



Safety and Operations Committee

Board Information Item III-C

**Update on Derailment and
2000/3000 Series Railcars**

Washington Metropolitan Area Transit Authority

Board Action/Information Summary

☐ Action ☒ Information

Document
Number:
205618

Resolution:
☐ Yes ☒ No

Presentation Name:

Update on Derailment and 2000/3000 Series Railcars

Project Manager:

Jayme Johnson

Project Department:

Safety and Readiness

Purpose/Key Highlights:

On September 29, 2023, a Franconia-bound 7000-series train derailed departing National Airport station. Preliminary findings from the investigation of this incident indicated the probable root cause of the derailment was a friction disc (brake disc) detached from the railcar 3069 on a preceding train. The brake disc fouled the track, and the 7000-series train contacted the disc, causing it to derail. The investigation is ongoing.

This presentation will provide more details on the technical functionality of the brake discs, preliminary findings, mitigations, and safety oversight and investigation activities.

Interested Parties:

None

Background:

On September 29, 2023, a Franconia-bound 7000-series train derailed departing National Airport station. Investigation of this incident has thus far indicated that the probable root cause of the derailment was a friction disc (brake disc) detached from railcar 3069 on a proceeding train. The friction disc landed in between the tracks, and the 7000-series train hit the disc, causing it to derail. Metro responded to the incident according to protocol and notified oversight authorities. Metro released video of the incident.

The 2K/3K railcars are equipped with a friction brake system which uses brake discs to provide service and emergency braking effort. The brake discs are secured to the outer surface of the wheel hub with eight (8) one-half inch (1/2") diameter bolts.

Metro conducts a daily inspection on all vehicles operated in passenger service. The brake disc bolts are visually inspected daily as part of this inspection.

Metro further conducts scheduled periodic inspections of all rail vehicles every 60 days. These periodic inspections are comprehensive in scope and include visual inspection of all bolts, physical inspection of the bolts' securement, and inspection of the disc thickness and surface condition. The physical inspection of bolt securement requires the technician to firmly pull and turn each bolt in all directions. If any bolt turns or moves, all eight (8) bolts are replaced.

Discussion:

Track Repairs

The derailment caused 310 feet of damaged area. After Car Maintenance staff re-railed the derailed train (which was a challenging task due to the superelevation of the track on an aerial structure), Track and Structures personnel began work on replacing studs and rail fasteners. In less than three days, the team drilled 494 holes in concrete and installed new studs and replaced 247 direct fixation rail fasteners.

Throughout the work, engineers were methodical and precise in order to protect the integrity of the aerial structure itself. After the work was completed, Track and Structures ran the Track Geometry Vehicle, which verified no ultrasonic defects in the rail and proper rail alignment, track gauge, and third rail gauge.

In the hours and days after the derailment, the Chief Operating Officer led regular multi-department coordination calls. These calls drove the recovery and mitigation activities, while also putting the customer at the center of decision-making, ensuring regular, transparent and accurate communication with Metro's customers.

Car Engineering and Maintenance Actions

To help to ensure safe operation of the fleet after the derailment, all 2000- and 3000-series railcars were removed from service on September 30. The security of all 2K/3K disc bolts were verified under Service Bulletin SBB-649, which is an enhanced, more conservative maintenance inspection. The brake bolts are installed with applied bolt torque of 70 ft-lb. The Service Bulletin incorporates an additional verification for every bolt to be torque checked using a wrench at 60 ft-lb to verify all disc bolts meet the minimum torque requirement.

There are 352 2/3K railcars, and each railcar has eight brake discs. Of a total of 2816 brake discs, 180 brake discs did not pass the Service Bulletin SBB-649 inspection. For any disc with non-conforming bolt(s), all eight (8) bolts were replaced. This is because if one bolt fails, there may be other bolts that have wear or fatigue that is undetectable.

The Chief Mechanical Officer's team of car engineers is now analyzing data and

materials from the railcars involved in the derailment, from the SBB-649 inspections and maintenance data more broadly to complete a technical investigation into the probable cause of the derailment.

Safety Investigation Actions

Alongside the Chief Mechanical Officer, Metro's Department of Safety is conducting their own investigation, focusing on the quality of the incident response and probable cause of the derailment. No back-to-back wheel discrepancies were identified. Multiple interviews have been completed, video footage has been reviewed, the railcars involved in the incident have been examined, and various data are being analyzed. The investigation is ongoing.

Metro has reporting requirements under the Washington Metrorail Safety Commission's (WMSC) Program Standard. While Metro's safety investigation is independent of the WMSC's investigation, it is conducted in close collaboration with WMSC investigators, who were on scene at the derailment site. WMSC investigators have received near-daily updates, participating in a working session, and have been provided access to information relevant to the investigation as it becomes available.

The Federal Transit Administration (FTA) and National Transportation Safety Board (NTSB) were informed of the derailment within two hours, as federal regulations require. Due to strong working relationships established during the October 2021 derailment investigation, open dialogue was established early, and any questions were responded to promptly. Neither agency deployed to the scene nor took any official action.

Safety Assurance Actions

Metro's Department of Safety conducted oversight and assurance activities of the re-railing process and track repairs. Safety also oversaw Car Maintenance and Engineering teams' activities regarding the 2000- and 3000-series fleets. The Safety team reviewed the Service Bulletin SBB-649 procedure to inspect brake disc bolts. Safety Specialists were present in all rail yards, alongside the Car Maintenance Mechanics, and conducted over 100 observations of the brake disc bolt inspection and brake disc bolt replacement procedure. Safety Specialists also audited the work order process to ensure maintenance activities were correctly recorded and updated in the system; this process ensured the safe release of railcars back into passenger service.

Facilitated by the Department of Safety, an After-Action Review is scheduled to review the incident response on October 11, which will involve multiple departments including Metropolitan Washington Airports Authority (MWAA) first responders and WMSC staff who both attended the scene.

Funding Impact:

There is no funding impact

Previous Actions:

September 29, 2023 – Derailment and emergency response
Sept 29 – Oct 2 – Single tracking for track repair
Sept 29 – Oct 4 – Vehicle inspections and data gathering
Oct 3 – Oct 10 – Vehicle repair

Next Steps:

Ongoing - Safety investigation report
Ongoing - Engineering analysis and root cause

Recommendation:

Information Only

Update on Derailment and 2000/3000 Series Railcars

Safety & Operations Committee
October 12, 2023



Derailment and Initial Response Activities

Friday, September 29

- Railcar 3069 (2K/3K mix) dropped a brake disc, which landed between the tracks outside of National Airport Metro Station on an aerial structure
- At 10:47am, Train 406 (7K) heading south towards Franconia-Springfield hit the brake disc, and the first car derailed
- Train operator and Metro Integrated Command and Communications Center took prompt action to ensure scene safety, including evacuating 43 passengers to another train and then to the platform
- Train service returned around 1pm, single tracking around the derailed train
- Inspections of 2K and 3K fleet brake discs started immediately
- Metro leadership held press conference
- Video of derailment released

Derailment and Initial Response Activities

Saturday, September 30

- Derailed train re-railed on Saturday morning and transported to Alexandria Yard where both incident trains were examined; track repairs began
- Preliminary conclusion indicated possible issue with brake disc bolt
- General Manager ordered 2K/3K fleets held from service until inspections and any necessary repairs were completed

Week of October 1

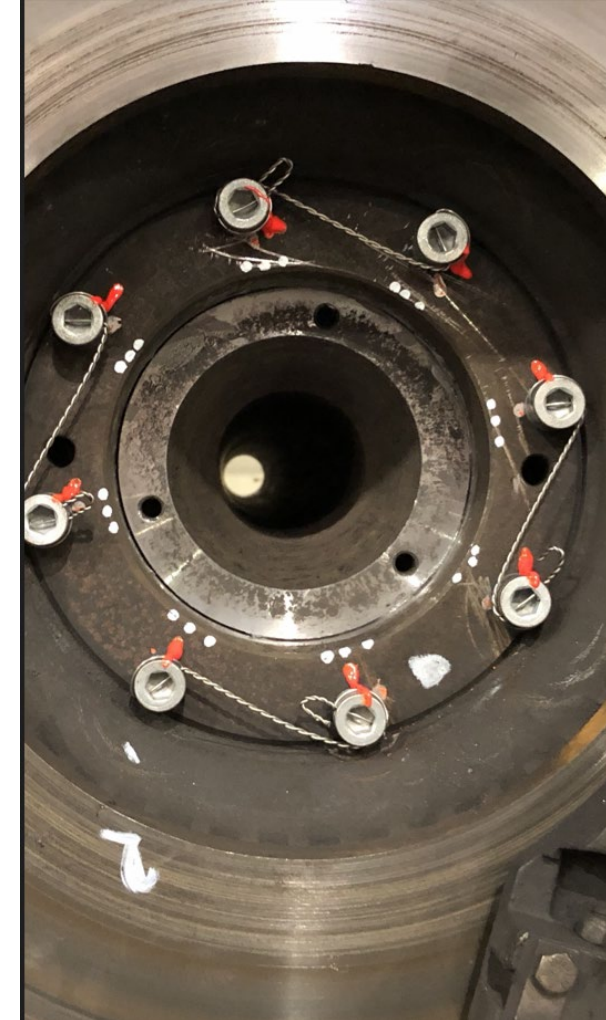
- Track repairs and associated testing finished Monday night, October 2
- Normal service pattern (no single tracking) started Tuesday morning, October 3
- Normal scheduled service levels returned Thursday morning, October 5

Week of October 8

- Brake disc repairs completed on Tuesday, October 10
- Investigation collaboration session held with WMSC staff on Tuesday, October 10
- After Action Review with all parties who attended the scene held on Wednesday, October 11

Investigation and Oversight

- Investigation structure and status
- Coordination with the Washington Metrorail Safety Commission (WMSC), Federal Transit Administration (FTA), and National Transportation Safety Board (NTSB)
- Brake disc bolt inspection oversight
- Brake disc bolt replacement oversight
 - Safety
 - Quality



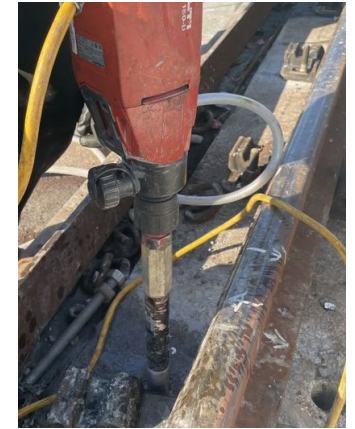
Track repairs completed on 310 feet of damaged area

- 494 holes drilled in concrete and new studs installed
- 247 direct fixation rail fasteners replaced
- Verified no ultrasonic defects in the rail and proper rail alignment, track gauge, and 3rd rail gauge with Track Geometry Vehicle
- **Work and required testing completed in less than 3 days**

Track Damage



Core Drilling Studs



Installing Fasteners



Repaired Track



Communications to customers

Press conference

Metro Forward @wmata · Sep 29

Metro GM and CEO Randy Clarke provides an update on the Blue Line derailment that occurred outside of National Airport. Watch the full video here: youtube.com/watch?v=1JXQZI... #wmata



1 11 46 24.1K

2K/3K held from service

Metro Forward @wmata · Sep 30

Out of abundance of caution, @wmataGM has ordered 2k/3k trains that have not yet completed an inspection held from service after finding 12 cars with at least one loosening bolt on brake assembly. Customers might experience delays until 9 pm while we replace these trains. #wmata



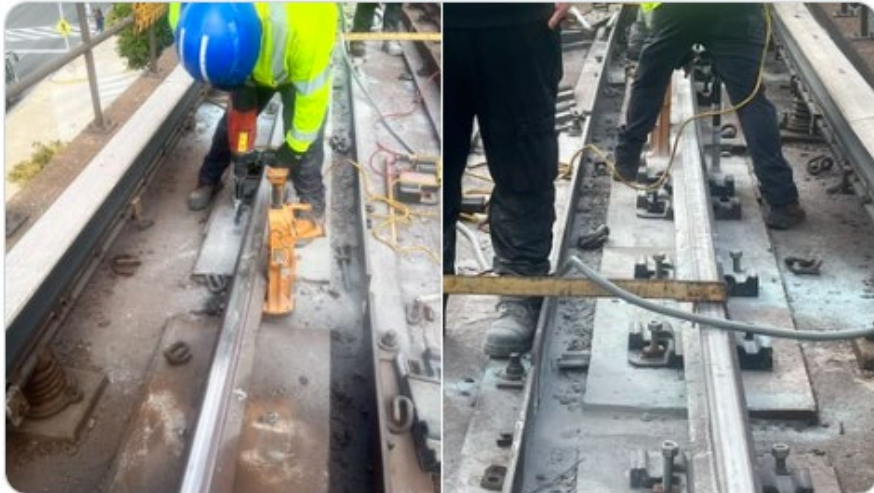
1 6 47 13K

Communications to customers

Saturday service impacts



Metro crews continue to assess and repair Blue and Yellow Line tracks near National Airport. Work will continue tonight and tomorrow. Trains safely single tracking to provide customers with service to all stations; but expect delays through the area. [#wmata](#)



6:41 PM · Sep 30, 2023 · 71.5K Views

1 18 113 3

Sunday service impacts



Metro Forward @wmata · Oct 1

Metro running normal Sunday service, except for a couple of minutes less frequent service on Orange, and Blue/Yellow lines, which will continue single tracking around National Airport.

Learn more: [wmata.com/about/news/Nor... #wmata](#)



3 11 72 44K



Metro Forward @wmata · Oct 1

Service in both directions for B/Y customers every 15 minutes. All other lines will see trains every 8-12 minutes. Metro track crews are working hard to restore both tracks at National Airport in time for Monday morning commute. Check [wmata.com/MetroPulse](#) for updates. [#wmata](#)

2 12 5,914

Communications to customers

Inspection process video



Metro Forward
@wmata



We're working around the clock to inspect and safely return to service our 2/3K fleet. Check out our status report and inspection process video with our Chief Mechanical Officer Shushil Ramnaress [#wmata](#)



7:32 PM · Oct 2, 2023 · 8,856 Views

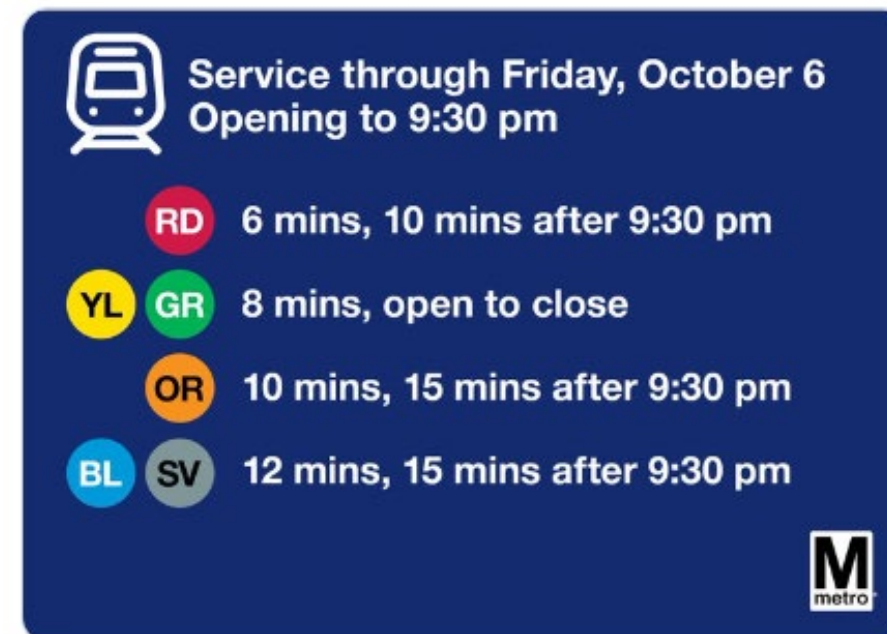
Post-single tracking service



Metro Forward @wmata · Oct 2

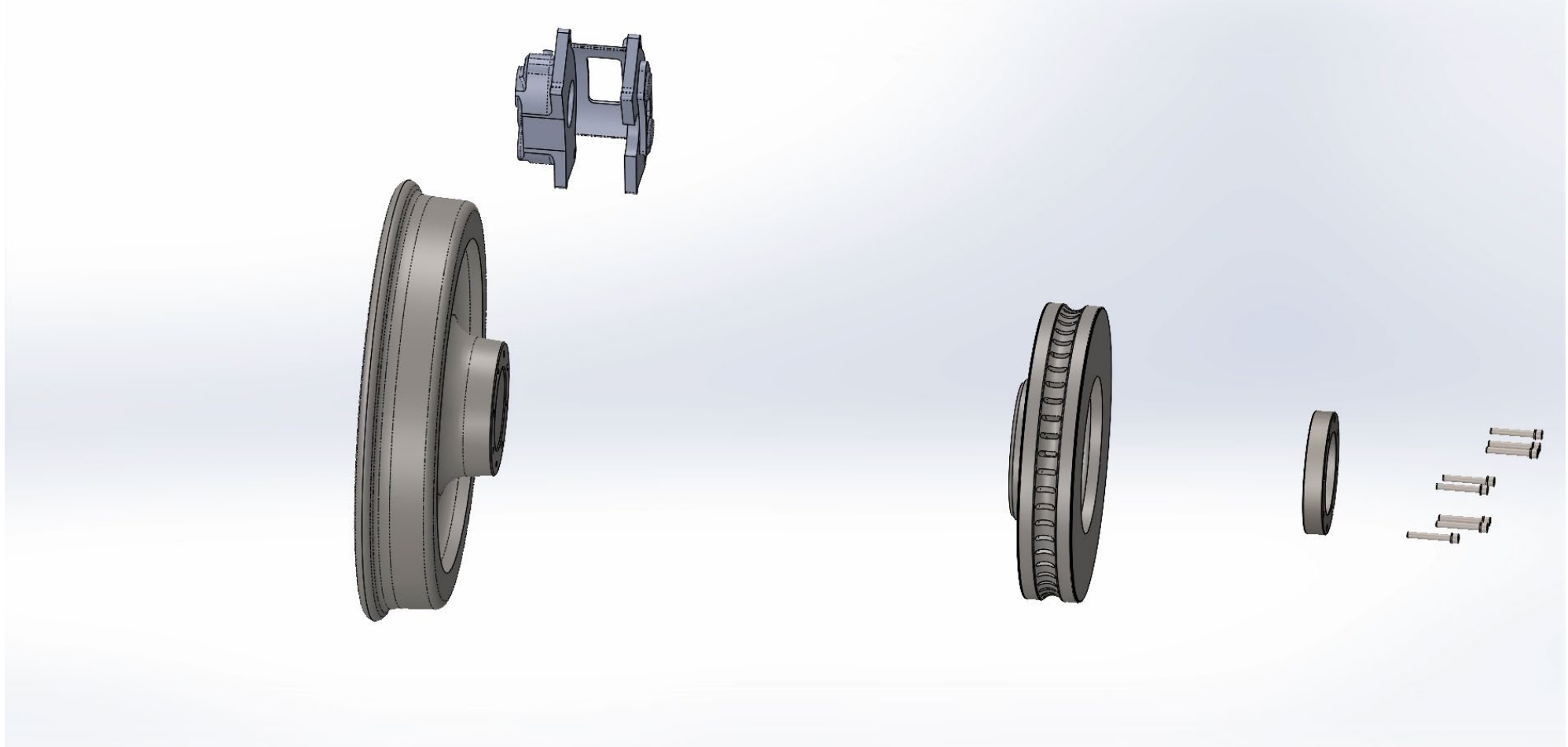


Good news! Track repairs completed. No single tracking in the morning. Please see graphic below for near normal frequencies. [#wmata](#)



2 29 124 59K

Animation of Friction Disc Assembly



Enhanced Procedures

- Inspected brake disc bolts on entire fleet
- Continue to visually inspect daily
- Implemented new requirement to torque check using a wrench every periodic inspection (every 60 days)
- Industry-leading procedure and conservative mitigation



Future State: Retire Oldest Fleets

- Both 2000-series and 3000-series manufactured by Breda
- 2000-series fleet (76 cars) in service starting in 1982
- 3000-series fleet (276 cars) in service starting in 1987