

Outputs from the Industry Freight Train Derailments Working Group

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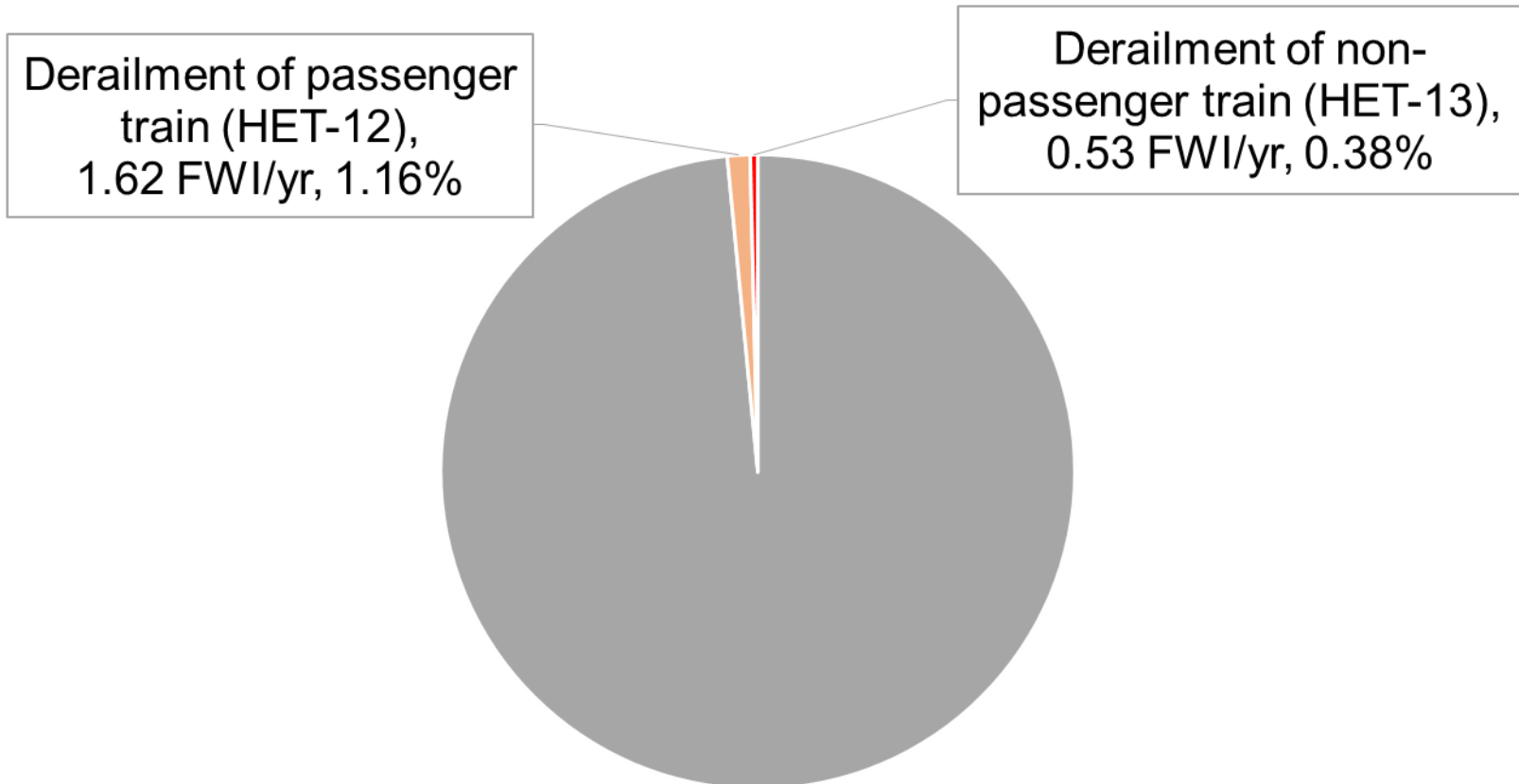
- Freight train derailment risk in context
- Overview of the freight train derailments working group
- Potential issues identified and possible actions to take forward into the discussion session

- FWI is a weighted risk index to allow for both fatalities and injuries when assessing risk
- 1 FWI =
 - 1 Fatality
 - And Statistically equivalent to:
 - 10 Major injuries (broken leg to paraplegic)
 - 200 Class 1 minor injuries (go to hospital but for less than 24 hours)
 - 1000 Class 2 minor injuries (cuts, bruises)
 - 200 Class 1 shock/trauma (witnessing fatalities)
 - 1000 Class 2 shock trauma (near misses, verbal abuse)

Total Network Risk (FWI/year)



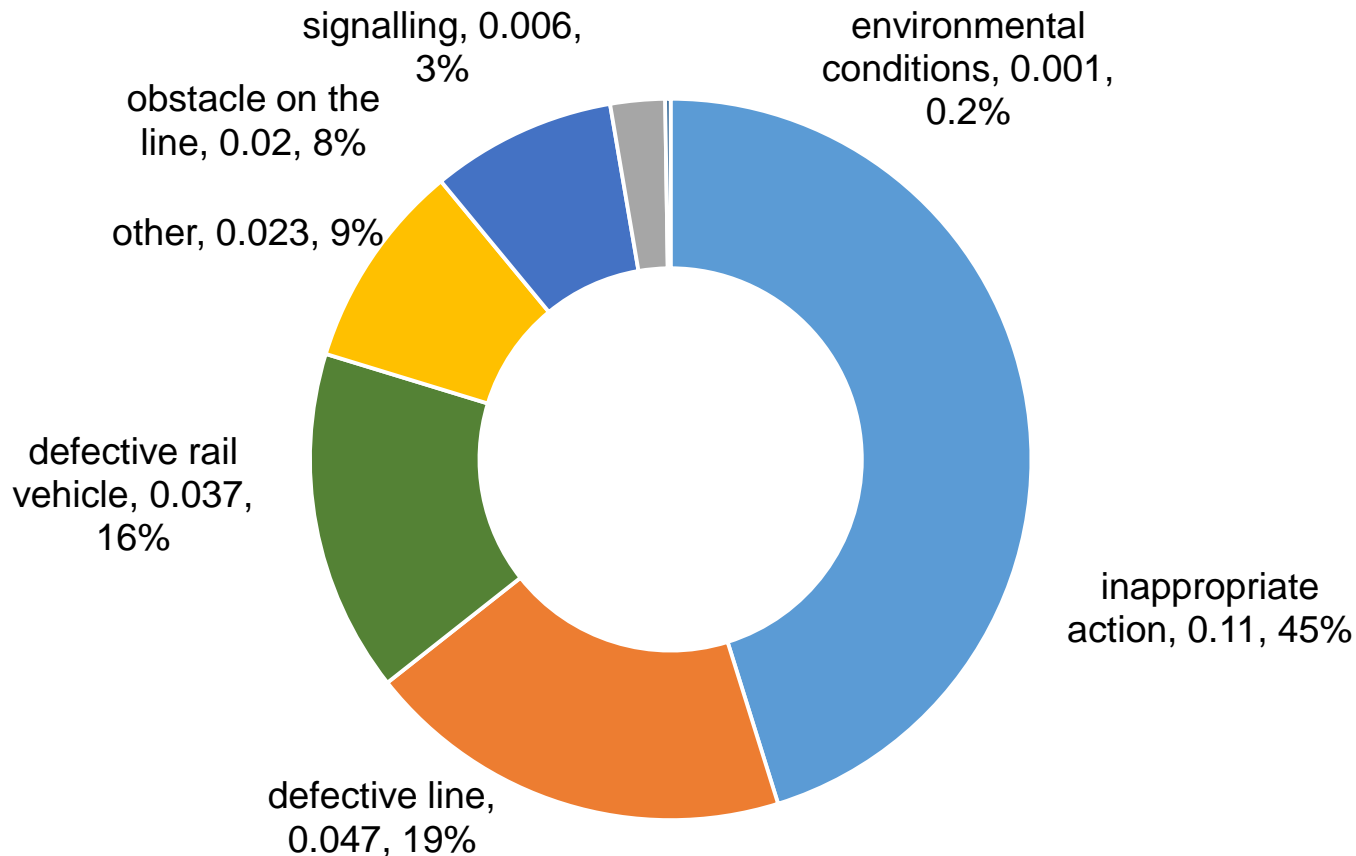
- Safety Risk Model (v8.1) Total Network Risk = 139 FWI/yr
- Train accident risk = 8 FWI/yr
- Derailment risk = 2.1 FWI/yr (27% of train accident risk)



Freight derailment risk on the running line



- Freight derailment risk = 0.242 FWI/yr
 - Not including ECS, Possessions, Yards, Depots and Sidings



- The SRM is based on a primary cause assessment
 - single precursor per event
- Does not routinely take into account combined causes
- A bespoke analysis of combined causes could be carried out on the SMIS data

- Freight derailment risk = 0.242 FWI/yr
 - Not including ECS, Possessions, YDS
- VPF(2014) = £1,826,000
- This suggests that to eliminate all the freight train derailment risk on running lines it would be reasonably practicable to spend £443,000 per year

“Potential risks to road and rail transport associated with asymmetric loading of containers”
– joint RSSB and TRL analysis and report:

- Average cost of a derailment, excluding safety
£138,500 per derailment
 - A single derailment could be as much as £6.5m
- Risk exposure due to uneven loading of containers
 - Safety benefit ~ £13,000 per year
 - Damage, etc ~ £42,000 per year
 - Total ~ £55,000 per year

Derailments working group

- Freight Technical Committee proposed a cross industry working group, Rolling Stock and Infrastructure standards committees agreed that the recent freight train derailments including Gloucester and Camden should be looked at jointly
- ORR letter prompting today's meeting
- Established a cross-industry expert group facilitated by RSSB, with representatives of:
 - Network Rail
 - Freight operators
 - RSSB
 - Interfleet
 - Huddersfield University
 - Lloyds Register Rail
 - ORR

- Working group process:
 - Review of data and risk relating to derailments
 - Initially focusing on track twist related derailments
 - but also considering cyclic top
 - Review of the standards relating to infrastructure, rolling stock and container loading
 - Review the origin of current requirements and identifying what, if anything, has changed on the railway in the last 10 years
 - Bearing in mind the low level of risk, consideration of what more could be done or done differently to improve the management of these derailments

- Railway Group Standards are consistent with the TSIs and ENs
- Research report T357 in 2006 concluded that the vehicle and track standards were consistent with no justification for change
- Important to note that because of:
 - the standards and processes in place,
 - the significant amount of time, effort and money spent on infrastructure inspection, maintenance and renewals, rolling stock design, approvals and maintenance, etc

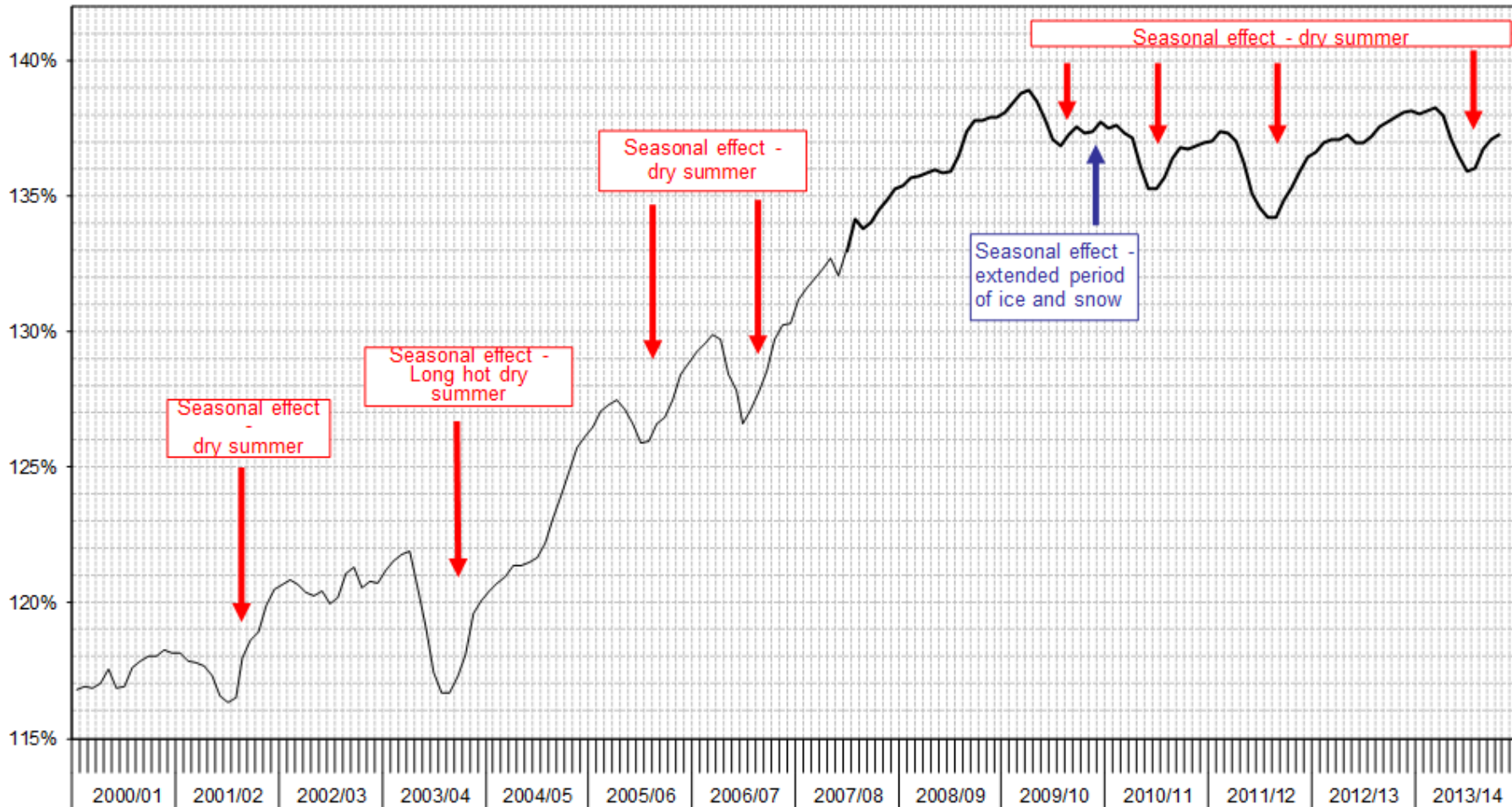
The residual risk from freight train derailment due to track twist and uneven loading is relatively low

Infrastructure:

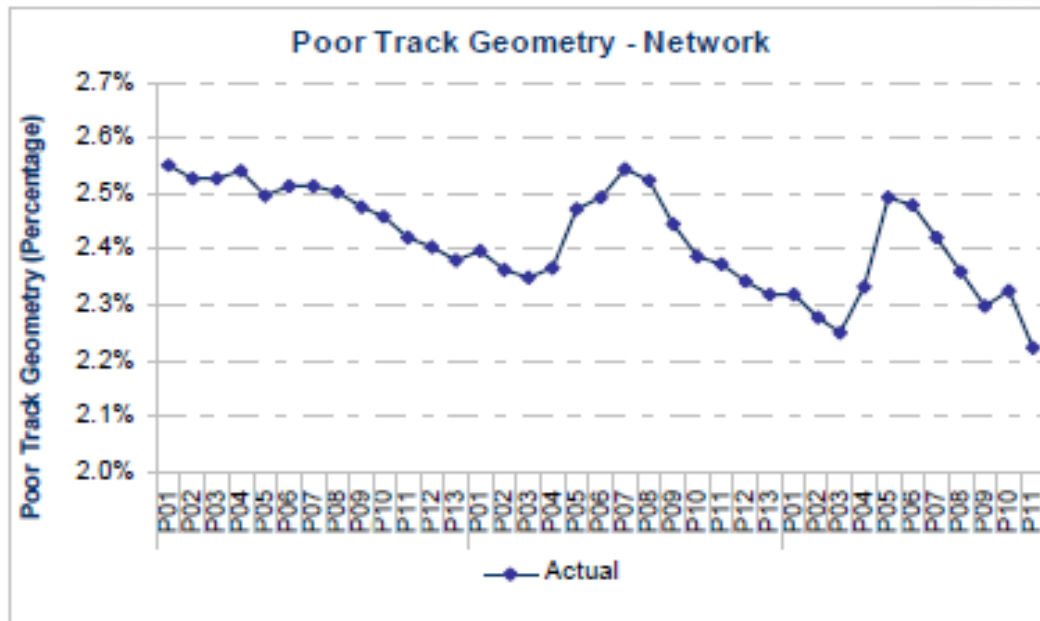
- Increase in traffic:
 - passenger and freight
 - extended hours of operation and increase in Green Zone working
- Track Recording Regime is now more extensive
 - Manual inspection regime specified for non-recorded routes
 - Some data processing ceases <10mph
 - Recording trains can be re-routed to accommodate TOC / FOC services
- Track quality has improved
- Less wooden sleepers
- Less repeat offenders (although some still remain)

Long term trend in track geometry

Geometry improvement – 100% as at privatisation



Poor Track Quality - P11 (2014-15) report



Long term trend in reducing poor track quality

The period value of 2.22% is the best for period 11 since reporting began in 2000

All routes have shown an improvement

Rolling stock:

- Wagon fleet size reduced by $\approx 25\%$
- Bogie wagons were $\frac{1}{3}$ of fleet, now $\frac{2}{3}$ of fleet
 - Probably account for $>90\%$ of tonnage
- 70% of two-axle wagons withdrawn/scrapped in period
- 89% of new build is bogie wagons
- BR engineers had some “engineering license” on how wagons were accepted – now the NoBo/TSI regime is binary go/no go – loss of corporate knowledge
- Change to structural strength standard has resulted in wagons which flex less (and may be less tolerant of twist)

Nature of loads:

- 50% increase in container traffic
- Containers are getting larger in both height (8' to 9' 6") and length (20' to 40', 45' and 50')
- Nature of import and export commodities has changed
 - The export of scrap metal components may be an example of this – to be verified
- Evidence of being poorly packed in some cases

General:

- No definitive assessment of risk from track twist and uneven loading

Possible Action 1: Update the previous data and risk analysis taking account of wider sources of data related to twist faults and uneven loading

- Need to ensure we understand the current and future railway conditions relating to managing twist faults with uneven loading

Possible Action 2: Expand on the review of what has changed on the railway in the last 10 years and what we see changing in the future and document in a report

Infrastructure:

- Is 3m the right base length for measuring twist faults?
 - Longer vehicles are sensitive to longer wavelength twists

Possible Action 3: Examine the potential benefits that could be gained from adding an additional longer wavelength track twist measurement/criteria

- Most running line twist derailments occur on crossovers and the monitoring of track defects on crossovers is not as good as on plain line as the track recording machines don't work at low speed

Current Action: New processes now being developed and used by Network Rail

S&C Diamond ***Inspection and measurement of Switches and Crossings***



Fitment of a Multi-Purpose Vehicle with a camera array and a track geometry measurement system capable of operating down to 5mph; seeking to extend to ultrasonic testing

Growing implementation plan

Emphasis on mainline terminal stations – eg Liverpool St and Paddington

80% of available shifts planned for the year ahead; prioritising the remainder

Potentially two more machines could be converted; seek to exploit new opportunities

Rolling stock:

- Interpretation of what constitutes 'representative loading' in GM/RT2141 to carry out the wheel unloading tests

Possible Action 4: Review existing industry practice and provide additional guidance, where we can, on both where existing limits are derived from and what is expected

Possible Action 5: Assess need for and feasibility of testing / computer simulations of existing wagons to understand sensitivity to offset loading and develop possible criteria for limiting offset loading conditions and related wheel unloading limits

Container loading:

- Lack of understanding around the extent of uneven loading on existing freight wagons.

Possible Action 6: Examine in more detail the potential to use GOTCHA measurements to monitor existing traffic and get a profile of container and wagon loading. The results from this will provide an input to Possible Action 5 above

Possible Action 7: Examine the rules and regulations around the loading and verification of containers as a wider transport issue – way forward not clear - for detailed discussion today

- The combination of track faults, suspension faults and uneven loading has the potential to cause derailment
- The industry is keen to tackle this issue in a joined up and coordinated way
- The level of residual risk from derailments due to track twist and uneven loading is low
- Given the large amount of time, effort and money spent on inspections, maintenance and renewals of the infrastructure and rolling stock it's potentially more about whether we can use the existing resources more effectively rather than embarking on expensive programmes of new work and initiatives

We offer the issues we have identified and their related 'possible actions' as an input to the discussion in the open session, namely:

1. Update of the risk assessment
2. Identification of changes to the railway over last 10 years and in the future
3. Potential benefits that could be gained from adding an additional longer wavelength track twist measurement/criteria
4. Review of existing loading practice and provide guidance provided for vehicle testing
5. Assess need and feasibility of testing and computer simulations of existing wagons to establish limiting offset loading conditions and related wheel unloading limits
6. Analysis of GOTCHA measurements to establish existing wagon uneven load profiles
7. The rules and regulations around the loading of verification of containers as a wider transport issue