The dawn of Augmented Reality in Track Maintenance

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Current Track Inspection Methodologies
What the average track inspector sees

The only good views are limited to one side of one rail, and the rail head

Blind Areas
One pair of eyes to see and record:

- Missing fasteners at four locations
- Missing or displaced anchors at two locations
- Rail seat abrasion at two locations
- Rail head anomalies at two locations
- Broken or damaged ties
- Twisted plates at two locations
- Cracked or broken joint bars at four locations
- Missing bolts at four locations
- Ballast condition and height
- Other anomalies

ALL WHILE TRAVELLING AT 10 – 15 MPH!!
This is inefficient, Ineffective and Dangerous

Men inspecting the track get killed every year
Current Track Inspection Methods

→ Mandatory frequent passes down the track, walking or in road rail vehicles. With two inspectors, 2 tracks can be inspected simultaneously. No inspection technology used

→ Ultrasonic testing

→ Geometry testing with lightweight and heavy vehicles.

→ Some Ground Penetrating Radar testing of specific areas

→ Some automatic tie inspection

→ Some optical systems, generally slow speed

→ Some gauge restraint testing
Tons of data... 2Tb/Week
Turning Data into Information

Welcome to NxTrack
NxTrack Inspection Vehicles
Geometry

Strip Chart with Thresholds
Optical

Coordinated HD Asset Imagery at up to 110MPH with automatic evaluation of:

- Fasteners
- Anchors
- Joint bars
- Concrete ties
- Rail head condition
- Ballast Height

Manual turnout inspection
PTC asset reporting
Other conditions as observed
Ground Penetrating Radar

Ballast Contamination and Depth
Tons of data....
But every defect and location has associated metadata

→ Location, MP and GPS, Track ID.
→ Description
→ Severity
→ Images
→ Statistics
Step 1: Presenting data against a real world backdrop

Transformation from Data to Information

The ability to ride the network on your PC at anytime, from anywhere

Visualization of track features, and recorded defects down to minute detail
GPR data showing an area with varying ballast depth
GPR data showing fouled ballast at mud hole site
GPR data showing an area with varying levels of humidity
Base gage defect on concrete ties. The location has several missing fasteners.
Step 6: View location of defects on the selected route

Defect Icons are Red and Yellow depending on their status. Each defect type has a specific icon.
Step 7: Virtual Ride on the track

Click anywhere on the line to see the track view. You can ride up and down with the play icon.
Step 8: View images for any location

The images shown are views of a rail head anomaly.
Step 9: View details at any location

You can scroll down on this screen to see the pictures on the next two slides.
Step 9: View details at any location

The images shown offers views of a rail head anomaly
Step 9: View details at any location

The images shown offers views of a rail head anomaly.
Step 10: Images can also be printed

The image can be printed with its location information.
Process used to generate the NxTrack Cloud™
Data from inspection vehicles or reports is loaded through the NxTrack Data Center onto the Cloud where it can be accessed by users in offices and in the field.
Step 2: Bringing it to the field
Processing Data into Information – Maintenance tool
Missing Bolt Defect Details:

- Defect Number: 12345678
- Sub Division: Champaign
- Line Segment: 53
- Track: M1
- MP: 243+1086
- Lat: 83.2345678
- Long: 40.0745678
- Date Discovered: 06.10.2017
- Repair by: 16.10.2017

Remember, Safety First

Missing Bolt Repair:

Instruction 3026

1. Remove all bolts
2. Insert new insulator
3. Realign holes/rails
4. Insert new bolts
5. Tighten to 120 FtLb
6. Verify no rail conductivity
7. Generate repair report

Remember, Safety First

Delete Missing Bolt Defect:

- Defect Number: 12345678
- Repaired by: Joe Bloggs
- Date: 06.21.2017

I certify that this defect has been removed from track according to prescribed procedures

Remember, Safety First