



Massachusetts Bay Transportation Authority

Green Line Derailment Update

MBTA Fiscal and Management Control Board

October 17, 2016



Overview

- Green Line Incidents Since January 2015
- Short-Term Actions
- Long-Term Actions
- Next Steps



What is a Derailment?

- “Derailment” is a technical term used when any wheel of a train comes off the top of the rail.





Green Line Incidents (Jan 2015 – Oct 2016)

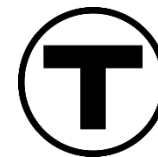
10* Main line rail incidents since January 2015

9 of 10: We have high confidence in the root causes

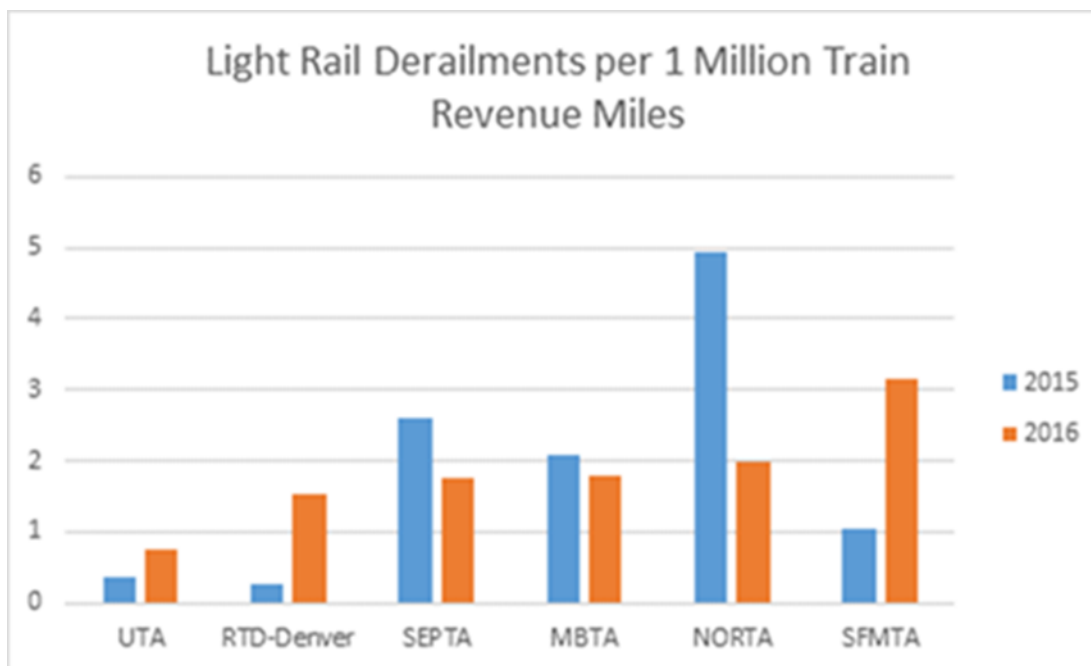
1 of 10: Is still under investigation

(October 3, 2016, Copley)

* 2 additional main line derailments occurred during non-revenue service.



MBTA in Context



National Transit Database 2016



Green Line Incidents (Jan 2015 – Oct 2016)

Date	Location	Root Cause	T8 C-Truck
2/15/2015	Coolidge Corner Station	Large Snow and Ice Mound	No
7/7/2015	Sutherland Street Station	Track Condition and Operating Speed	Yes
7/12/2015	Longwood Station	Track Condition and Operating Speed	Yes
8/17/2015	Boston University Central Station	Track Condition and Operating Speed	Yes
11/8/2015	Copley Station	Human Error and Switch Alignment	No
1/30/2016	Beaconsfield to Reservoir	Vehicle Defect – HPCU Failure Causing a Stuck Wheel	Yes
3/19/2016	Copley Station	Track Condition and Operating Speed	Yes
5/13/2016	Government Center to Park Street	Switch Defect	Yes
8/1/2016	Park Street Station (GL)	Track Condition and Operating Speed	No
10/3/2016	Copley Station	Under Investigation	Yes



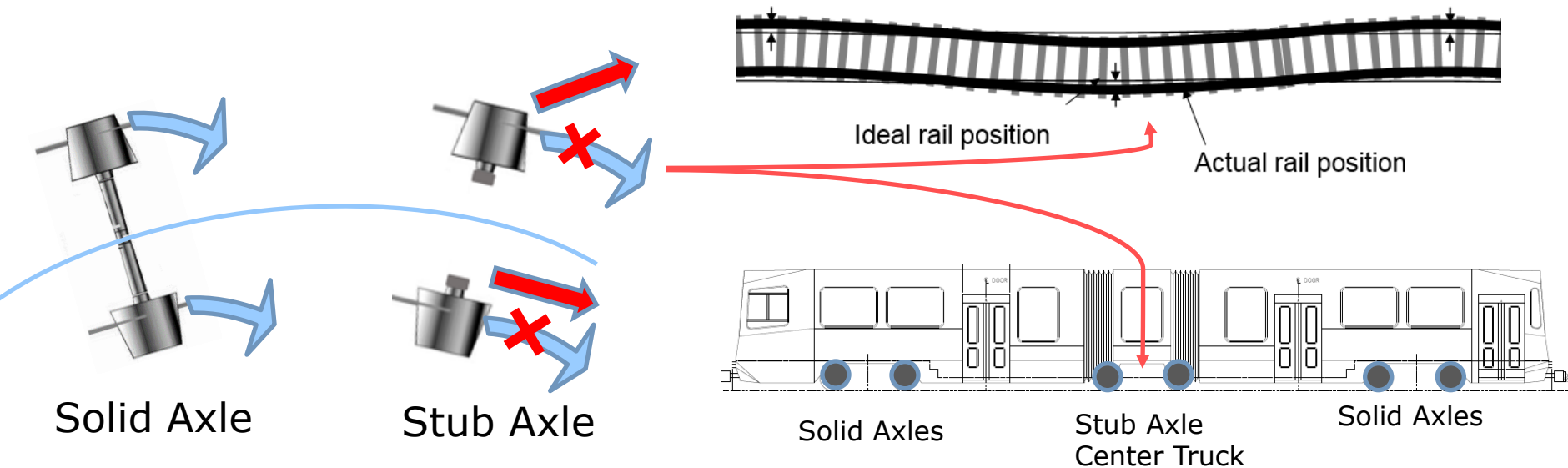
Type 8 Background

- To provide accessible service, the MBTA procured 95 Type 8 Low Floor Vehicles from AnsaldoBreda.
- Shortly after entering service in March 1999, the Type 8 fleet began experiencing center truck derailments.
- August 2001: Type 8 fleet removed from service.



What Was the Problem?

- To meet the low floor requirement, the Type 8 required a “stub” axle center truck.
- However, this design was based on *ideal track conditions* and was overly sensitive to track condition variations.

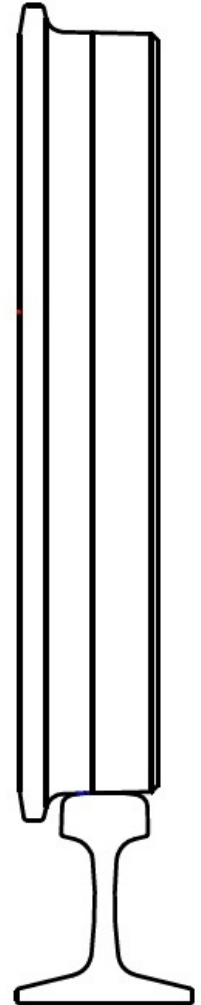
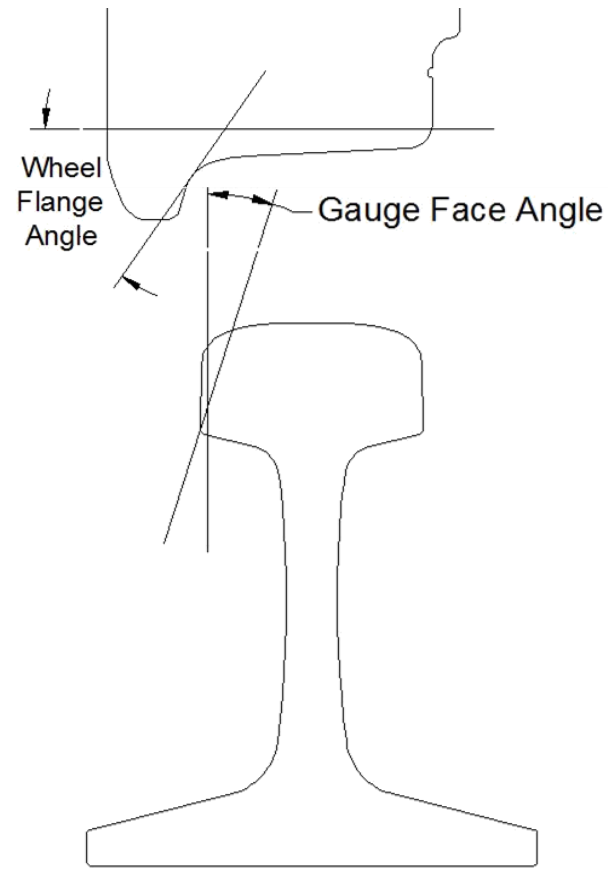




What Was the Problem?

Rail and Wheel Interaction

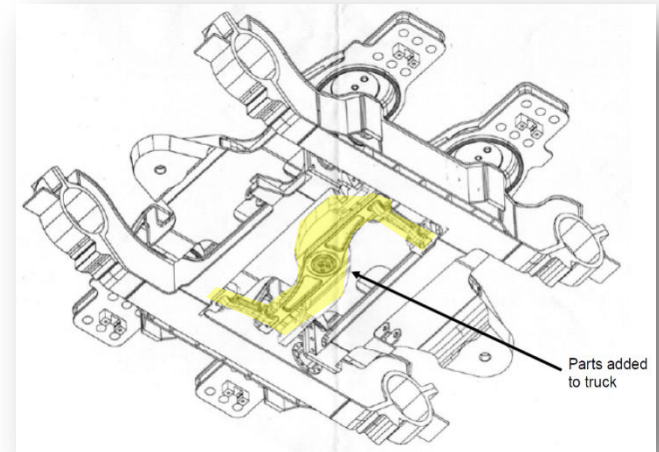
- ❖ The cornerstone of the performance of any train relies on:
 - Steering
 - Handling
 - Comfort
 - Noise
 - Wear





Corrective Actions, 2003 to 2007

- ❖ Modifications to track conditions and gauge face angle.
- ❖ Center truck design changes and wheel flange angle changes.
- ❖ In coordination with the DPU, the MBTA pursued a Phased Corrective Action Plan to open all lines for Type 8 service.
 - Mar 2003: B Line Service resumes
 - Dec 2003: C Line Service resumes
 - Aug 2004: E Line Service resumes
 - Feb 2007: Service to Lechmere resumes
 - Fall 2007: D Line Service resumes





Actions Since July 2015

- ❖ Derailment incidents continued, though fewer in number. Beginning in July 2015, short and long-term actions were taken, focusing on three main areas:

1 Track Maintenance and Engineering

2 Operations and Rules Enforcement

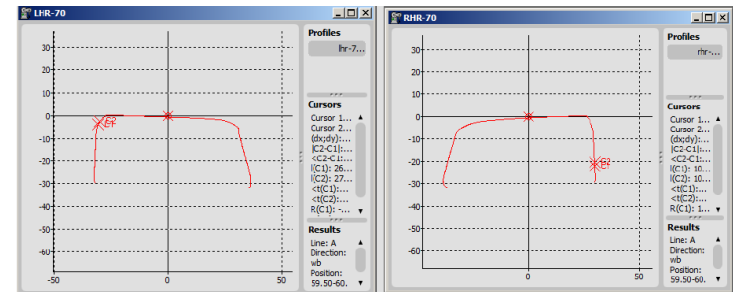
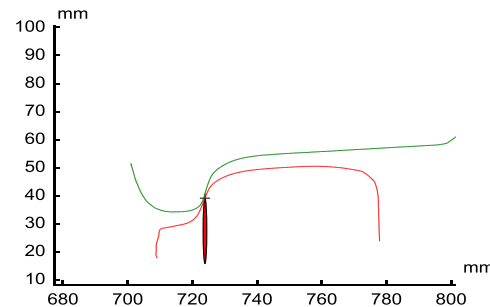
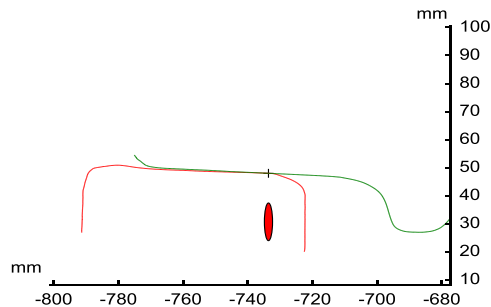
3 Vehicle Maintenance and Engineering



1 Track Maintenance and Engineering

Short-Term:

- In-depth analysis of available engineering data (Optical and Track Geometry data).
- Speed restrictions implemented at critical locations.
- Work began immediately to upgrade the track and rail head.
- Increased inspection frequency focused on risk areas (switches, track lubricators, curves).

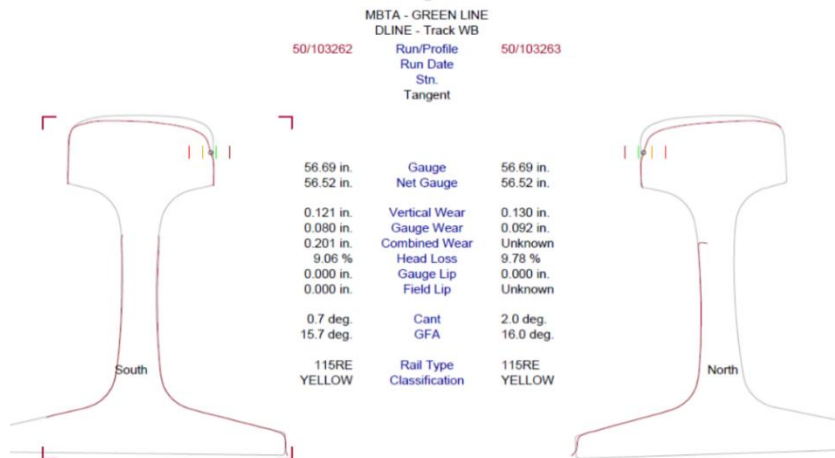




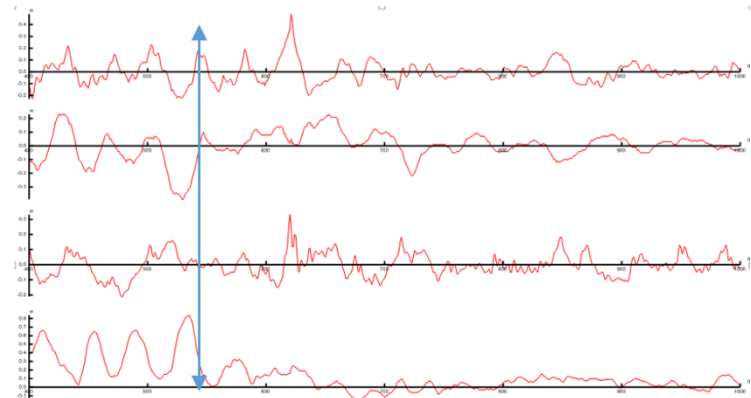
1 Track Maintenance and Engineering

Long-Term:

- Initiated first widescale rail head grinding program on the Green Line in 9 years.
- Initiated deep review of MBTA track maintenance standards.
- Developed Application for track geometry data analysis.
- Enhanced preventative track maintenance.



Optical Rail Wear Survey (Performed Twice Yearly)



Track Geometry Survey (Performed Quarterly)



2 Operations and Rules Enforcement Since July 2015

Short-Term:

- Training and regular reminders to observe posted speed.
- Unannounced speed reviews are being conducted on a regular basis.
- All signage reviewed and repaired as needed.
- Portable radar speed monitoring equipment deployed to support speed monitoring.

Long-Term:

- Permanent installation of radar speed monitoring equipment.
- Implement real time, constant speed monitoring.

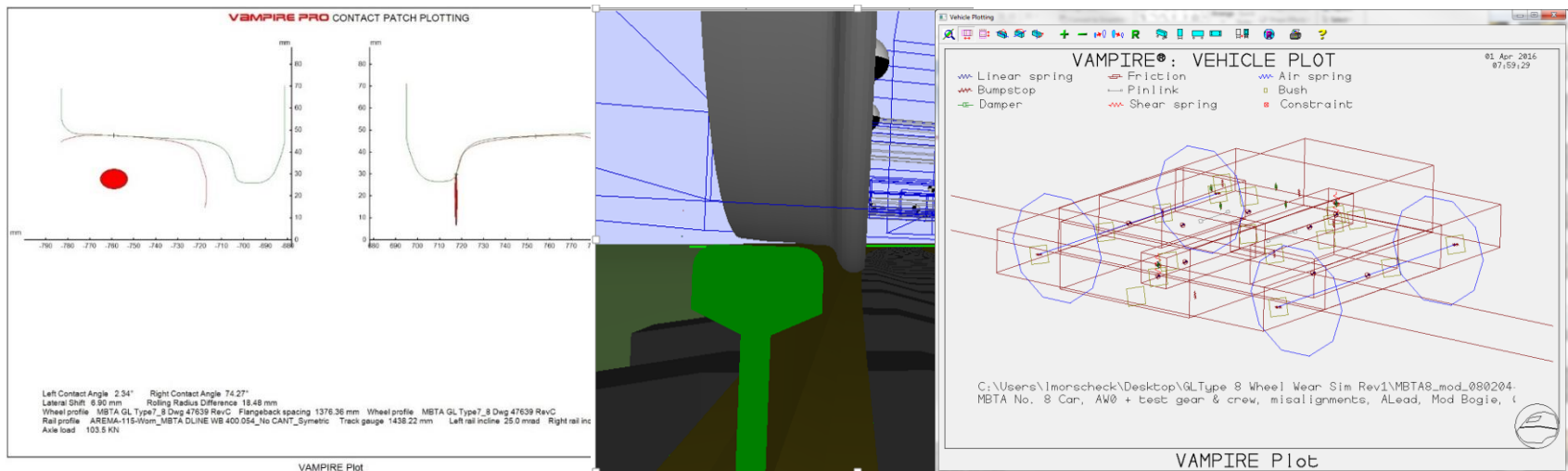




3 Vehicle Maintenance and Engineering Since July 2015

Short-Term:

- Wheel Profiles and Truck Condition inspections continue (each wheel is inspected every 90 days).
- Conducted video survey of rail/wheel interaction on the entire Green Line.
- Initiated detailed Dynamic Modeling of the Green Line Type 8 vehicles and infrastructure to support rapid confirmation of incident causes.

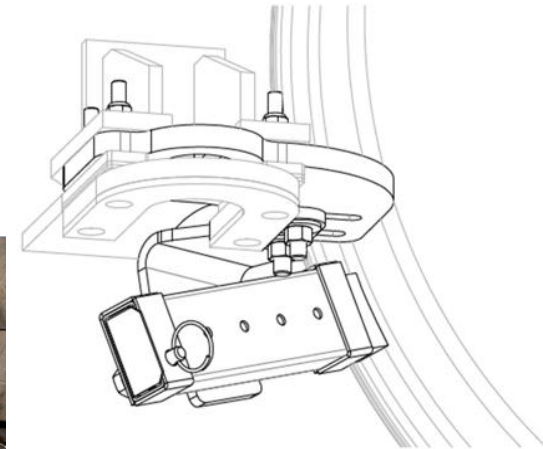
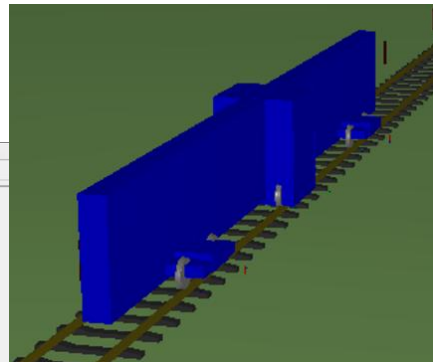
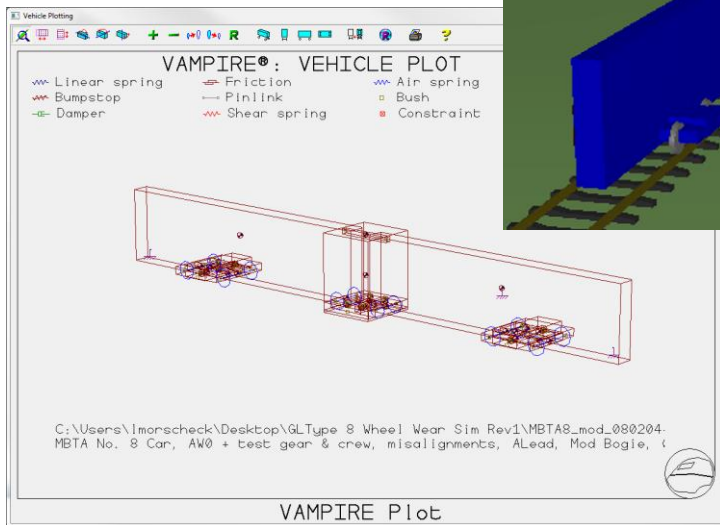




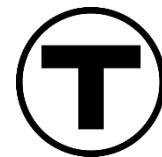
3 Vehicle Maintenance and Engineering Since July 2015

Long-Term:

- Utilize the dynamic model built to continuously monitor risk.
- Implement Flange Lubrication System on Type 8 center trucks.
- Overhaul the Type 8 trucks.



Car 3841 in Service Testing



Next Steps

- ✓ Ongoing partnering with DPU and FTA on corrective action.
- ✓ Strictly enforce operating rules.
- ✓ Implement all long-term actions.
- ✓ Maintain focus on safety and reliability improvements to track and vehicles.
- ✓ Continue to explore innovative and impactful technical solutions.



Thank you