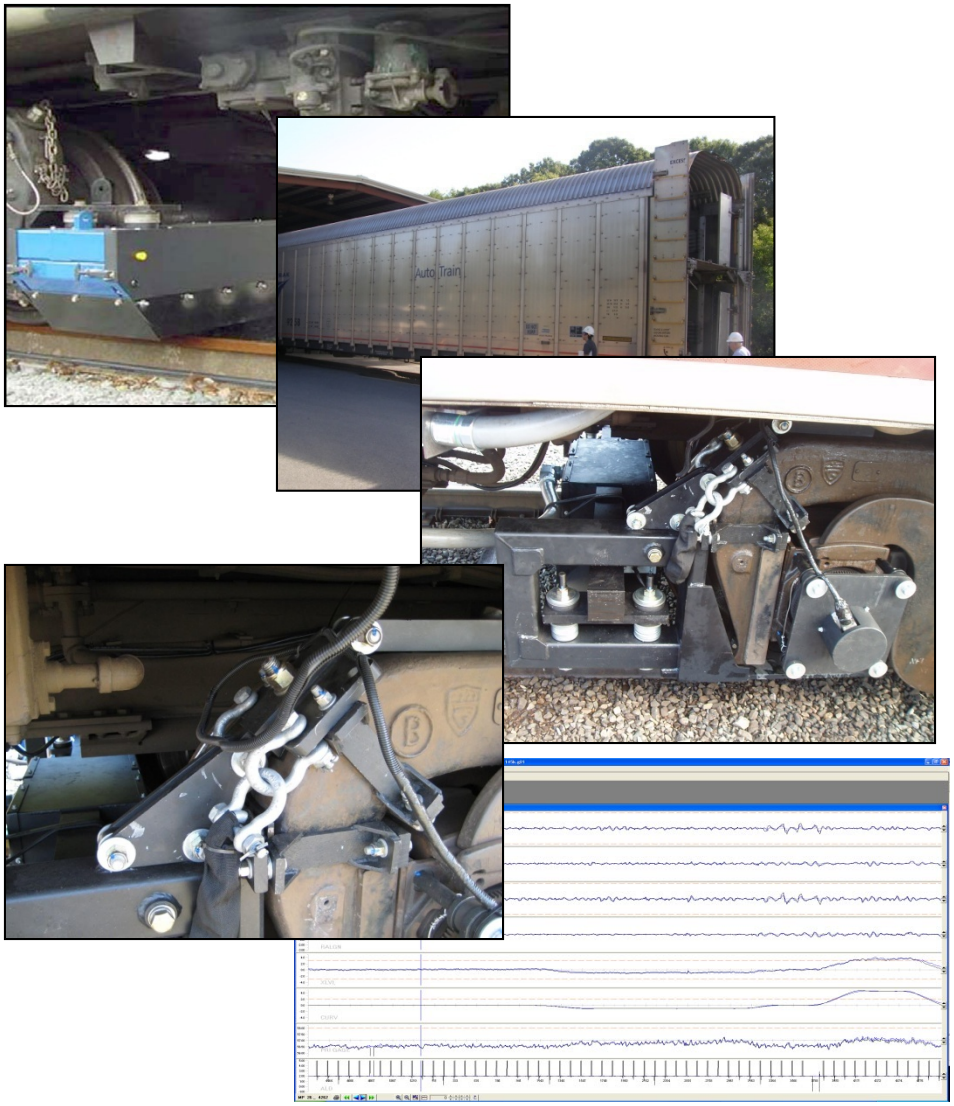
ATGMS Project Summary



- Design has been completed
- Was tested on Hi-railer for the road test
- Being tested and refined on Amtrak train since Spring of 2008. Collected more than 100,000 miles < 1 year
- New system is being built for operation on Northeast Corridor

Near Future Activities

- Improvement and implementation of exception filtering to decrease number of false exceptions without “manual” intervention.
- On track verification of geometry exceptions to validate the measurements.
- Participating railroads will be encouraged to use the ATGMS website to view the information and provided feedback.
- **A key aspect of the acceptance of this technology will be to establish operating procedures acceptable by FRA and railroads.**

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ATGMS Future Activities

- Demonstrate to industry
- Foster industry acceptance
- Develop self power system
- Introduce low cost/low power robust sensors
- **Establishment of Procedures and Recommended Practices for System and Data Usage**
- **Development of Appropriate Regulations**

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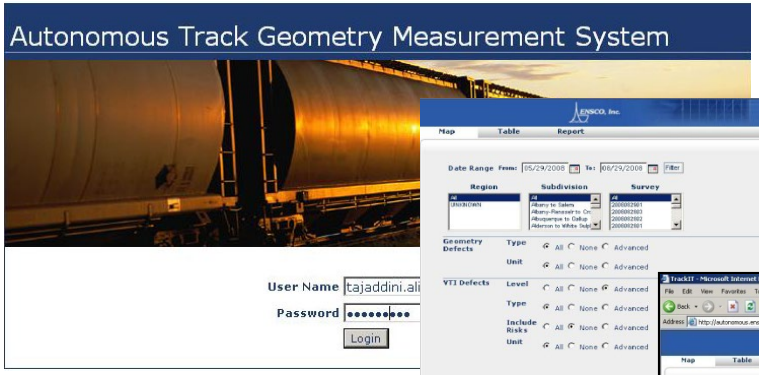
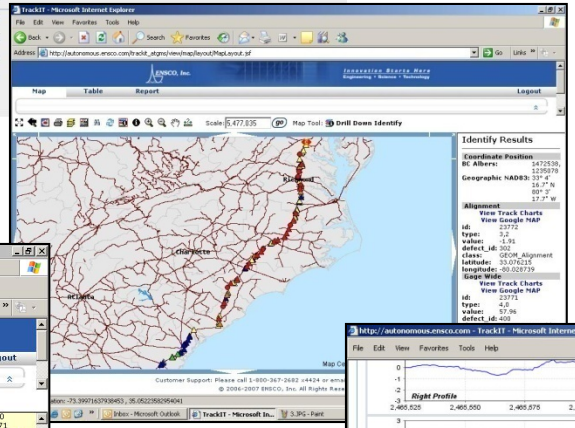
ATGMS Web

Secure Site

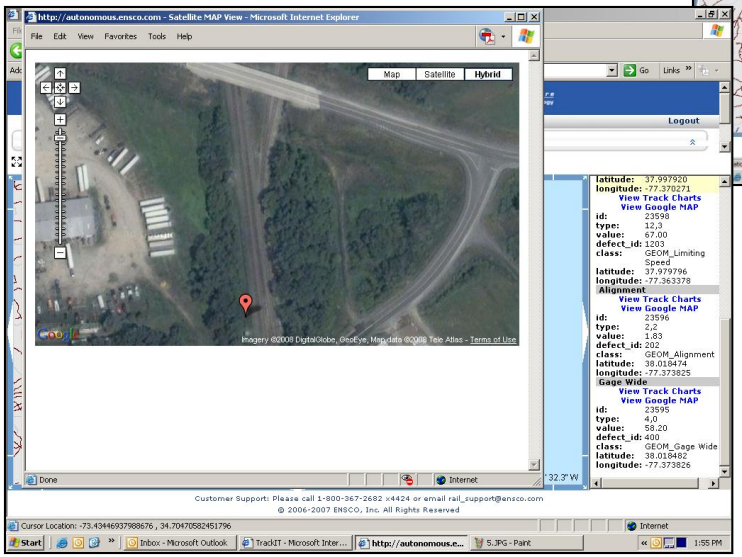


Data Selection

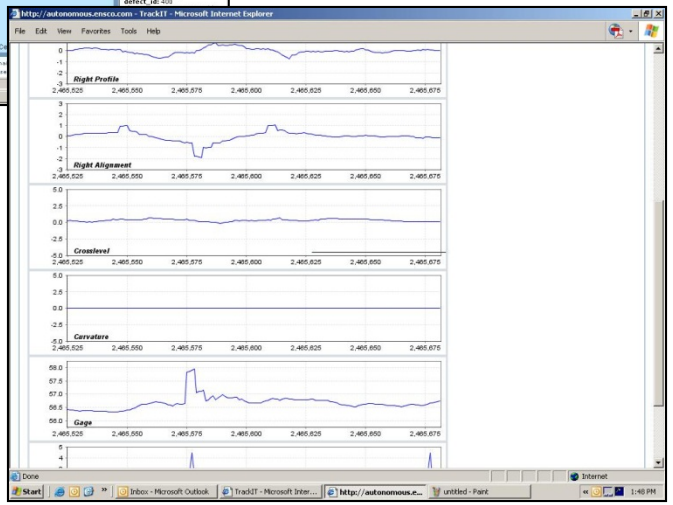
GIS Map



Google Map



Geometry



ATGMS

Acknowledgment:

- Contractor, Ensco, Inc
- Volpe
- Amtrak
- CSX Railroad