



1ST FEBRUARY 2017

London Underground RCF Monitoring

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EVERY JOURNEY MATTERS

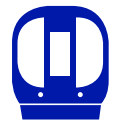


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- RCF-VIC-2 (Deep Tube)
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MRX Rail Surface Crack Measurement



RCF Monitoring Sites

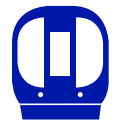
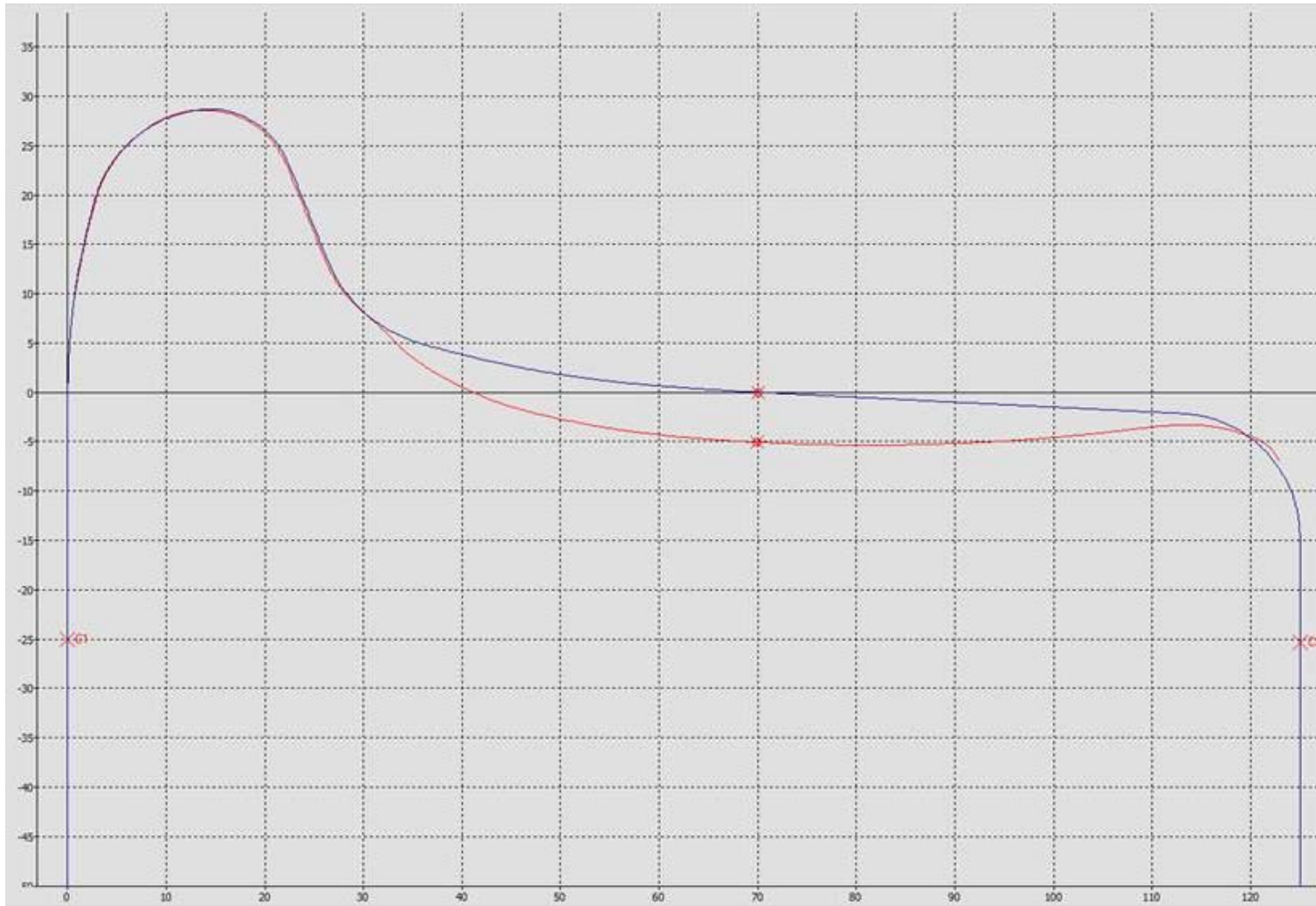
- Started with c.60 sites where re-railed based on RSCM data
- Added in a number of renewal sites and maintenance re-rails c.35
- Data Collected:
 - Rail Surface Crack Measurement
 - Rail Profile
 - MPI Photos
 - Wheel Profile Distribution
 - Vampire Results



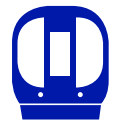
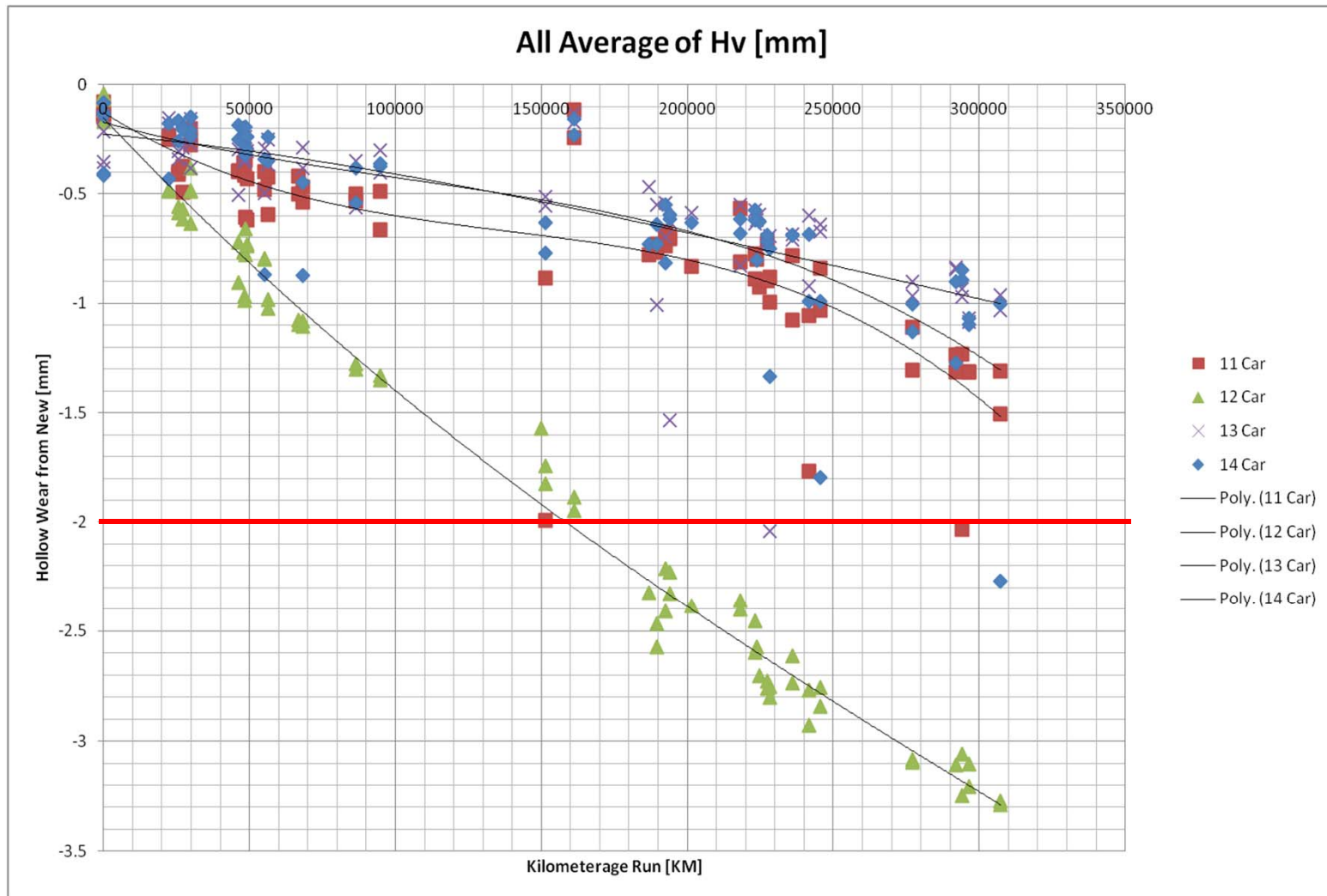
09 Tube Stock



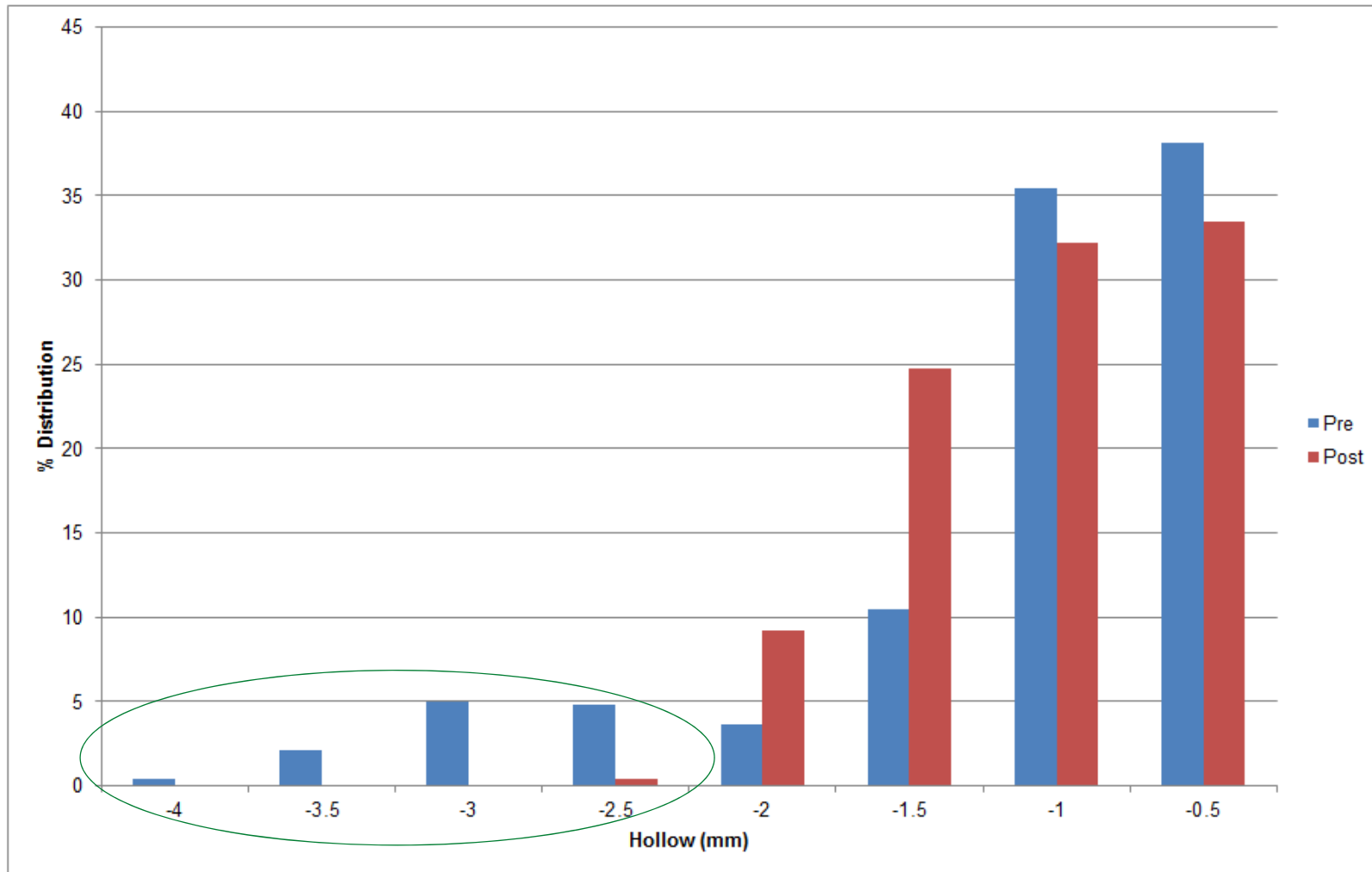
09TS Hollow Tread



09TS Hollow Tread



09TS Hollow Tread Distributions



RCF-VIC-2

- Highbury & Islington to Finsbury Park 1322 to 1670m
- 09TS & ATO
- Deep Tube, High Rail (Right)
- Radius 700m, Cant 55mm, Deficiency 50mm, Bullhead Rail, 1432mm Gauge
- Re-Railed: 21st March 2014
- Survey: 5th September 2016
- 89MGT, 5.7M axle passes



RCF-VIC-2

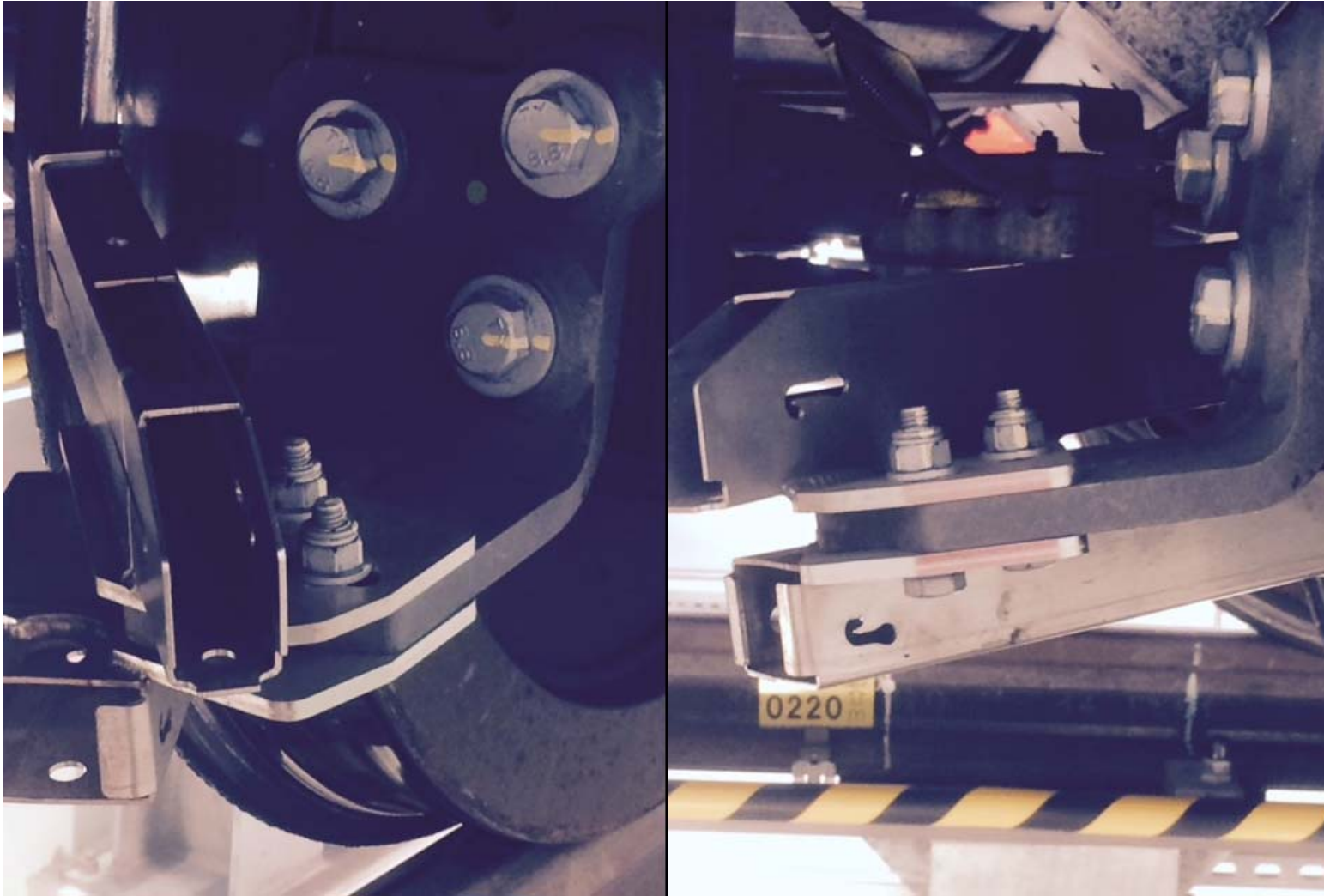


RCF-VIC-2

- No RCF appearing on RSCM
- Contact positions are all predicted by wheel-rail combinations available
- WLRM predicts 3 of 4 bands of RCF
- Rate is not necessarily accurate as rail should have 'failed' based on these results
- Very dynamically unstable with new bullhead rail, very high conicity for small lateral shift
- Only one set of friction values run but.....



09TS HPF/LCF

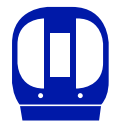


RCF-DIS-6

- Bank/Monument WB platform 0 – 123m
- S-Stock & Manually Driven
- Sub Surface, Low Rail (Right)
- Radius 200m, Cant 90mm, Deficiency 20 to - 80mm
- Flatbottom Rail, 1438mm Gauge, Check Rail
- Re-Railed: 1st June 2016
- Survey: 15th November 2016, 1st December 2016 (post grind)
- 46MGT, 3.4M axle passes



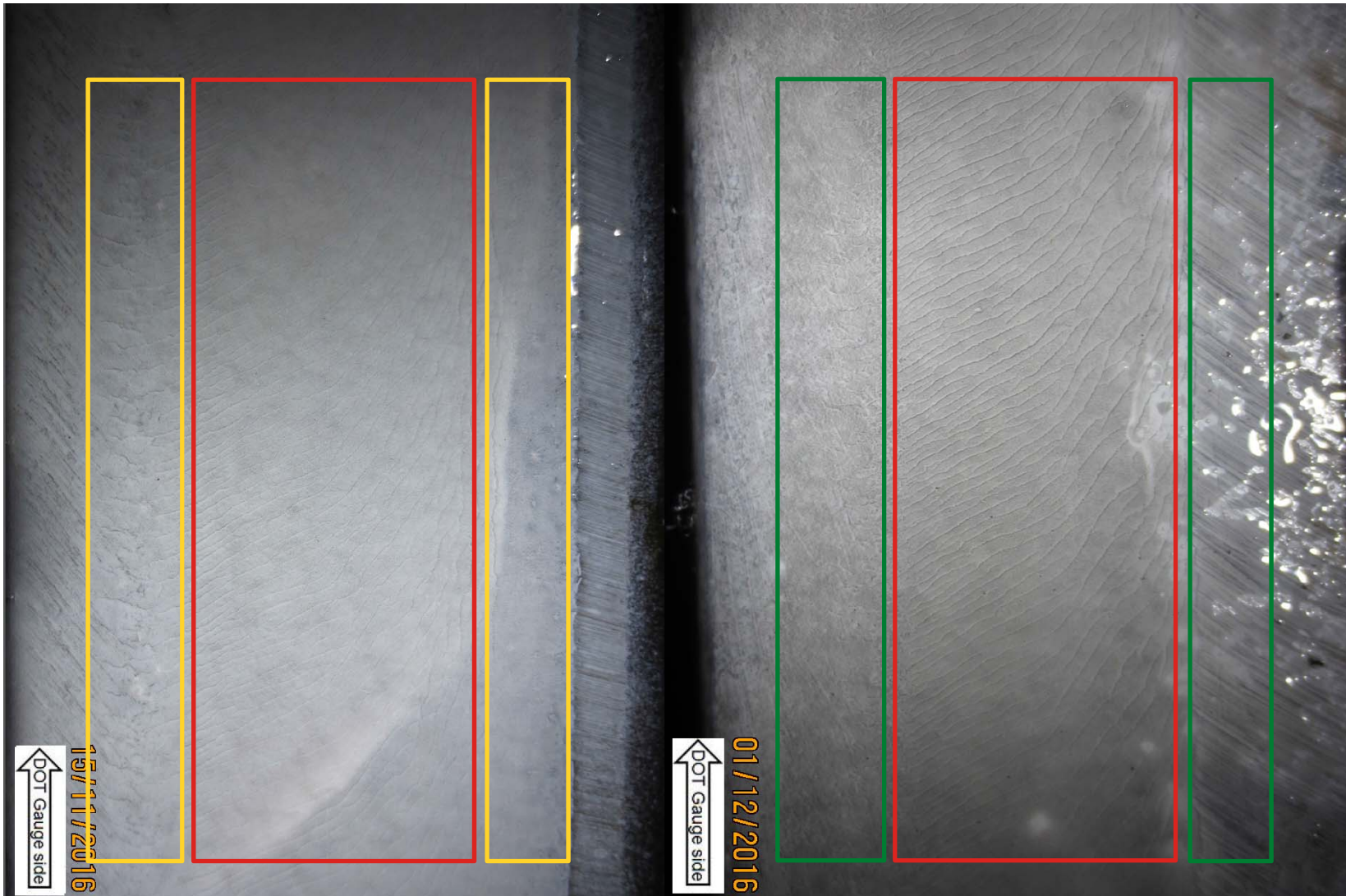
RCF-DIS-6



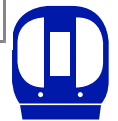
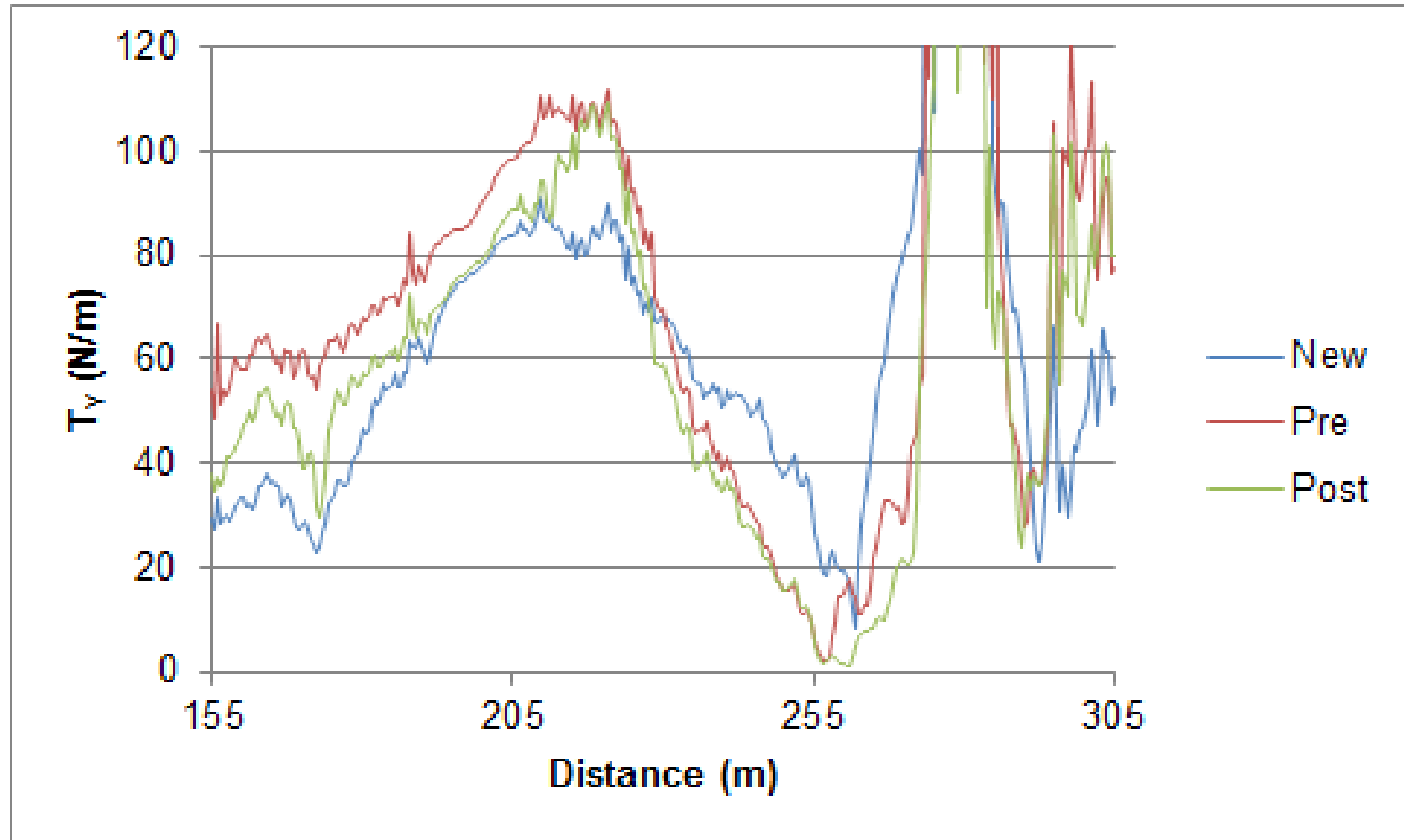
RCF-DIS-6



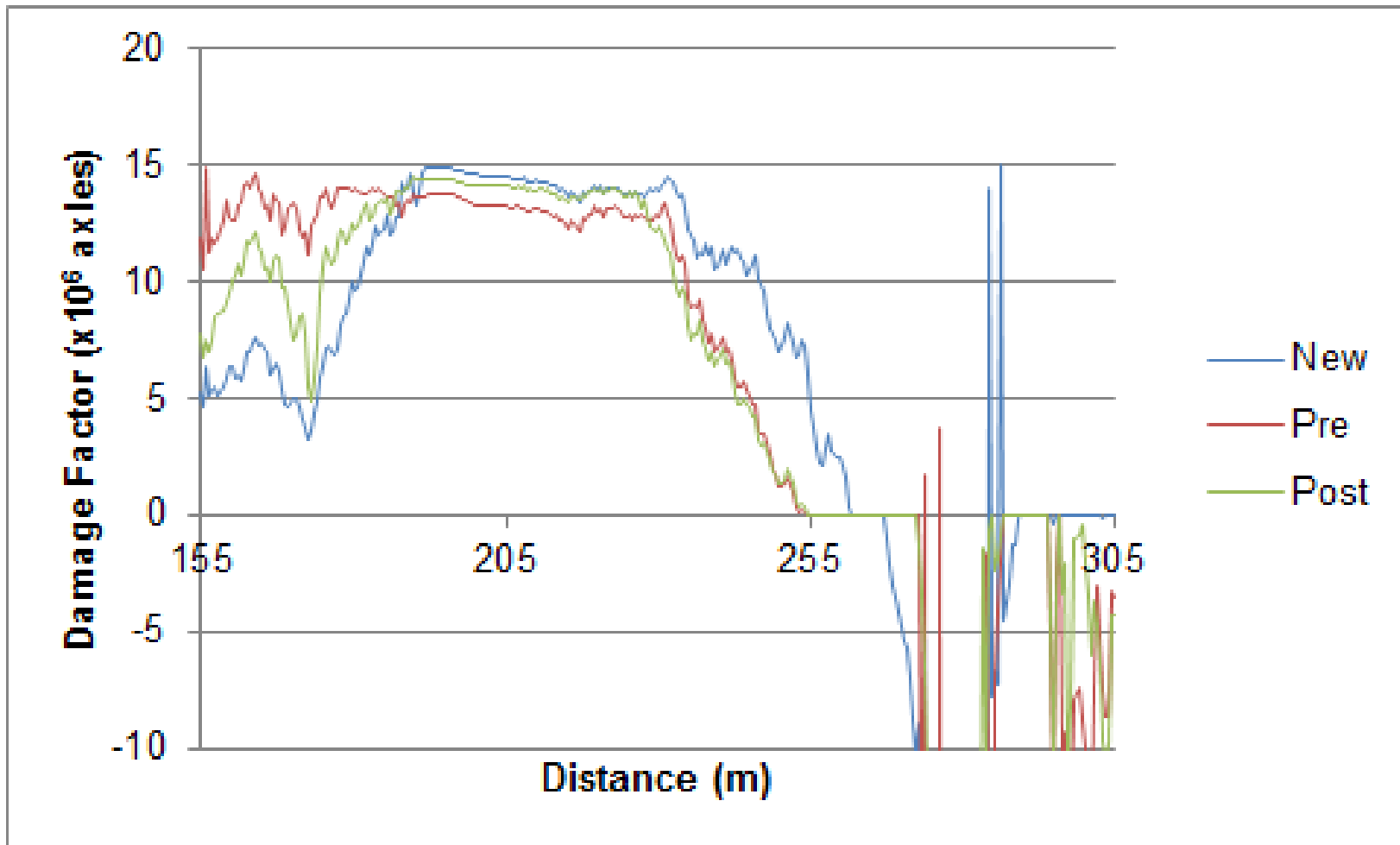
RCF-DIS-6 - Low Rail



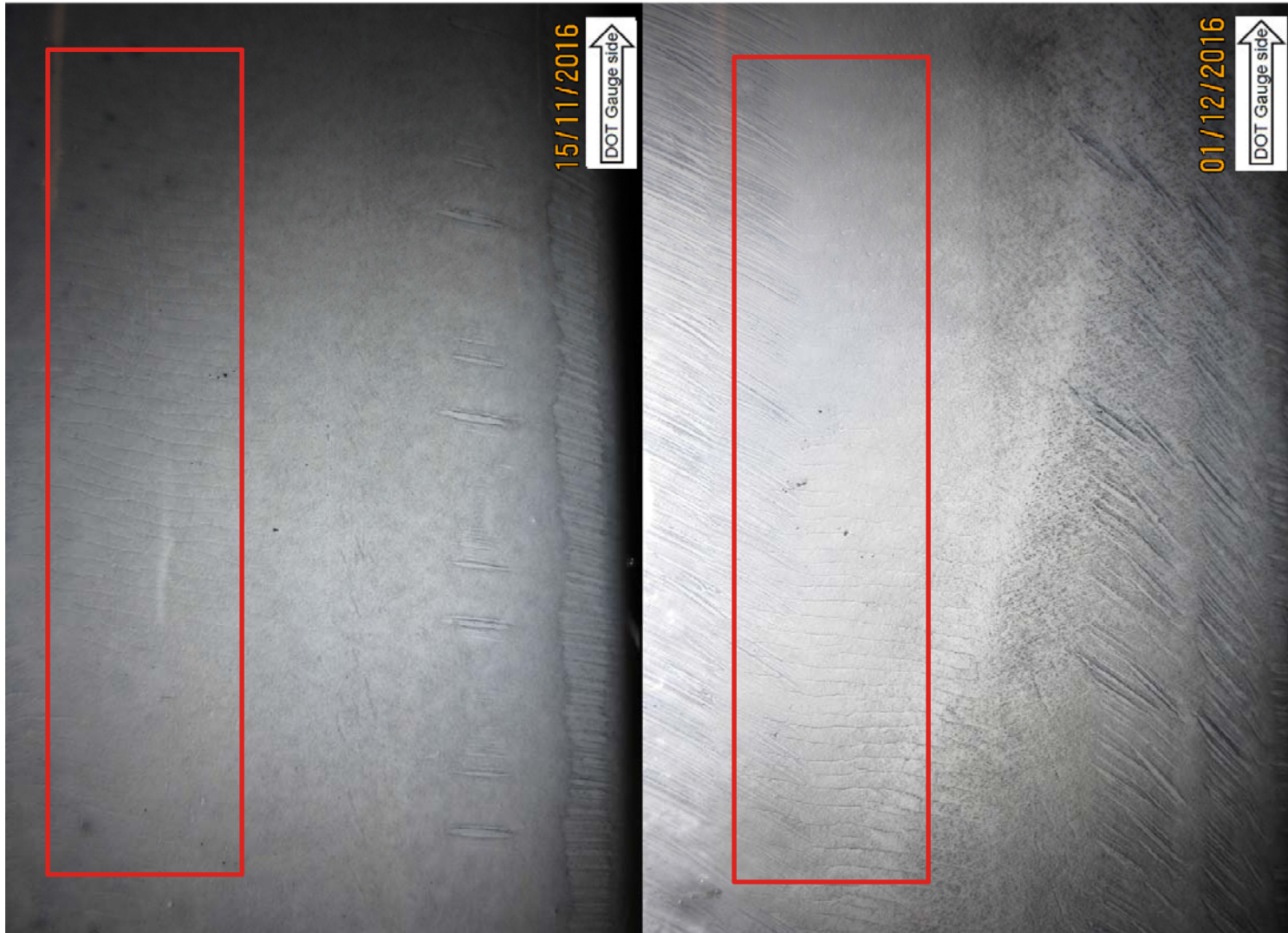
RCF-DIS-6 Low Rail Results



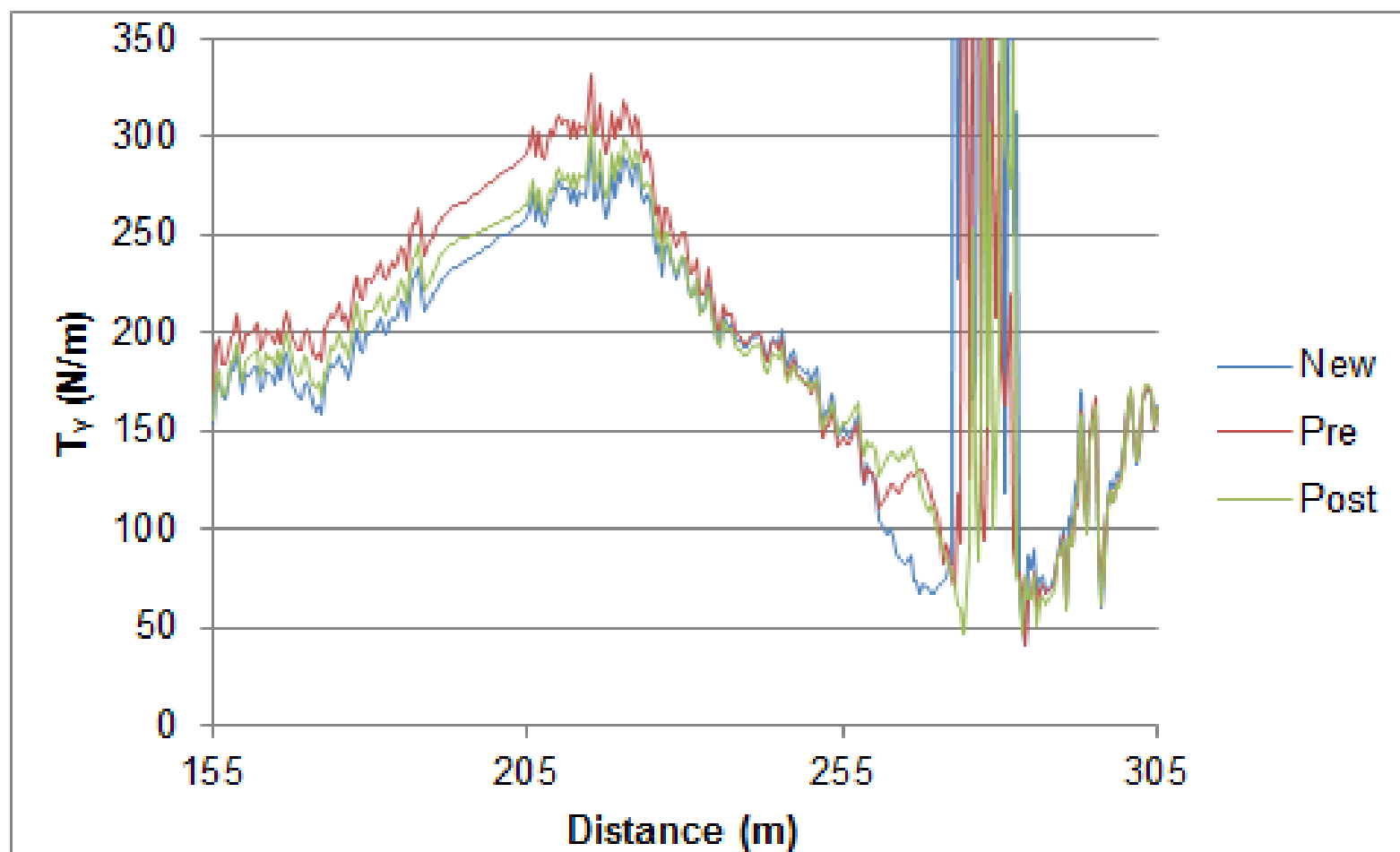
RCF-DIS-6 Low Rail Results



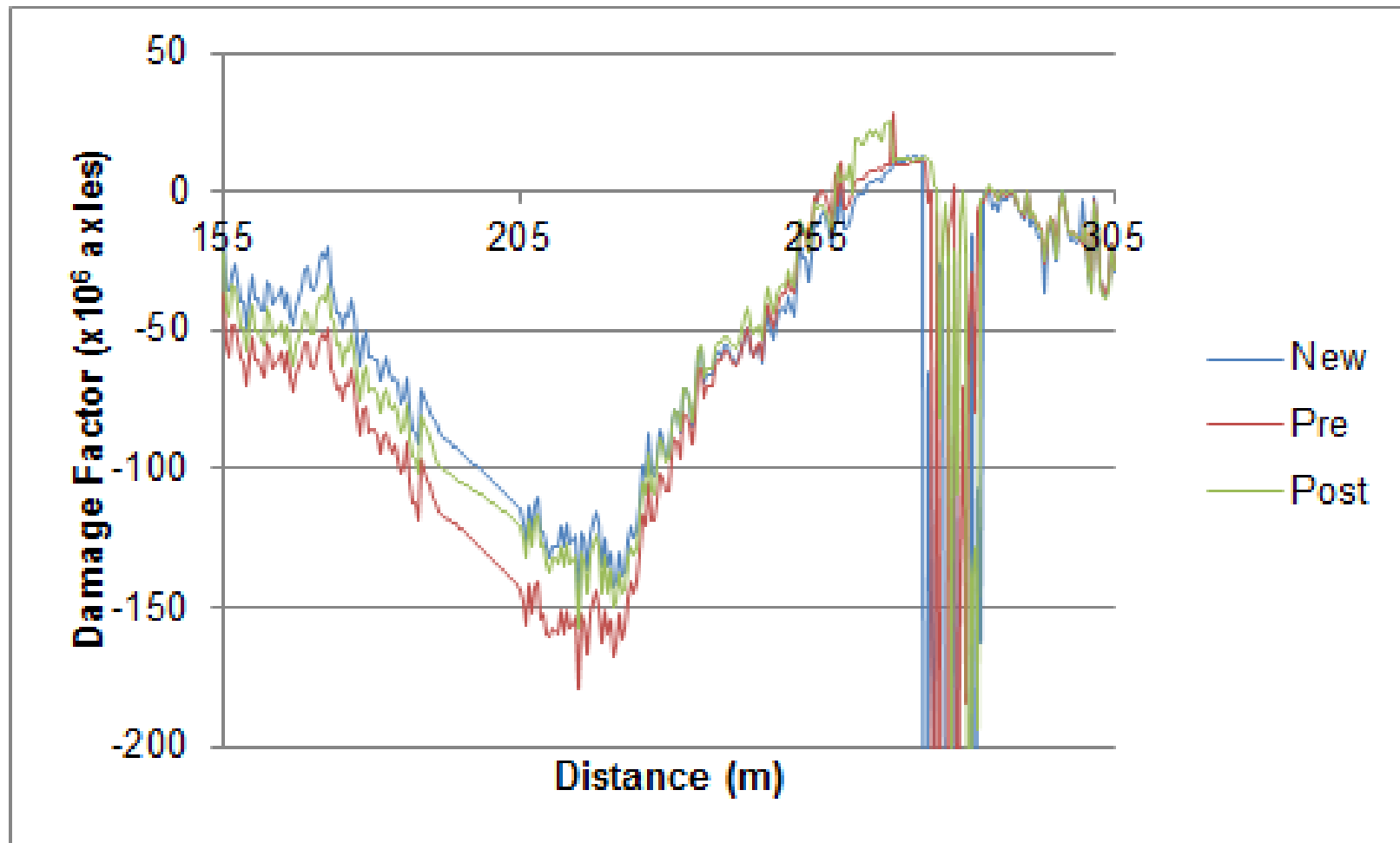
RCF-DIS-6 - High Rail



RCF-DIS-6 High Rail Results



RCF-DIS-6 High Rail Results



RCF-DIS-6

- Reduction in T_y between pre and post grind
- No RCF appearing on RSCM
- Some cracks removed from low rail gauge corner from 0.35mm removal
- WLRM predicts low rail RCF but again should have 'failed'
- High rail should be in wear region?
- Crack density historically more likely to result in UUR at this site

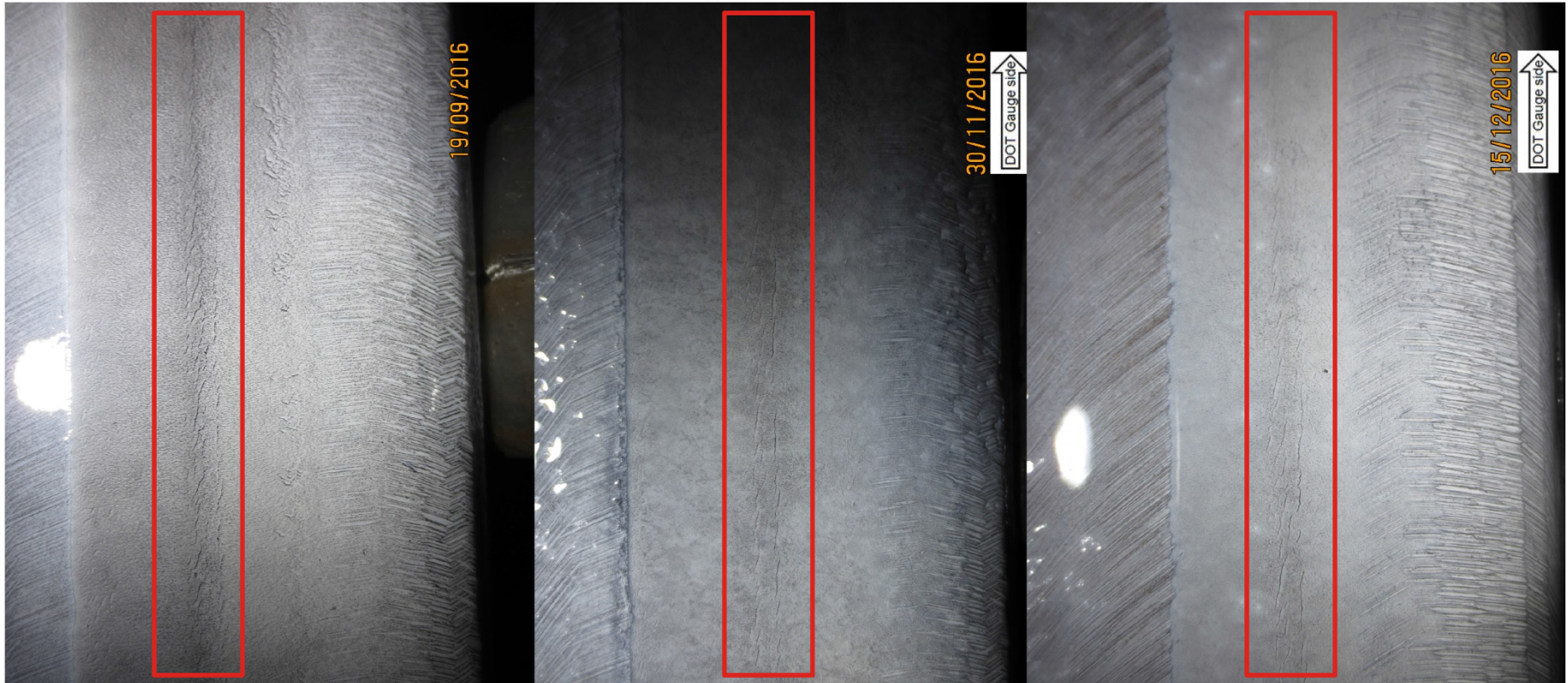


RCF-DIS-12

- Parsons Green to Putney Bridge 640 – 836m
- S-Stock & Manually Driven
- Open, Renewal, No Check Rail
- Radius 180m, Cant 80mm, Deficiency 60mm
- Flatbottom Rail, 1438mm Gauge, Check Rail
- Re-Railed: 28th May 2016
- Survey: 19th September 2016, 30th November 2016, 15th December 2016 (post grind)
- 10MGT, 2.4M axle passes



RCF-DIS-12: 670 Low Rail



5MGT

10MGT

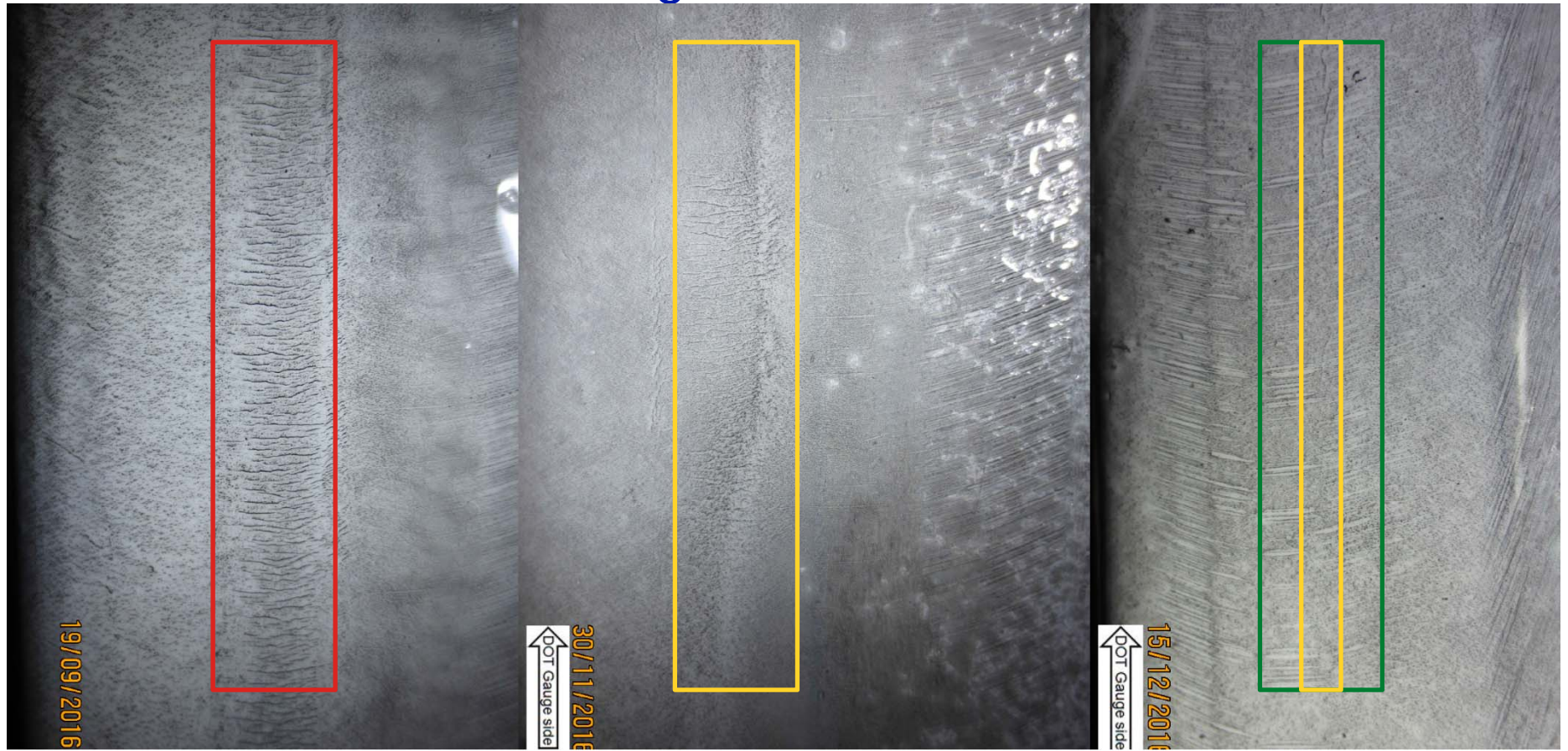
Post

Grind



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RCF-DIS-12: 670 High Rail



5MGT

10MGT

Post



EVERY JOURNEY MATTERS

RCF-DIS-12: 720 Low Rail



5MGT

10MGT

Post

Grind



EVERY JOURNEY MATTERS

RCF-DIS-12: 720 High Rail



5MGT

10MGT

Post

Grind



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RCF-DIS-12

- WLRM predicts high rail should be in wear
- Cracks have developed but then potentially have been worn out?
- WLRM predicts low rail should develop in transition (670) but not curve itself (720)
- Linear grinding method appears to have removed some cracks



Grinding Regime



Conclusions

- Extremely accurate wheel profile distribution
- Single Stock Running (ATO in some)
- Rail Profiles pre and post grind
- Rail Surface Crack Measurement
- MPI Photos
- WLRM not really been validated down to tight curves or against measurement systems
- Vampire outputs
- Very happy to provide data!

