



Topic: Adaptation of SMART Maintenance Technologies to Support SMART Railway Operations

Ir Matthew Tsang

Operation Assurance Manager, China Railway Construction (HK) Ltd. Teacher, MTR Academy

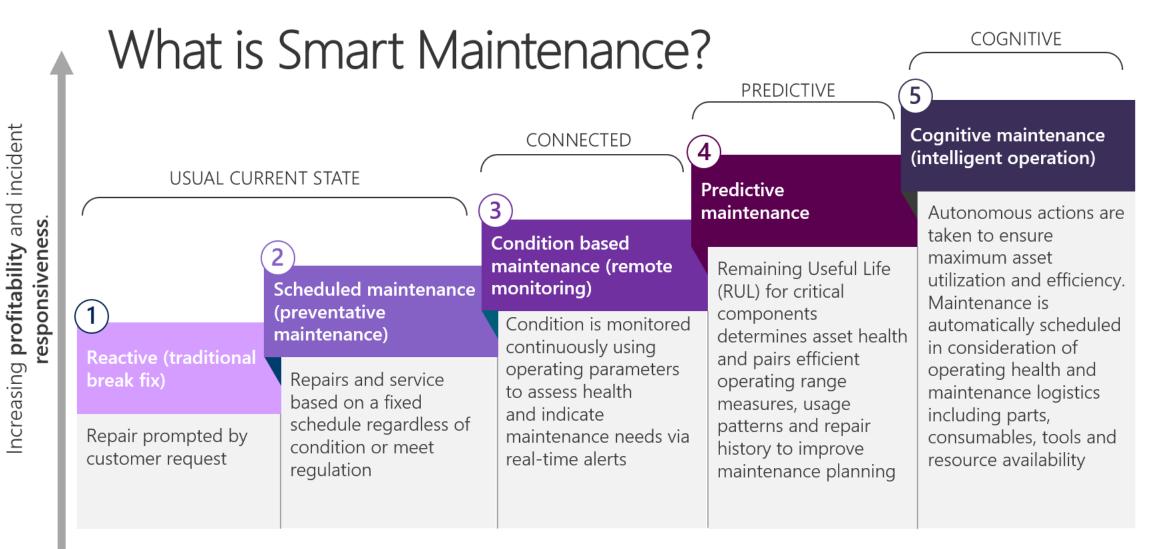
24 March 2023



SMART Railway Operations

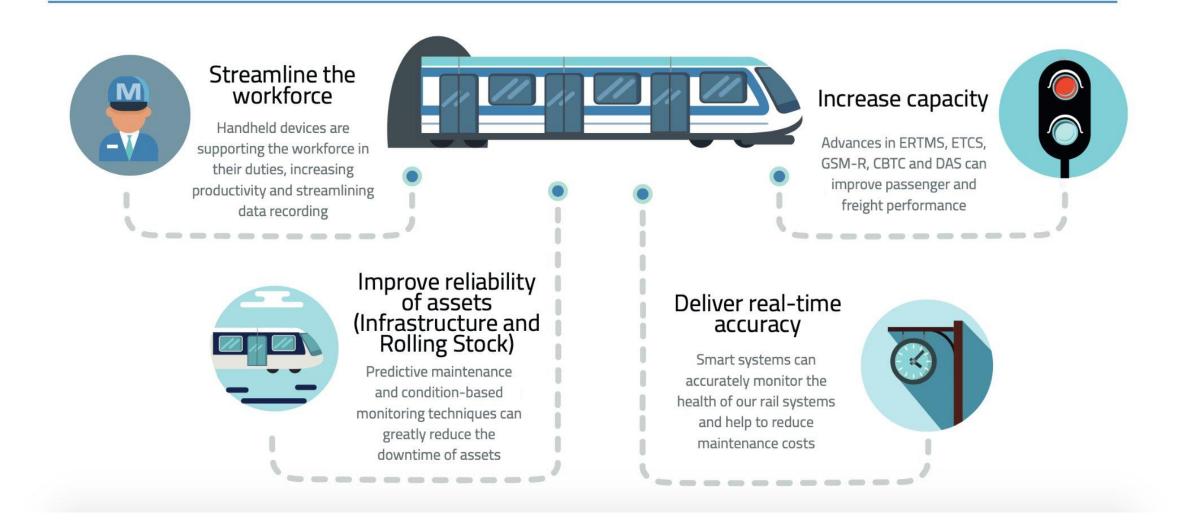
SMART is defined as Self-Monitoring, Analysis and Reporting Technology





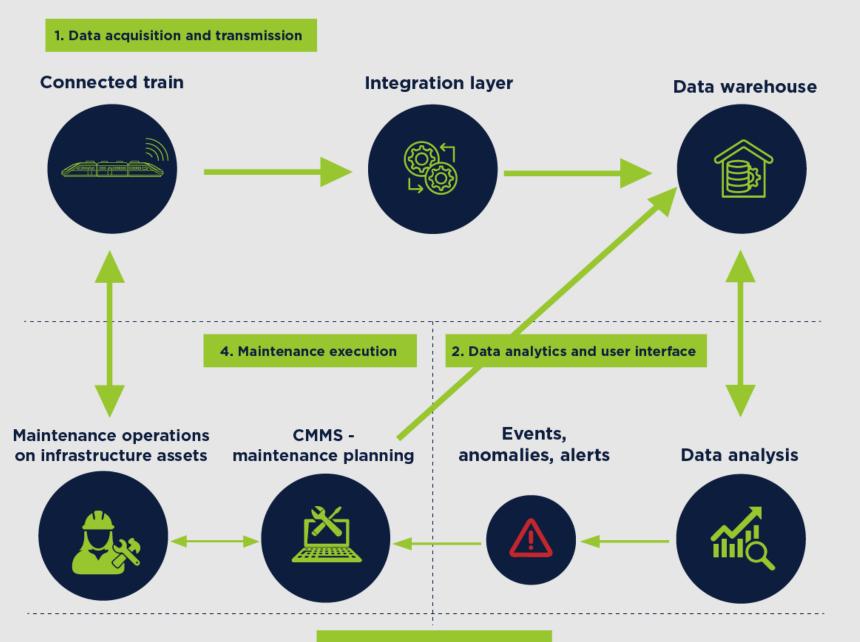
Increasing asset uptime and revenue

Why are these initiatives being implemented?



Railway Signalling

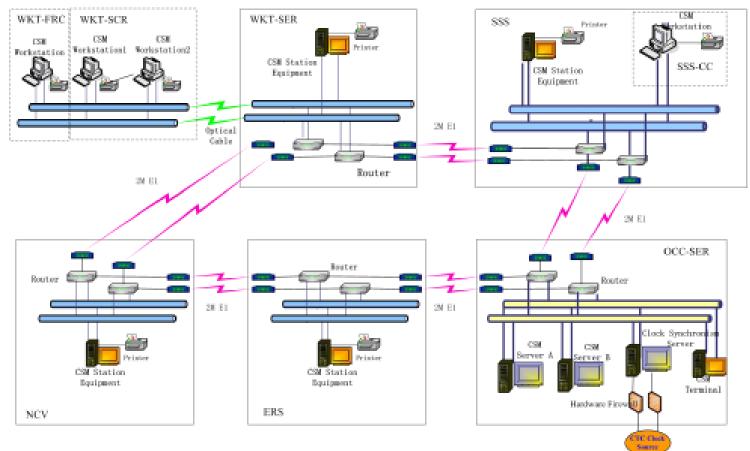
Communication Based Train Control – High Speed Rail, Metro & Light Rail in Hong Kong

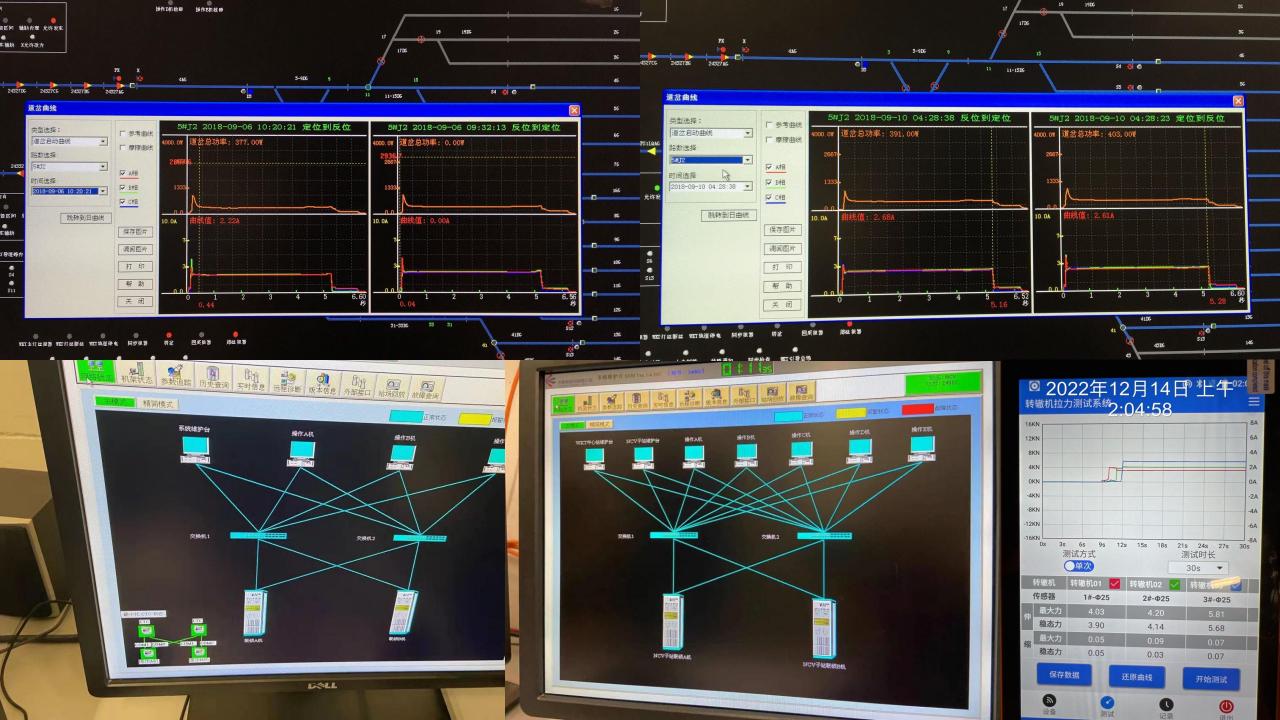


3. Maintenance management

Centralized Signalling Monitoring System (CSM)

- CSM will be used to monitor and gather the status of TCC, Track Circuit, CBI, CTC, Point Machine, Power Supply, Signal, signal cable, etc. TCC, ZPW-2000A Track Circuit, CBI, CTC, Power Supply, etc will send the self monitoring information to CSM, including analog quantity, digital value, status information alarm information, etc, to realize centralized monitoring and remote diagnose, and to avoid gathering duplicated information.
 - Monitoring method includes gathering, indication, storage, playback, remote test and monitoring, etc.

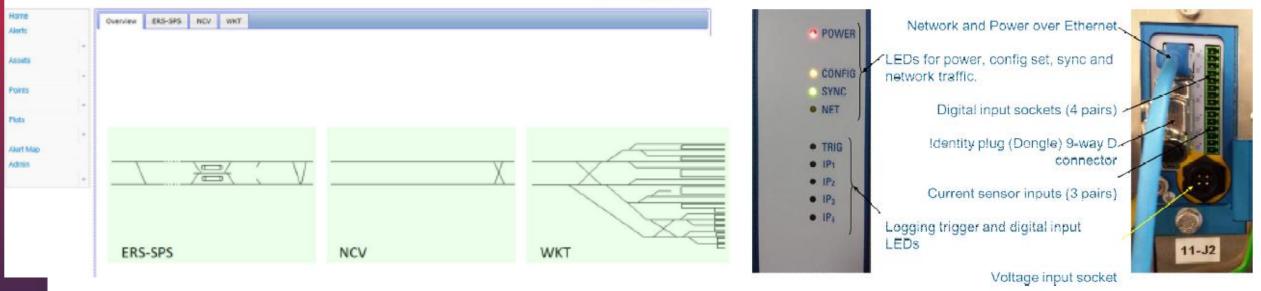


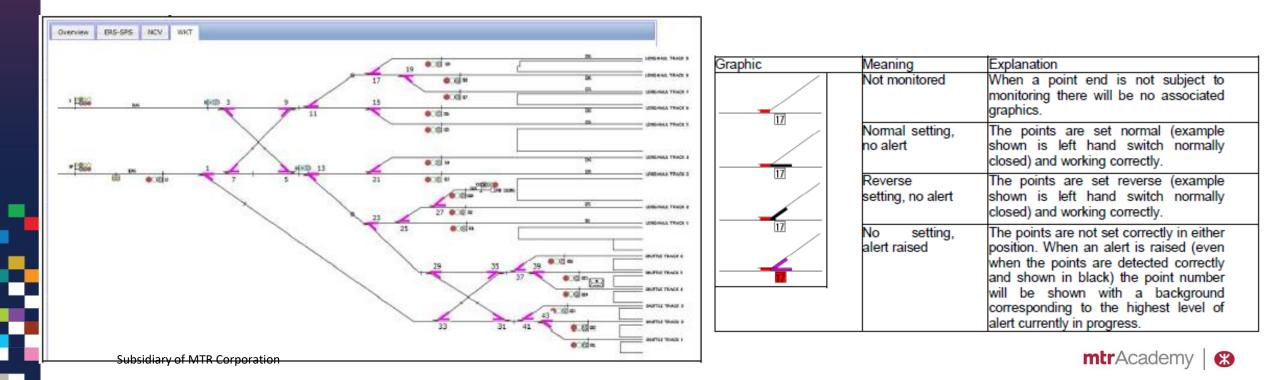


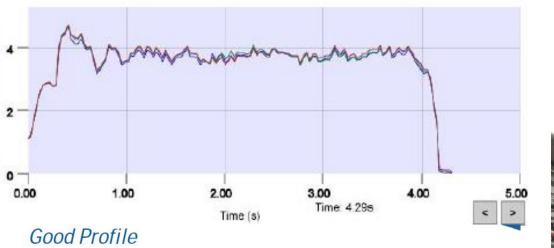
Point Monitoring System (PMS)

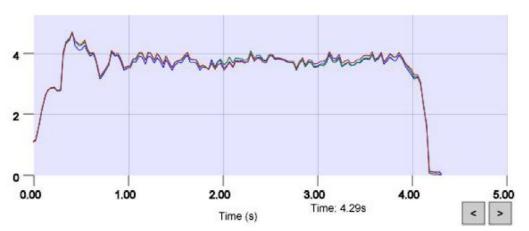
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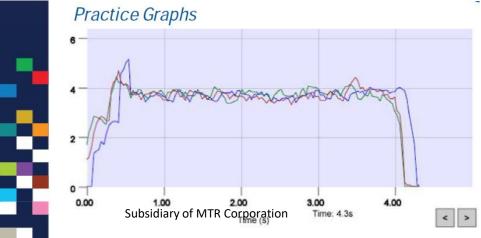












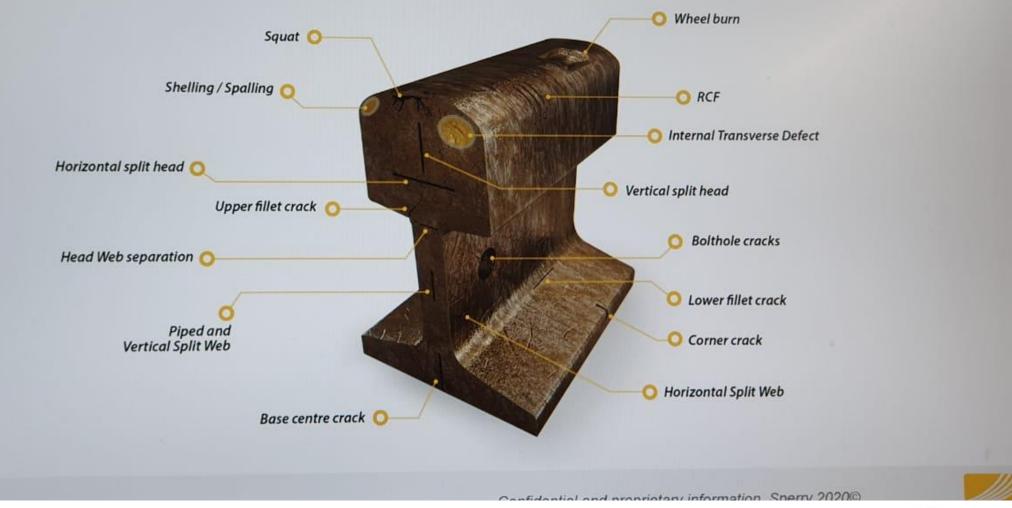


Tacho Meter, Onboard Computer, Event Recorder, Train Integrity, Train Lines...



Permanent Way and Rolling Stock Maintenance

Rail Defects



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Ballast Track – Ballast Standard



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Broken Rail





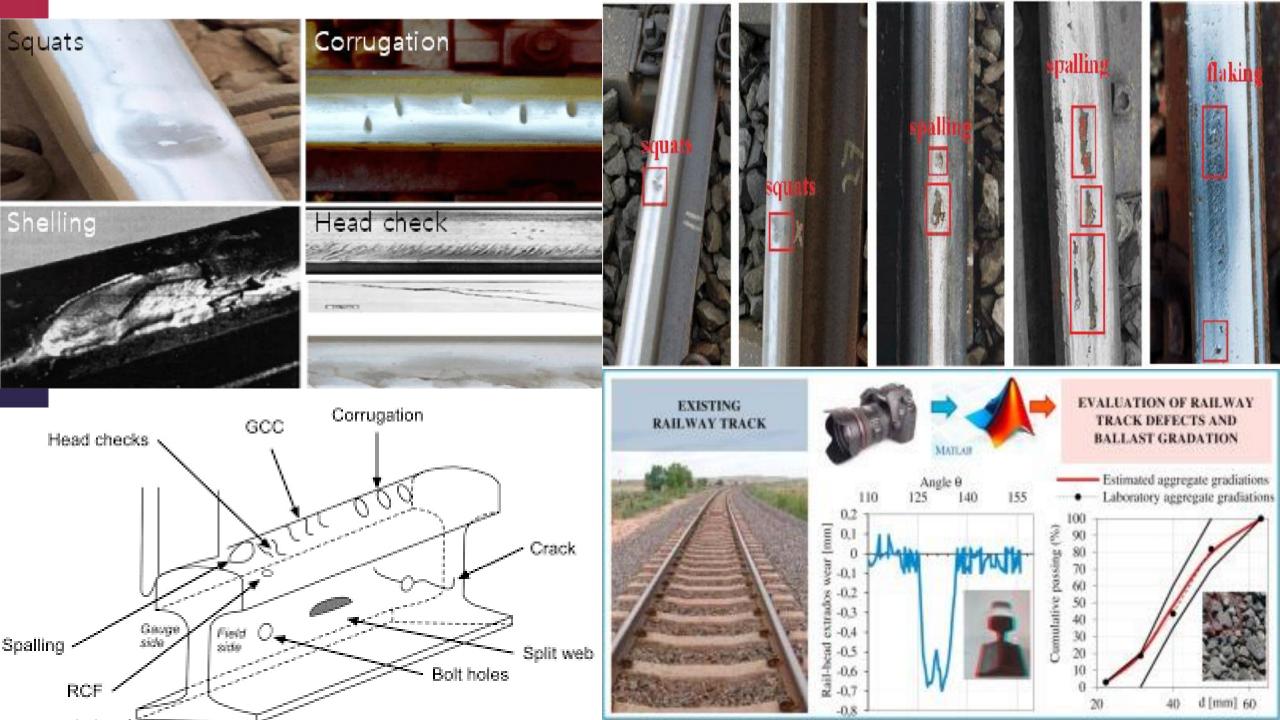
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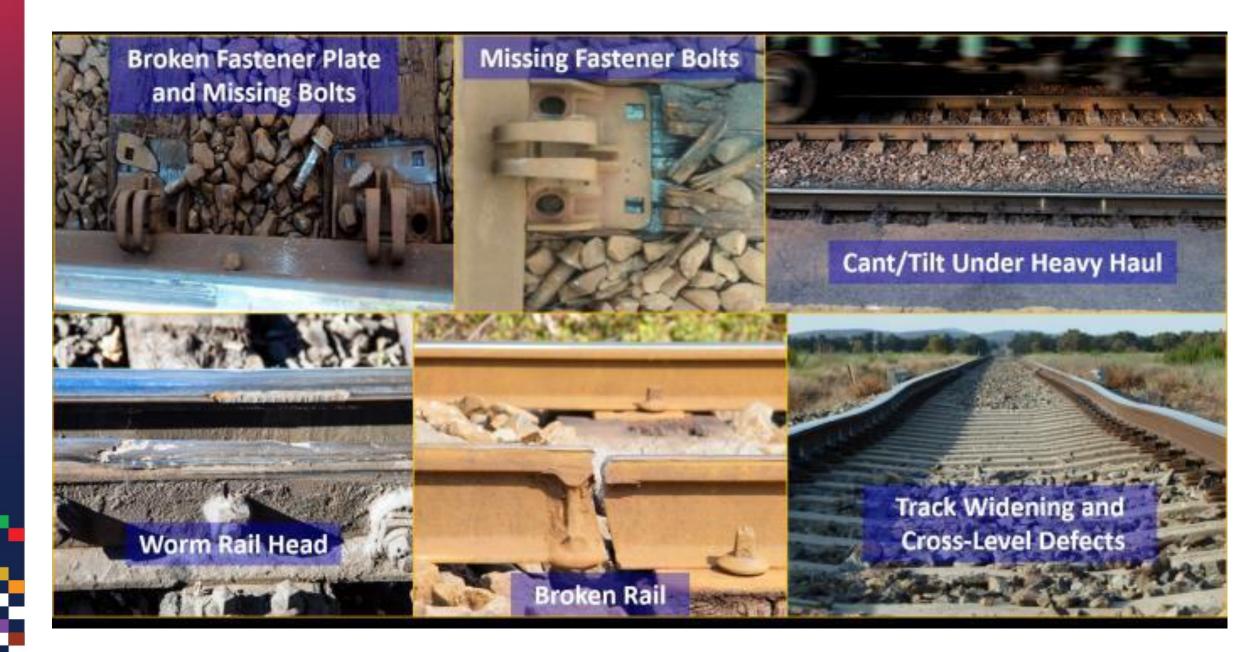
Extreme Cases Wheel & Rail Wear





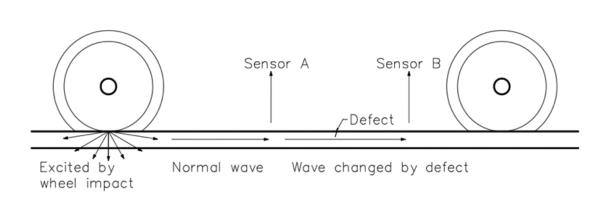
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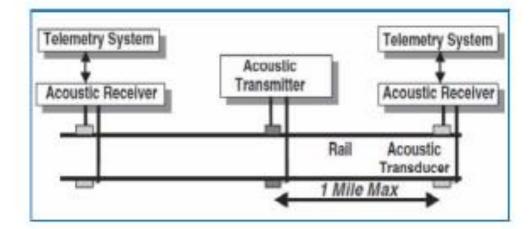


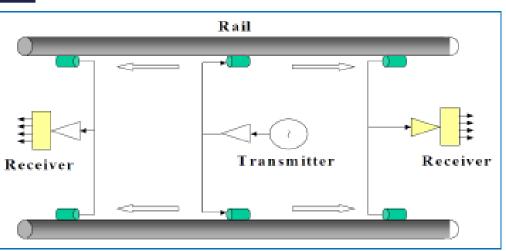


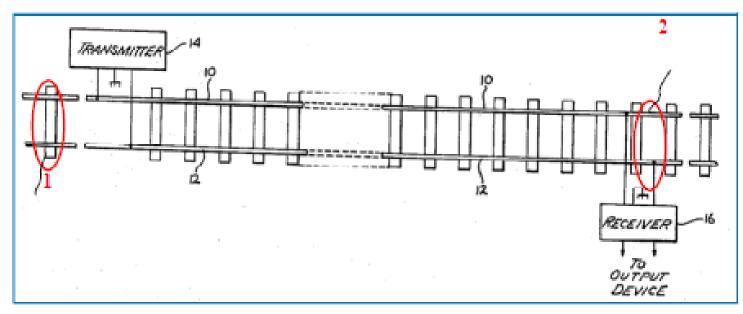


Theoretical Consideration of Passive Extraction of Defect Information











Track Recording Coach

Track Gauge



Nominal Track Gauge





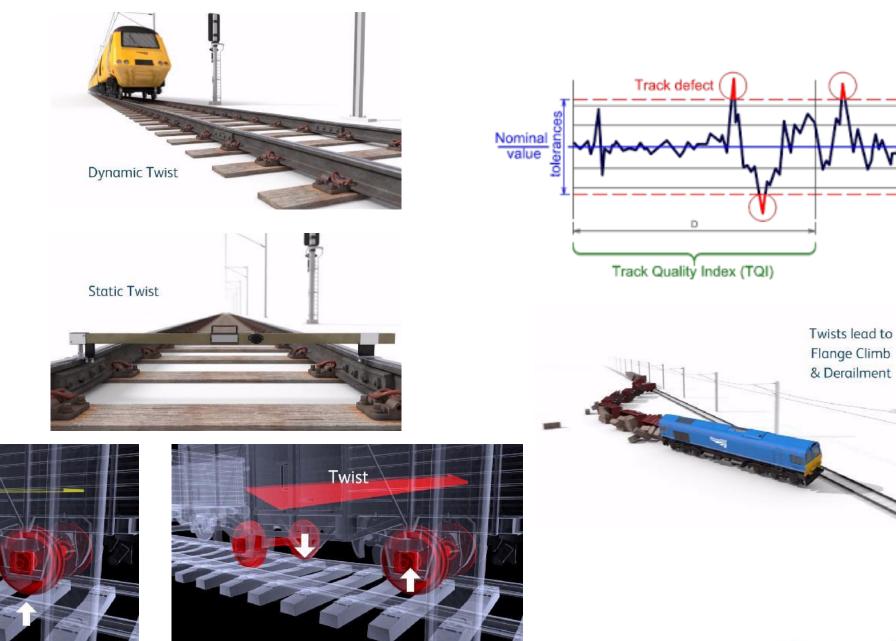


Actionable Limits Detailed in Table 2 & 4

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Twist



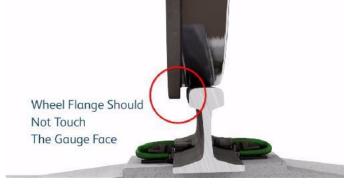
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Twist

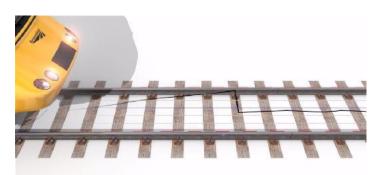
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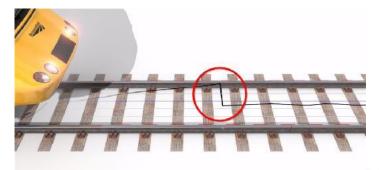




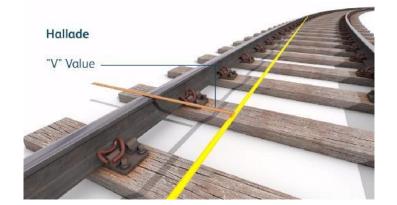


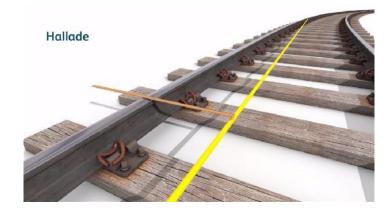






Curvature

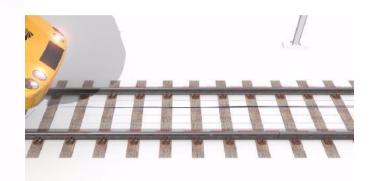




Hallade

 20m Wire







Repair Timescales Detailed in Table 2 & A.1

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Cyclic Top

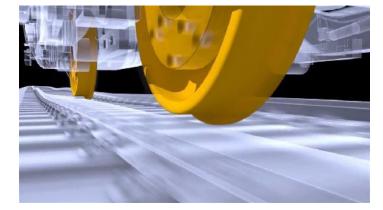
Twist

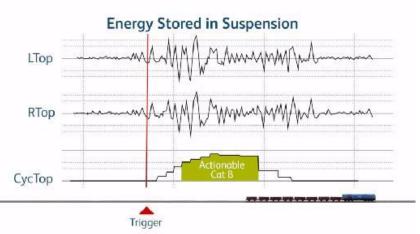
Equal Distance Between Dips

Dip 3 Dip 2 Trigger







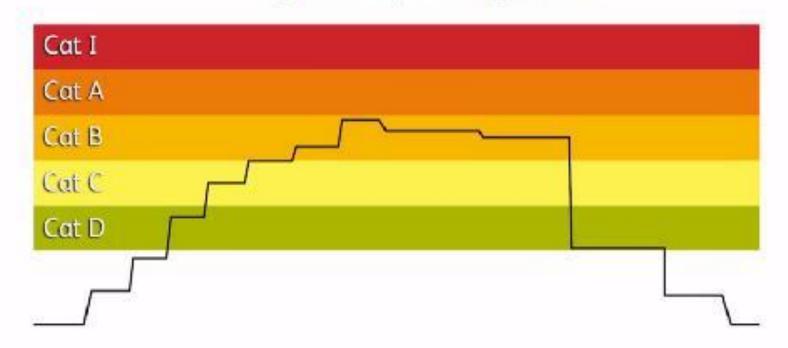


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Cyclic Top Categories





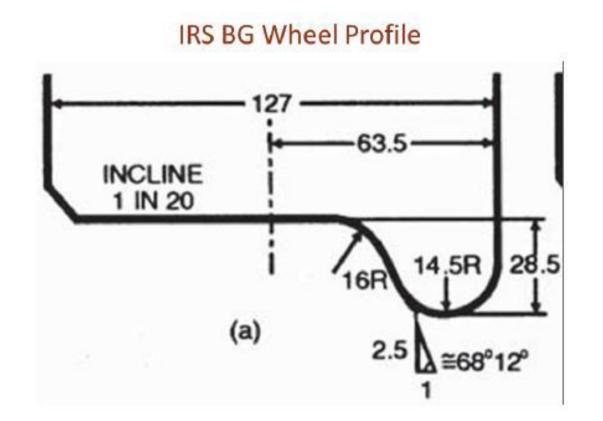
Rolling Stock Maintenance Mechanical Defects

Underframe Robot

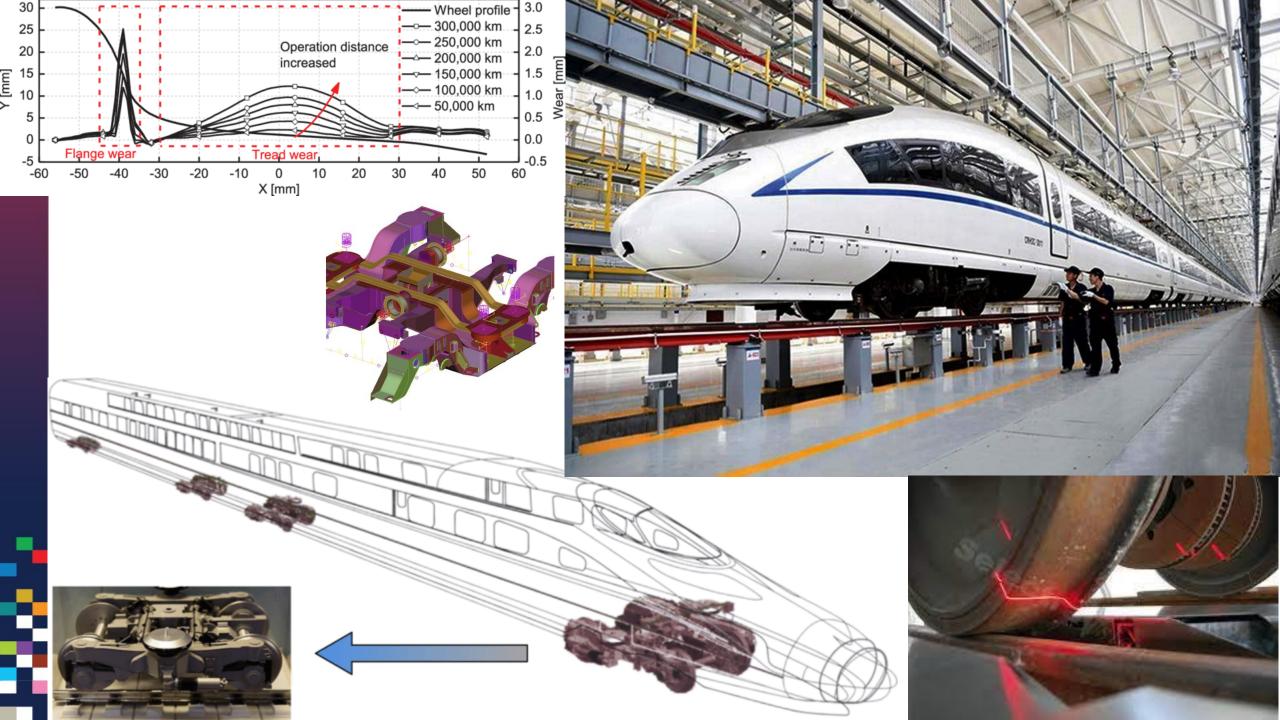
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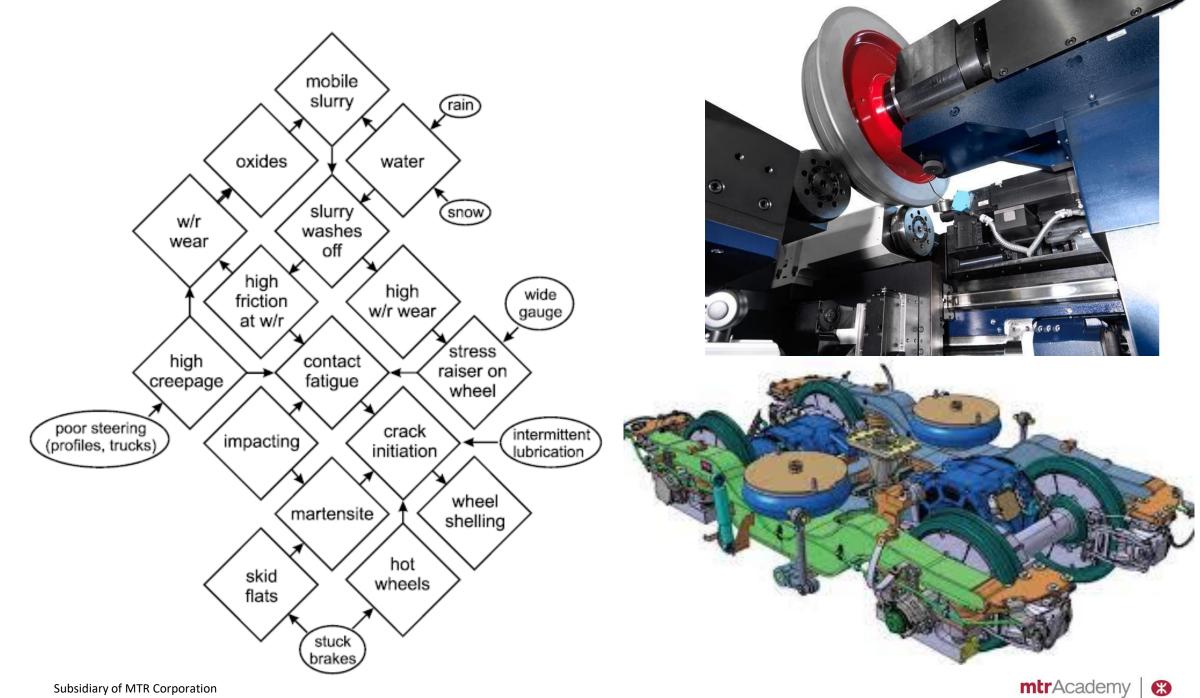


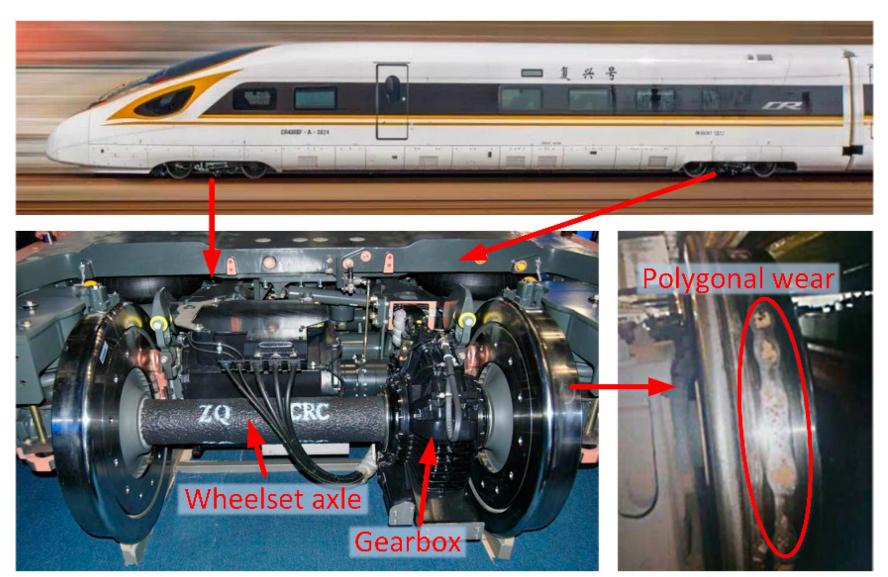
Wheel Defects



- Defects In Wheel And Flange :
- . THIN FLANGE
- SHARP FLANGE
- RADIUS TOO SMALL AT THE ROOT OF FLANGE
- DEEP FLANGE
- FLAT TYRE
- . HOLLOW TYRE

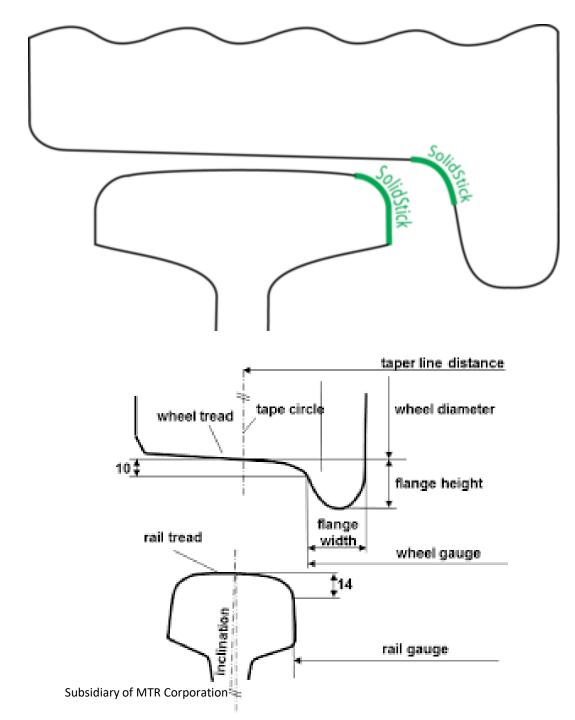


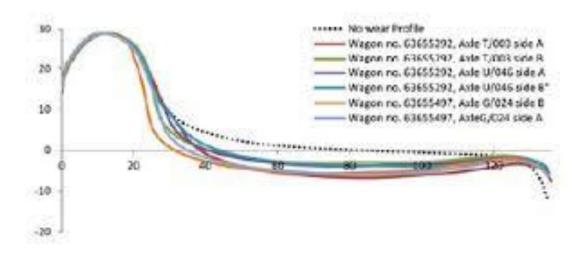


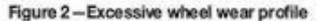


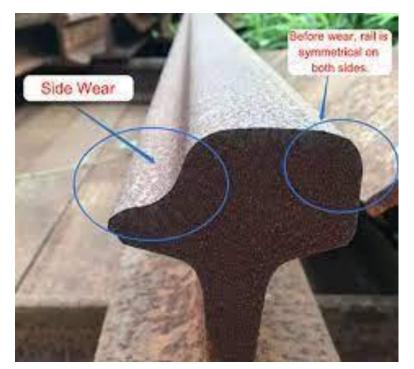
Bogie

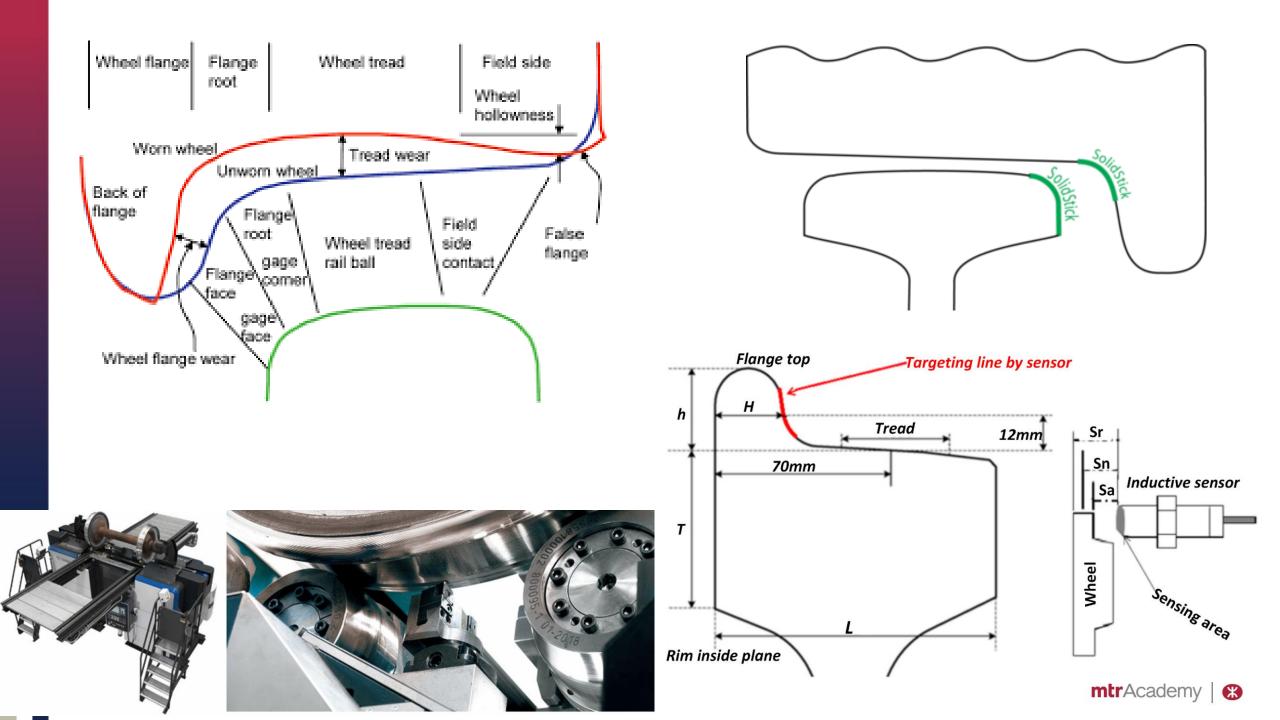
Wheel

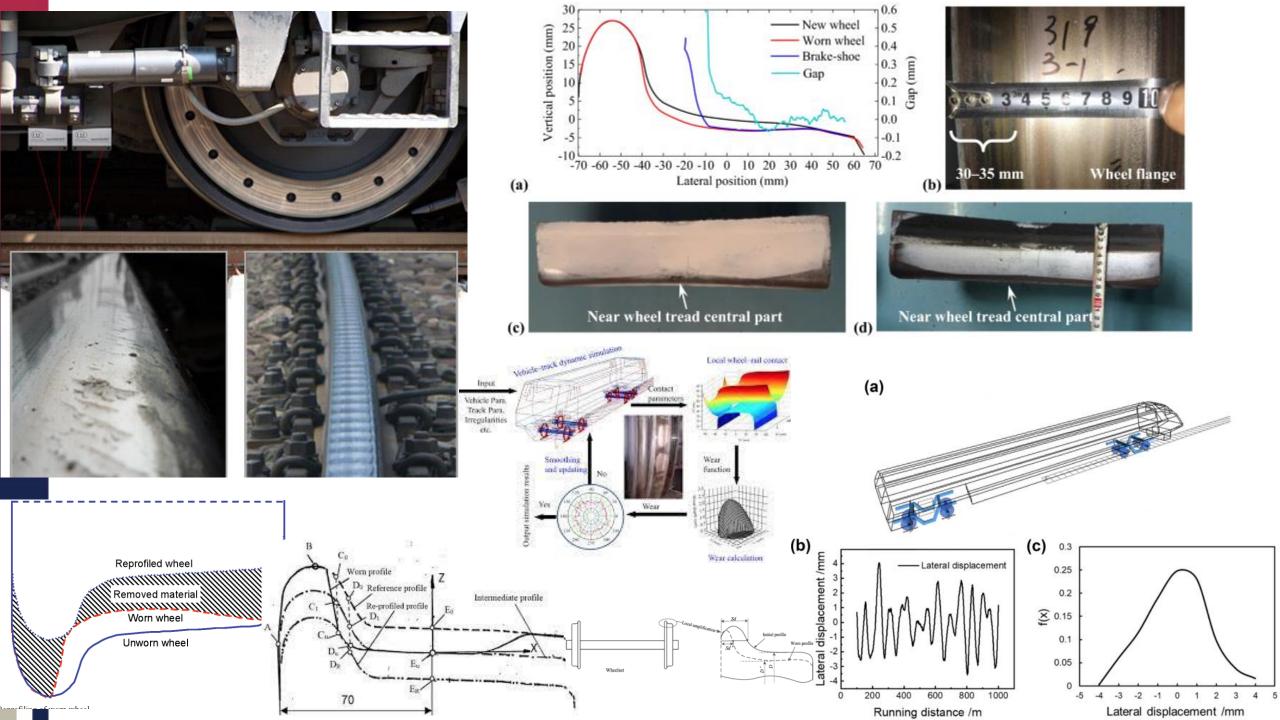














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Q & A

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