

# A Holistic Approach to WRI Management on London Underground



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RAIL TRANSIT SEMINAR • MAY 2, 2016

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**WRI 2016**

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- A very brief history of London Underground
- Wheel Rail Interface Team
- Rail: Wear to Rolling Contact Fatigue
- Wheel: Managing wheel wear
- Conicity: Putting it all together
- Adhesion: Finding the Magic Wear Rate
- WRI Strategy: Predict to Prevent



# A Very Brief History of LUL

1863 - 1888



1948 - 1963



1890

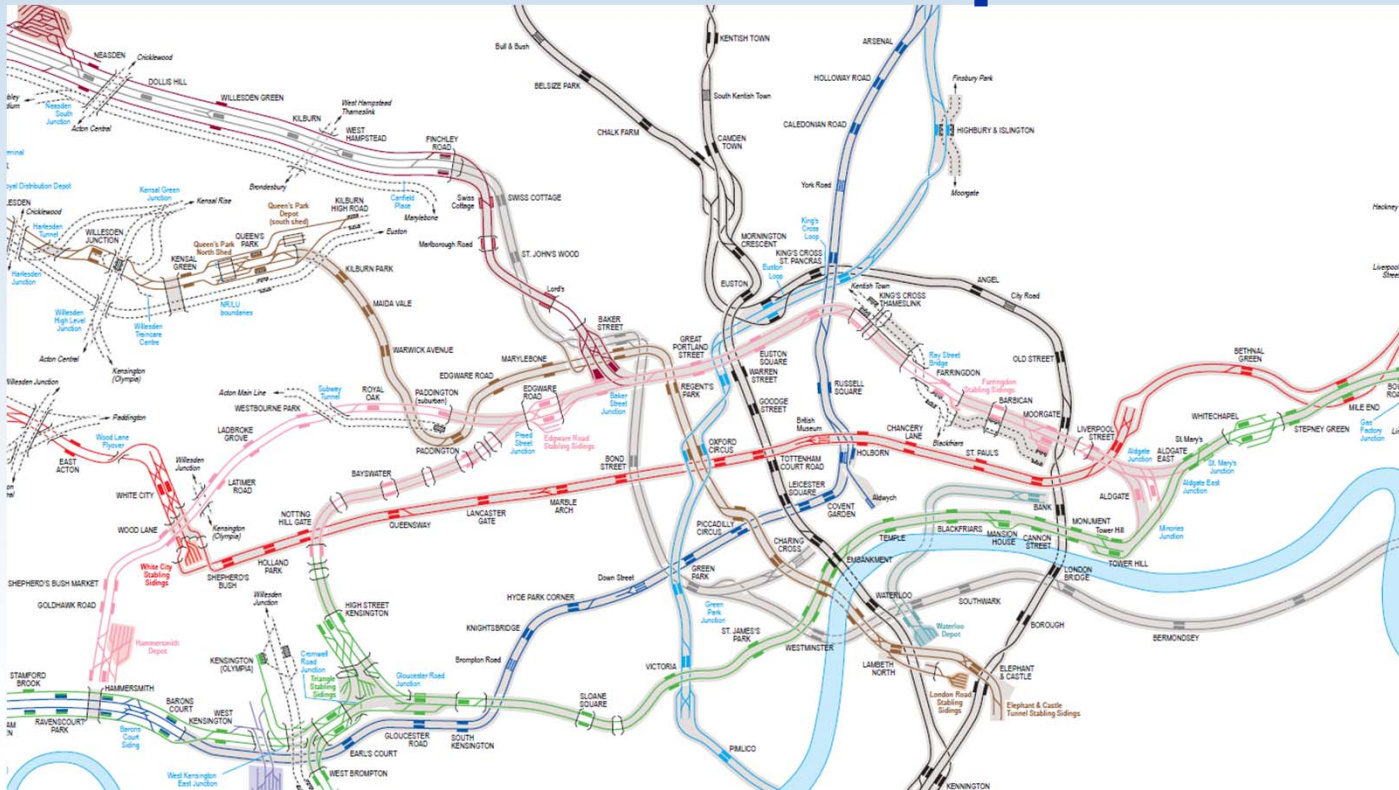
1999 - 2008



2000



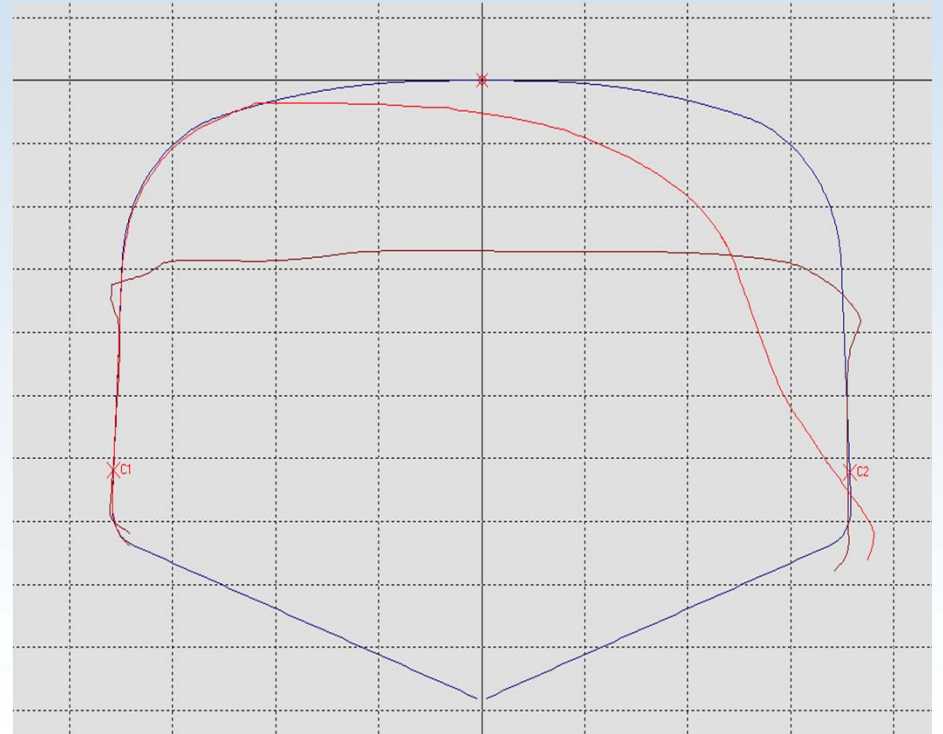
# The Real Map



# Westminster



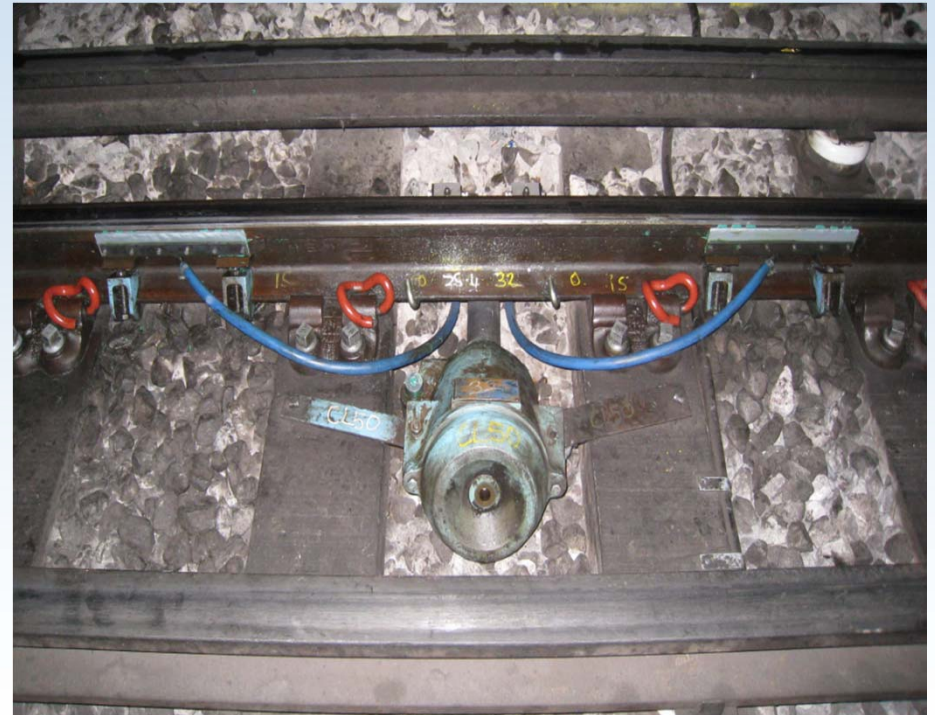
# Rail Wear



# C Stock

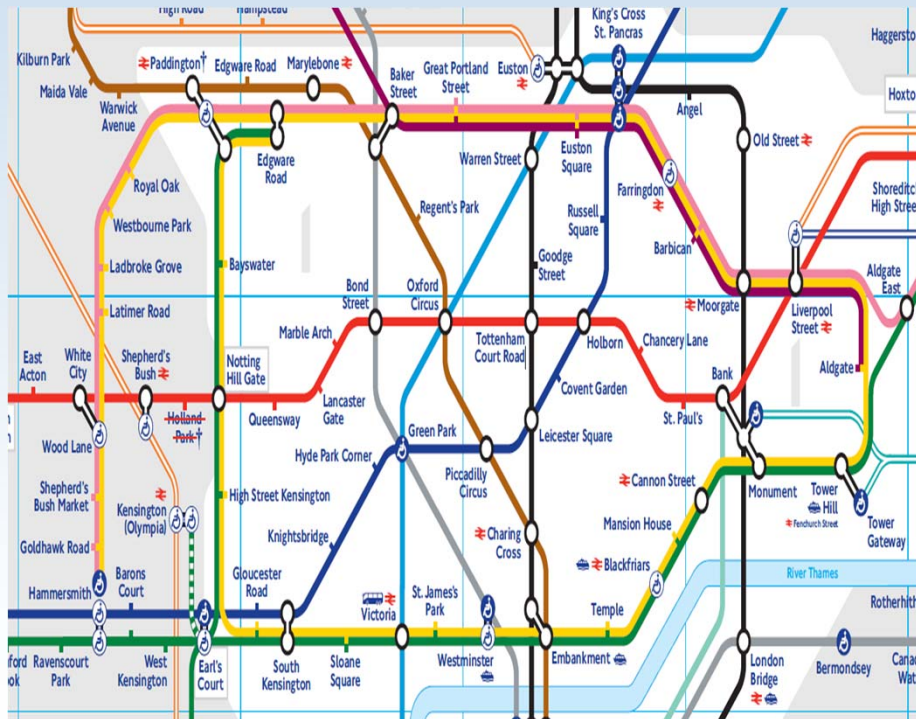


# Green Grease



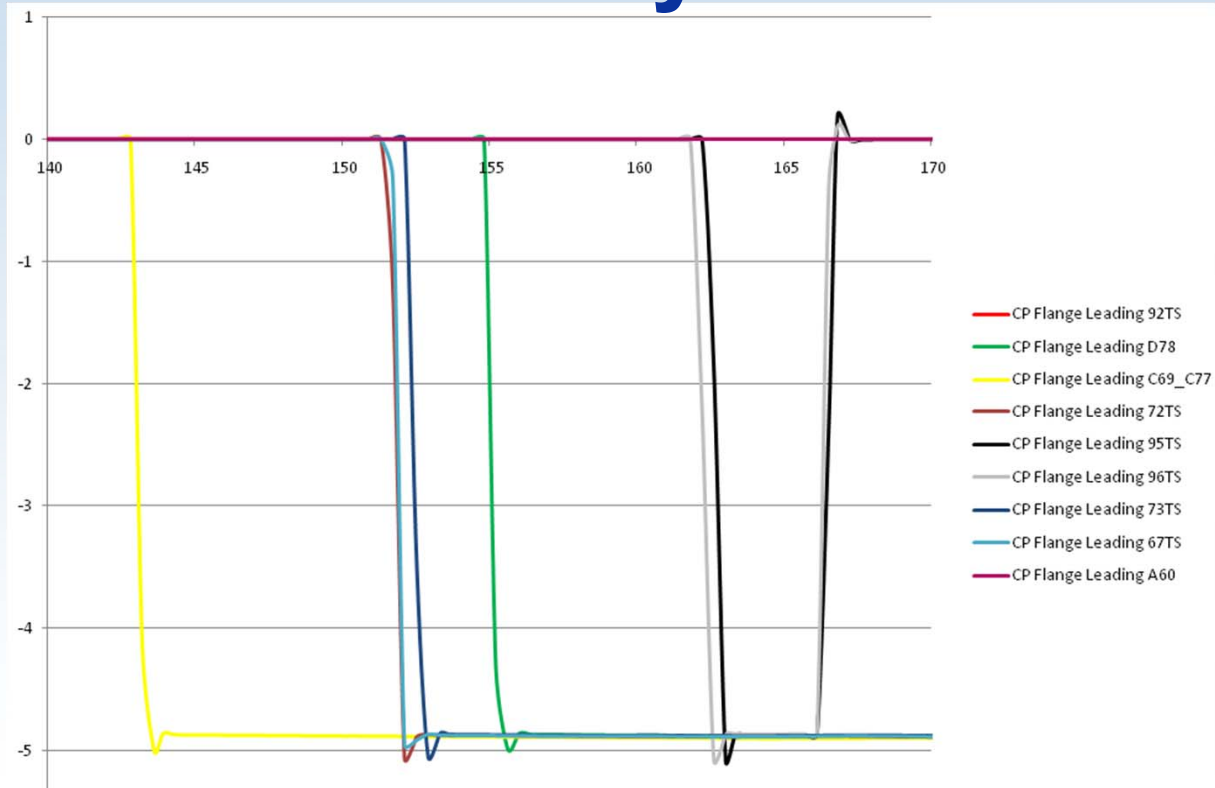


# Inter Stock Running

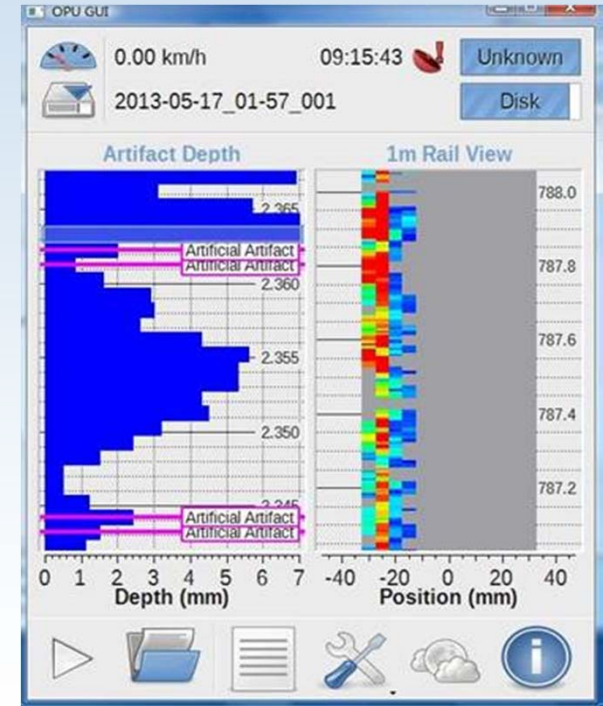


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# Vehicle Dynamics



# MRX: Rail Surface Crack Measurement

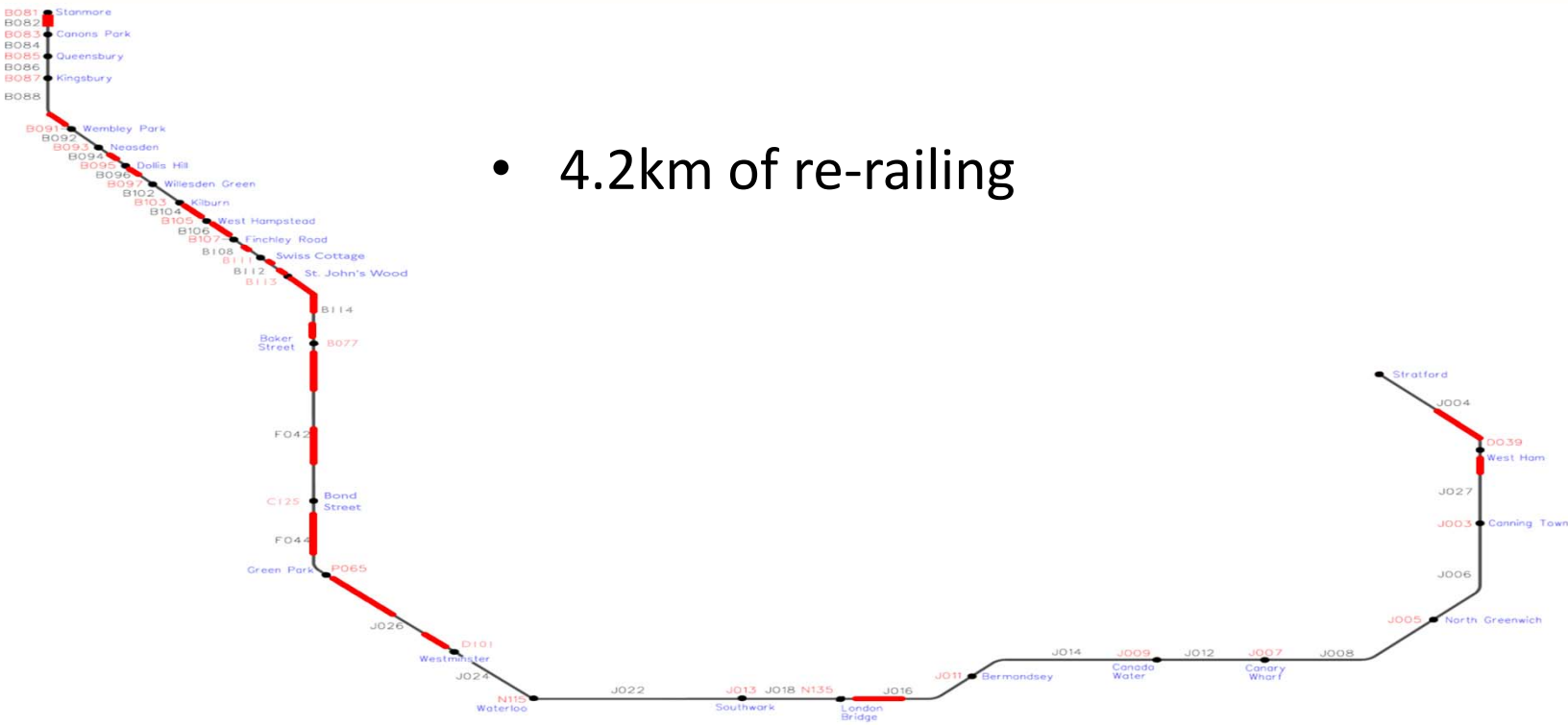


# Whole Life Rail Model



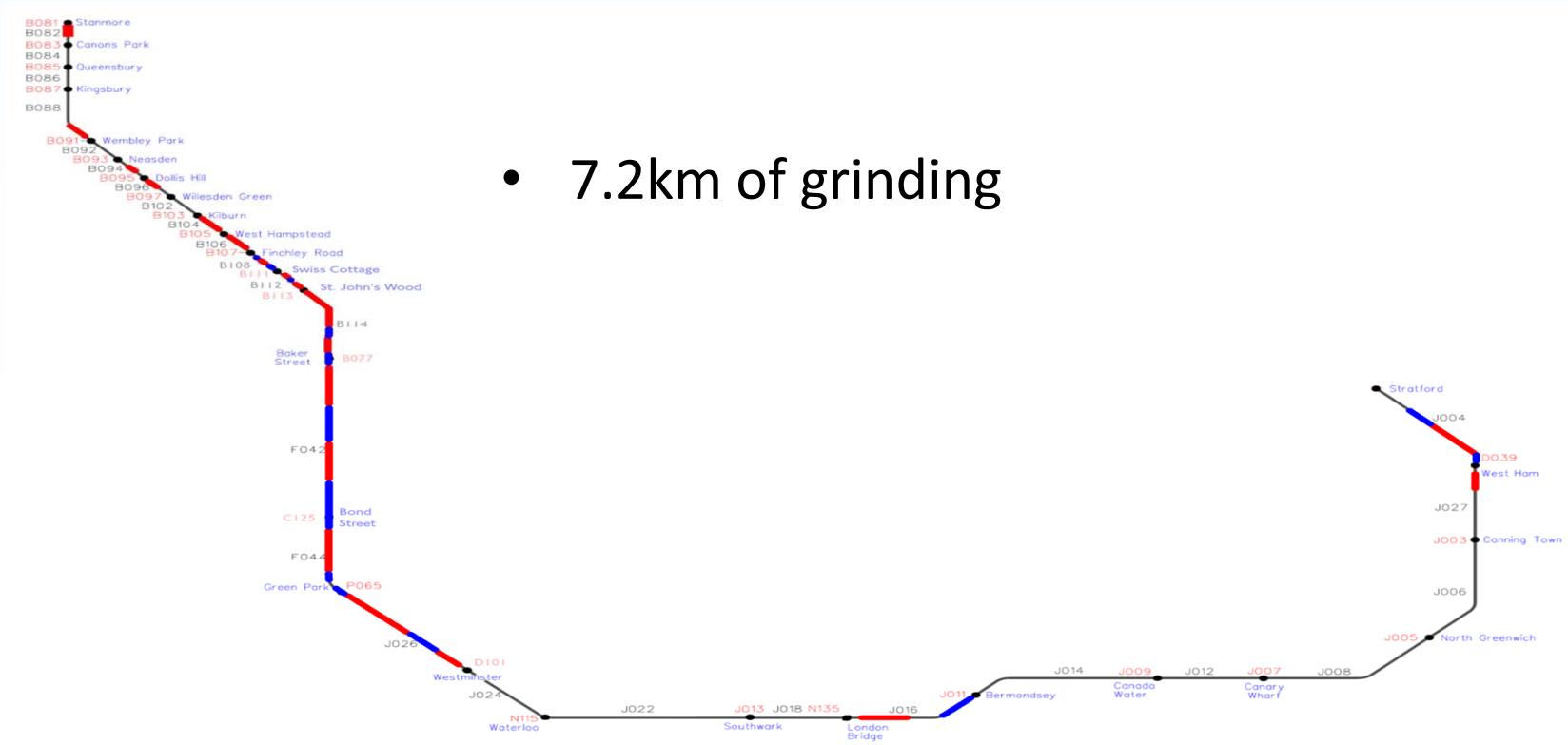
# Jubilee Line RCF

- 4.2km of re-railing

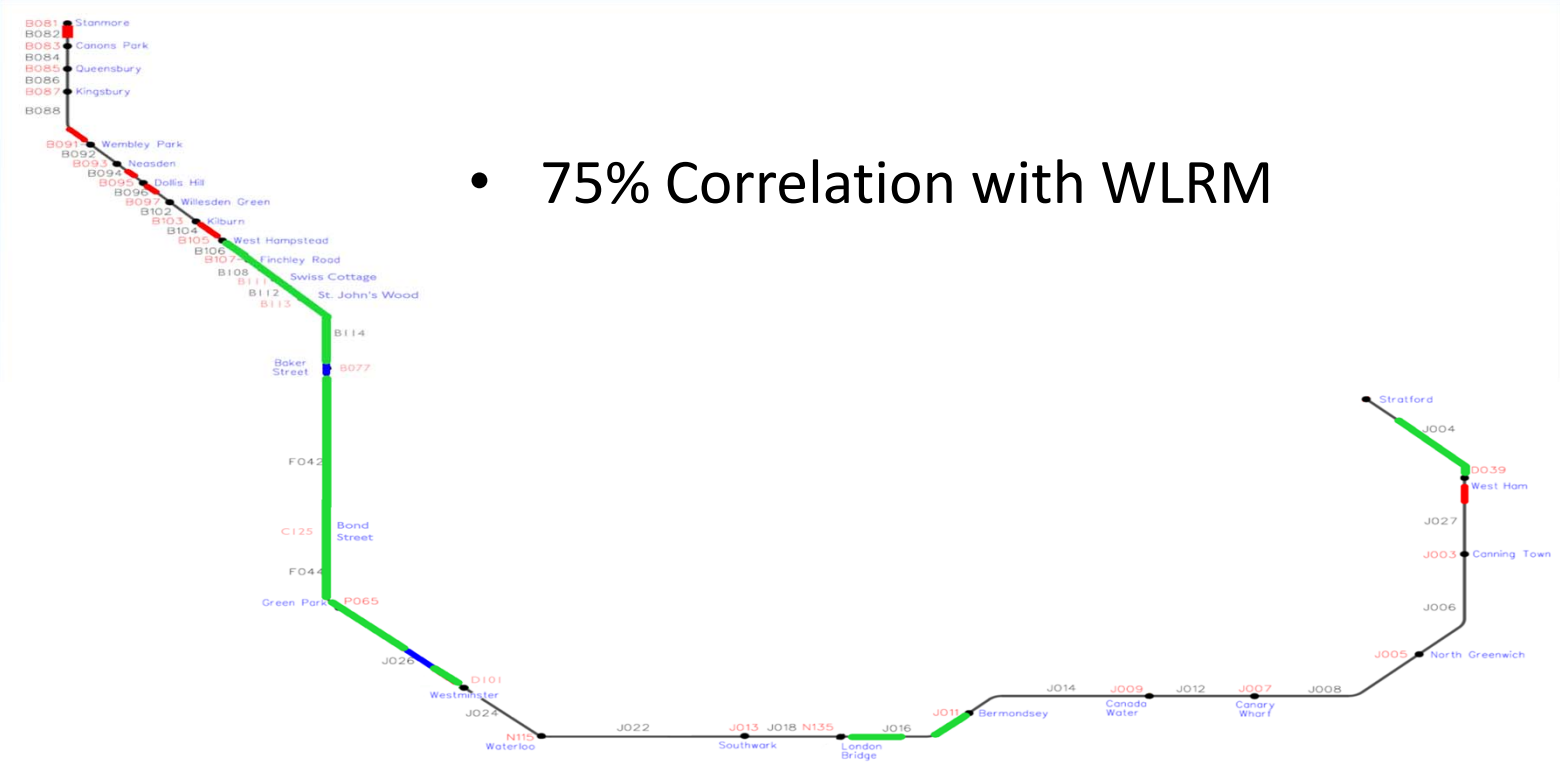


# Jubilee Line RCF

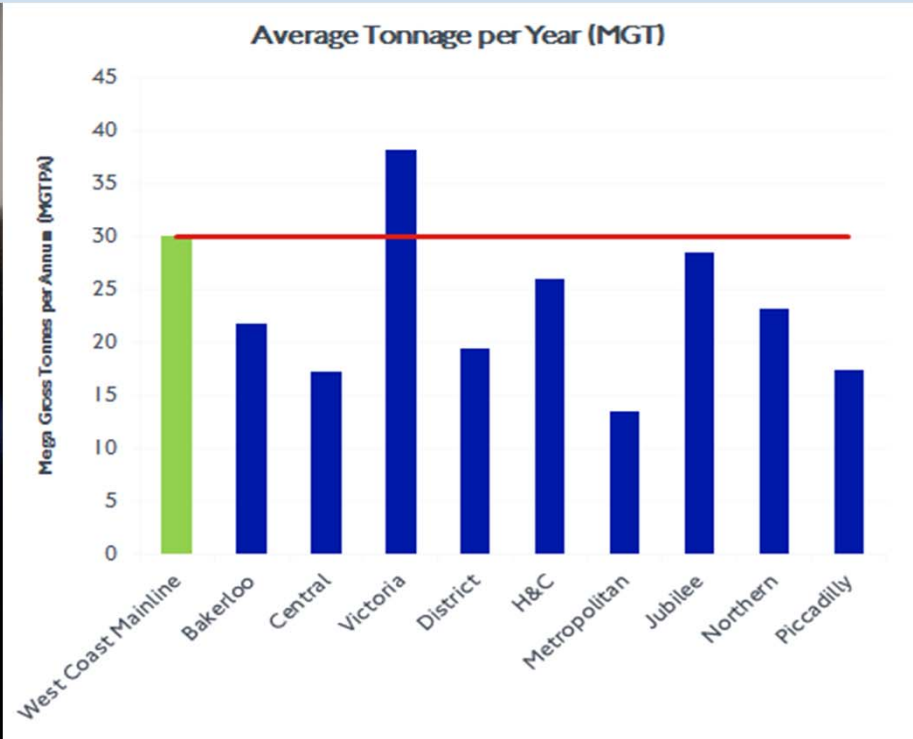
- 7.2km of grinding



# Jubilee Line RCF

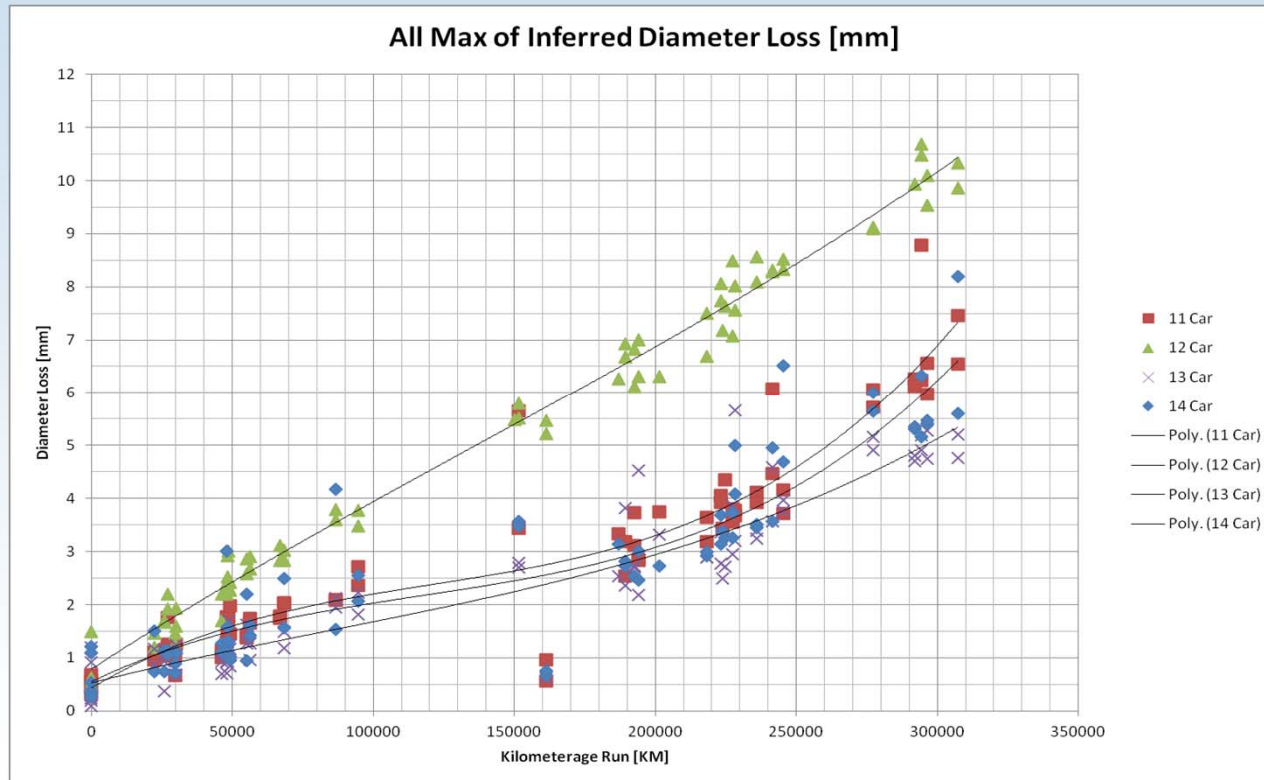


# Victoria Line 09TS

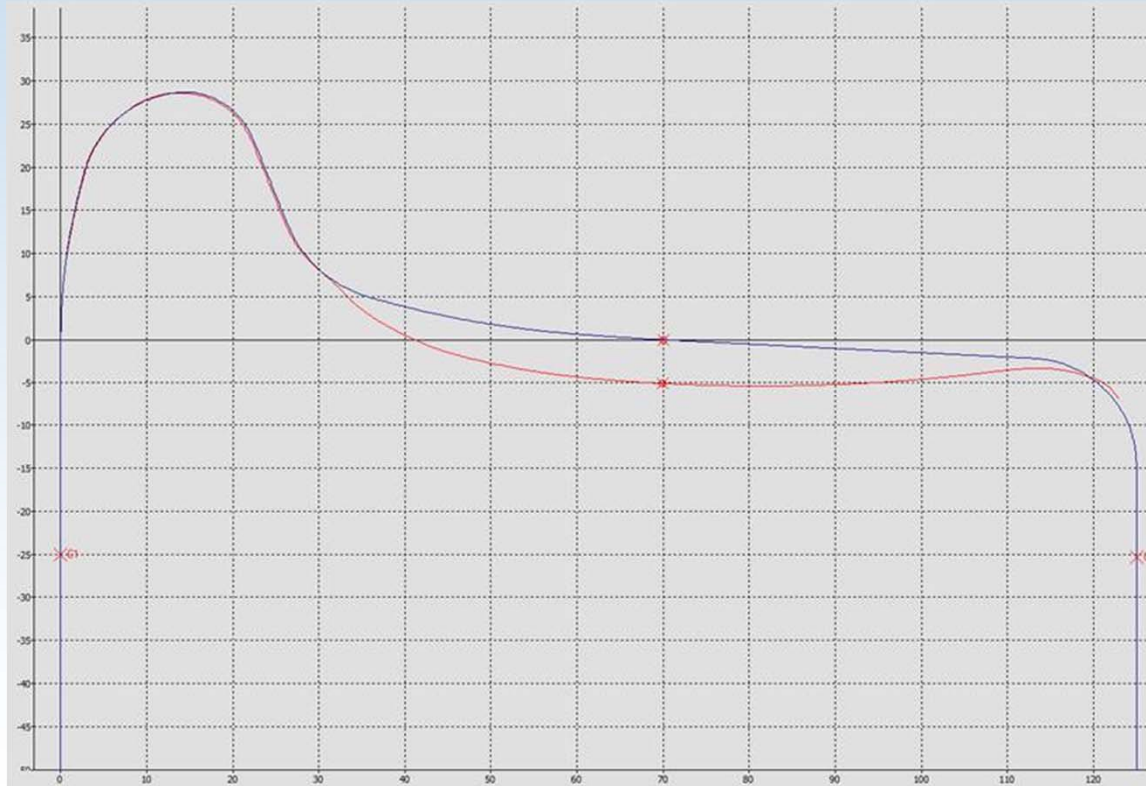




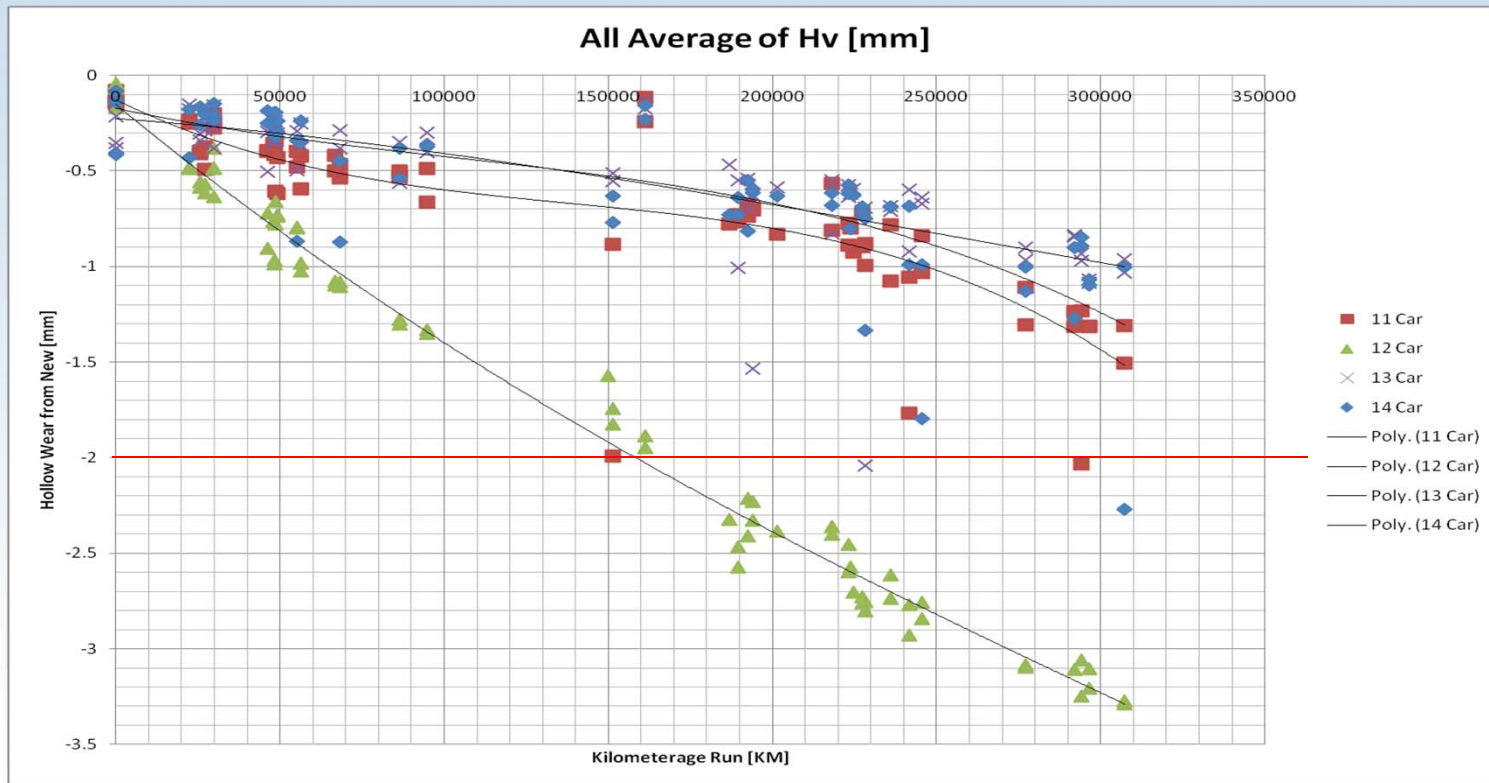
# Victoria Line 09TS



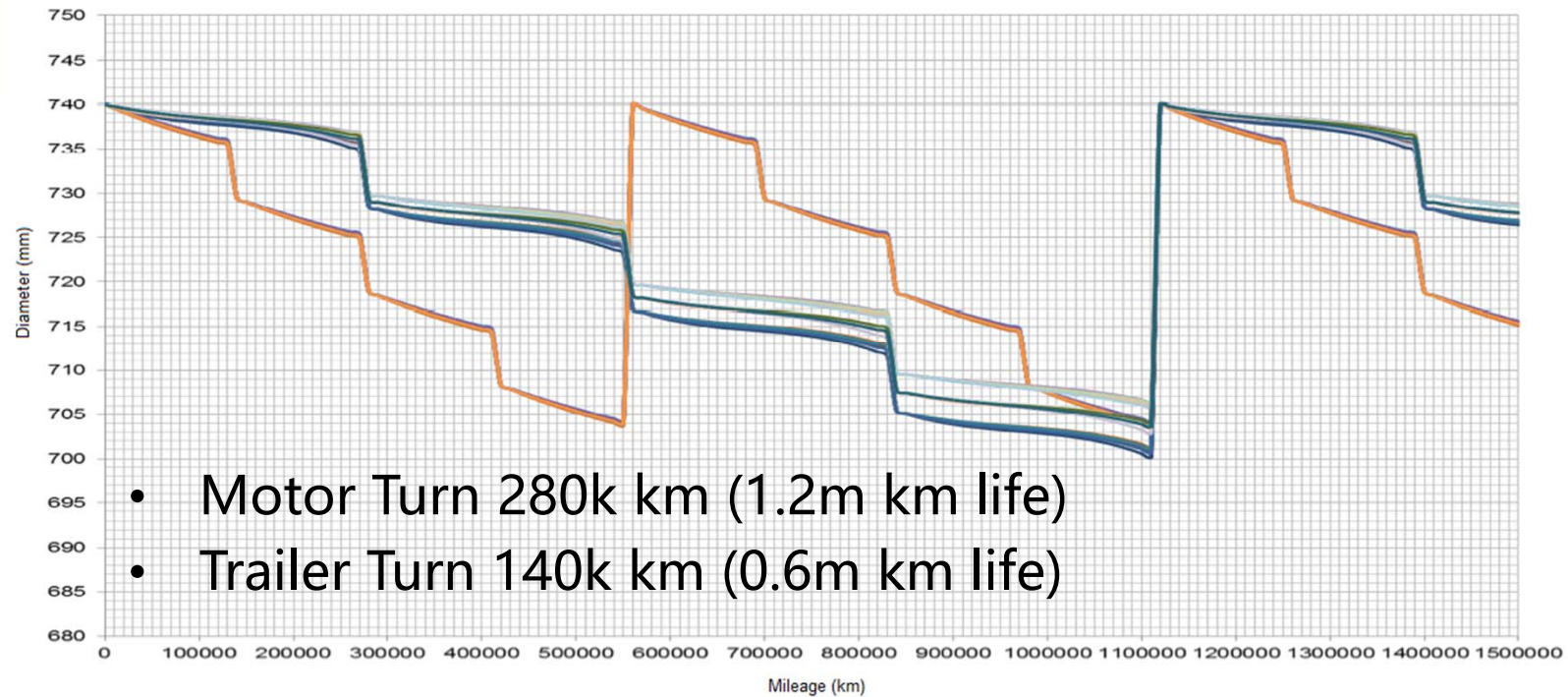
# Victoria Line 09TS



# Victoria Line 09TS



# Victoria Line 09TS



- Motor Turn 280k km (1.2m km life)
- Trailer Turn 140k km (0.6m km life)

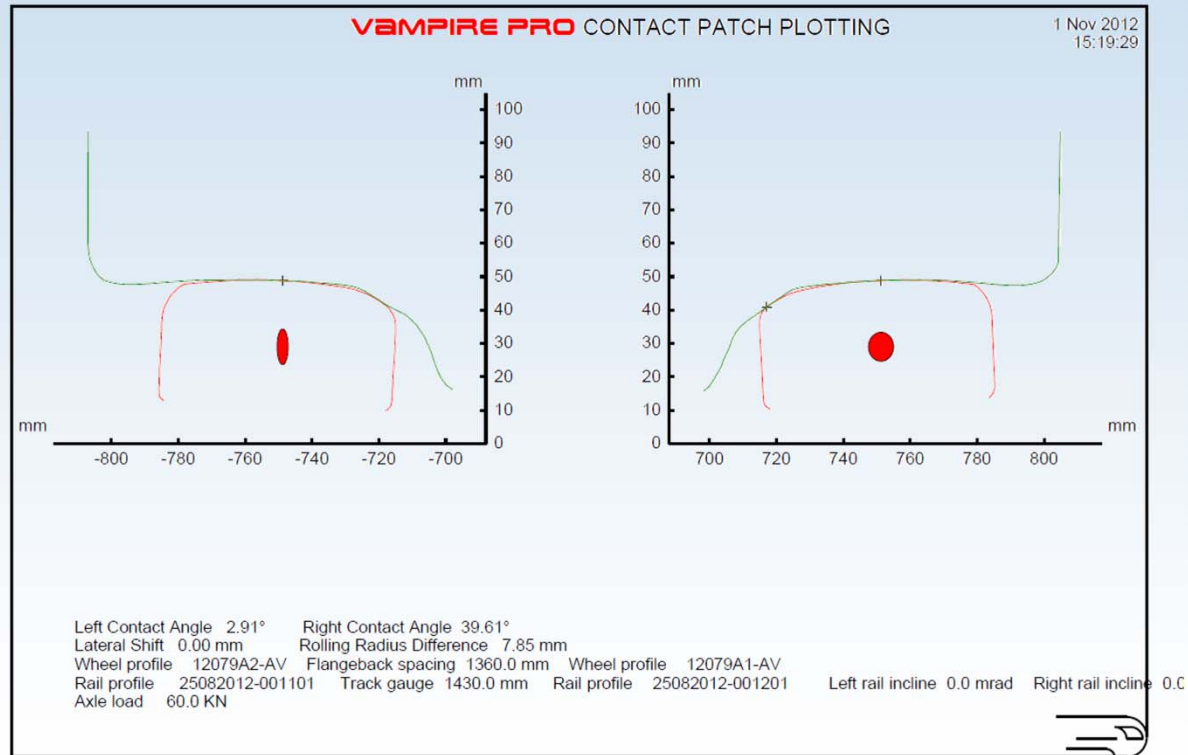


# Condition Turn Status

Stock	Line	Turn Interval	Confidence	Comments
S8	Metropolitan	200k km	Medium	
S7	District/H&C	160k km	Medium	
09TS	Victoria	140/280k km	High	Trailer/Motor
92TS	Central/W&C	3 years	High	
72TS	Bakerloo	TBC	TBC	2.5yr lift cycle
73TS	Piccadilly	2 Years	TBC	
95TS	Northern	7000 Hours	TBC	
96TS	Jubilee	180k km	High	



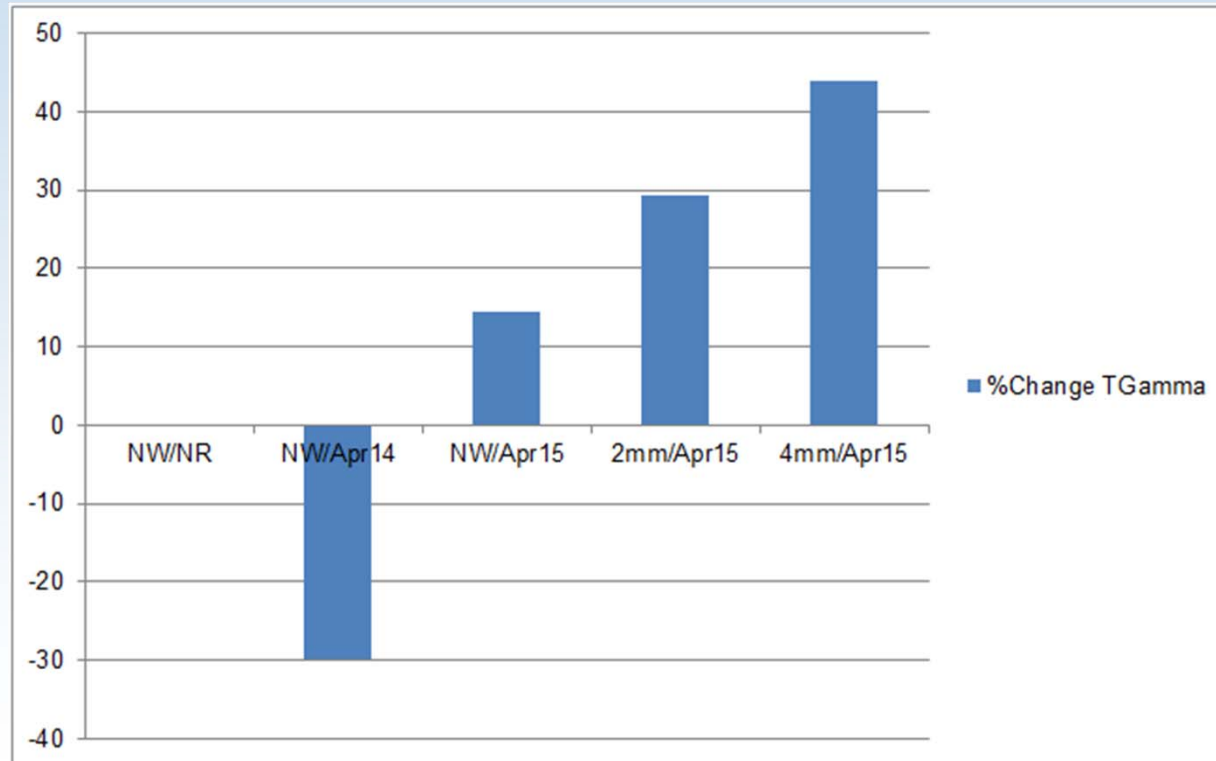
# Conicity



VAMPIRE Plot



# Conicity

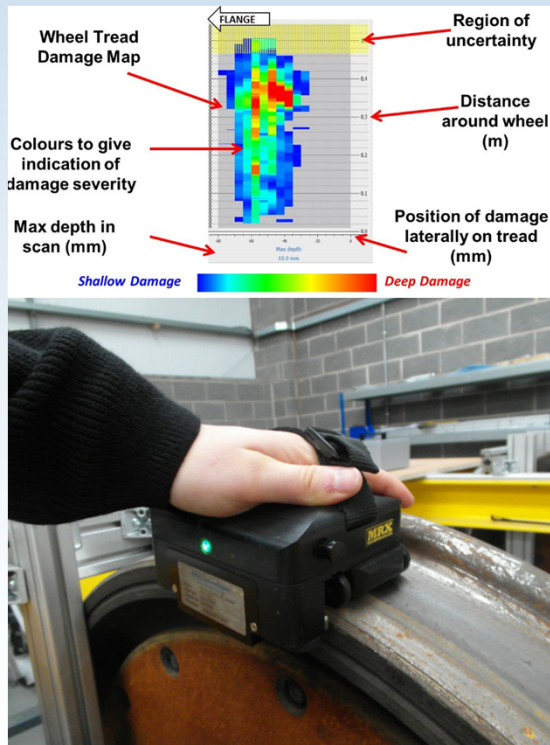


# Preventative Grinding Regime

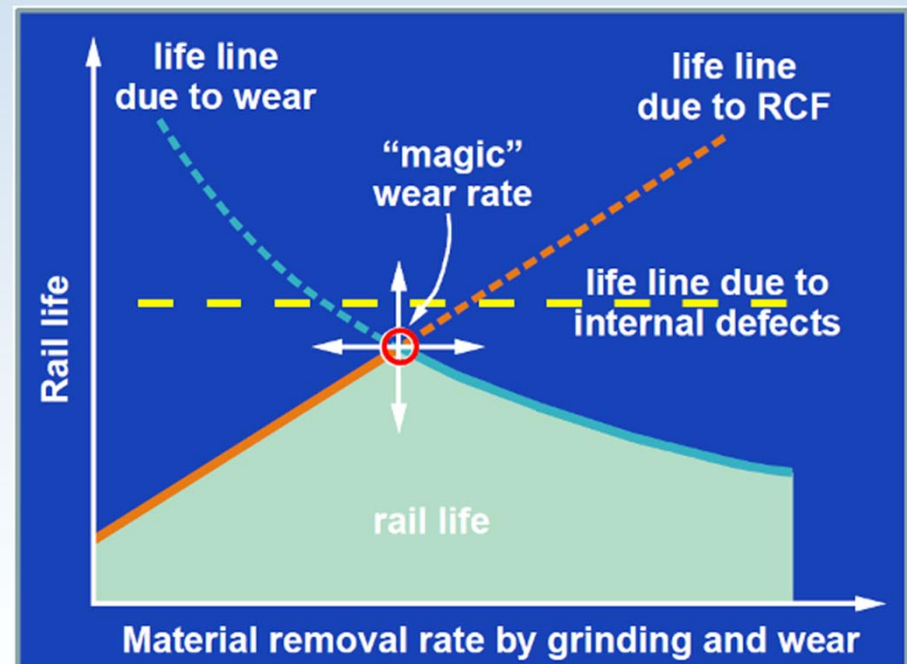
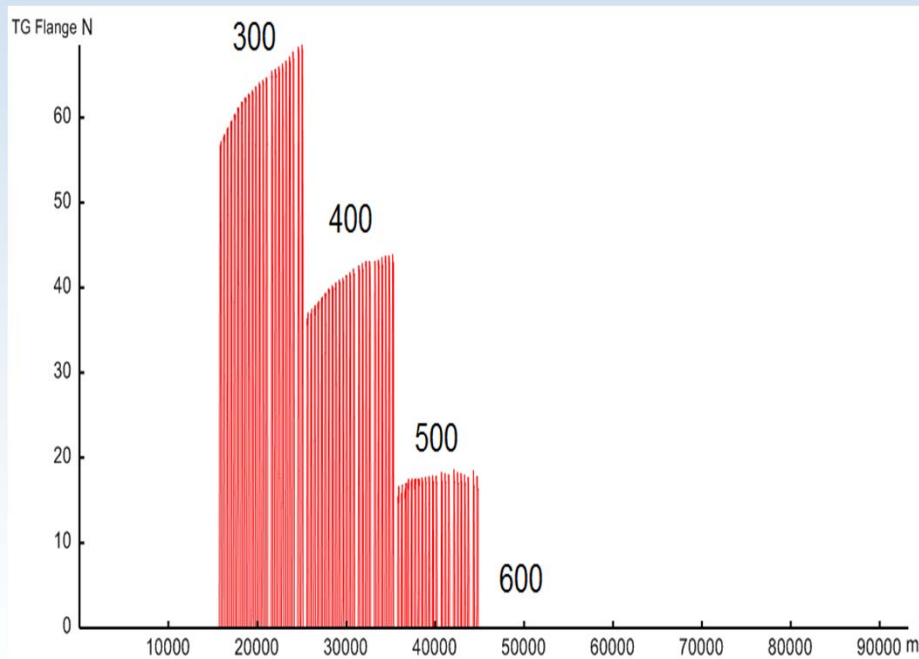




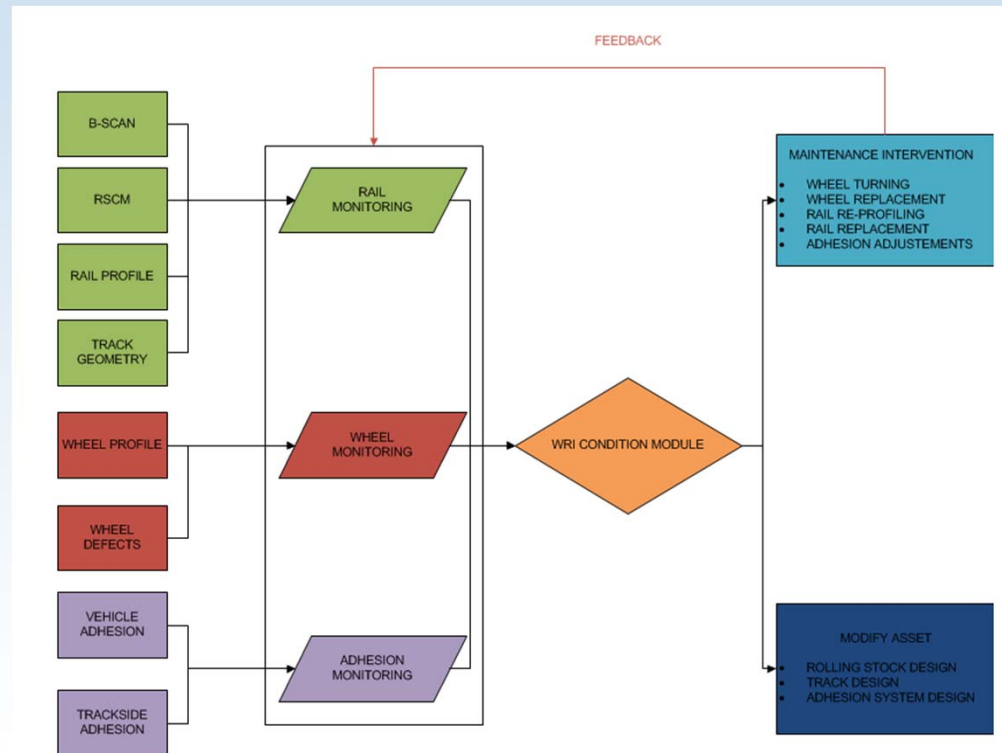
# Preventative Wheel Turning



# Adhesion Rationalisation



# WRI Strategy: Predict to Prevent



# Conclusions

- Gather Decent Data!
- Wheels, Rails and Adhesion (Traction/Braking)
- Ignore Projects/Maintenance
- Know your costs
- Manage expectations
- Cultural Change





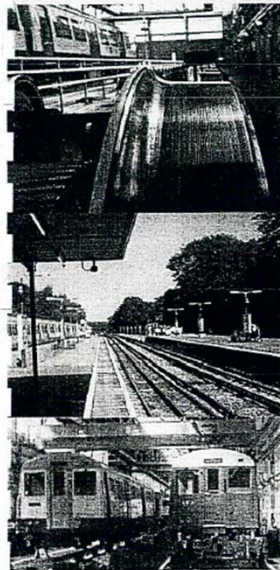
National Research  
Council Canada

Conseil national  
de recherches Canada

**NRC · CNRC**

Centre for Surface  
Transportation Technology

Centre de technologie  
des transports de surface



## Opportunities for Optimising Wheel and Rail Performance on Metronet's Subsurface Lines

A Report to  
Metronet Rail SSL Limited  
30 The South Colonnade  
London E14 5EU

Canada

TR 54-LUL

June 2003



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