



INNOVATION AND RESEARCH IN RAIL

MANCHESTER CONFERENCE CENTRE, SACKVILLE STREET, MANCHESTER, M1 3NJ

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Welcome!

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Successes in the UK Rail industry in research and innovation



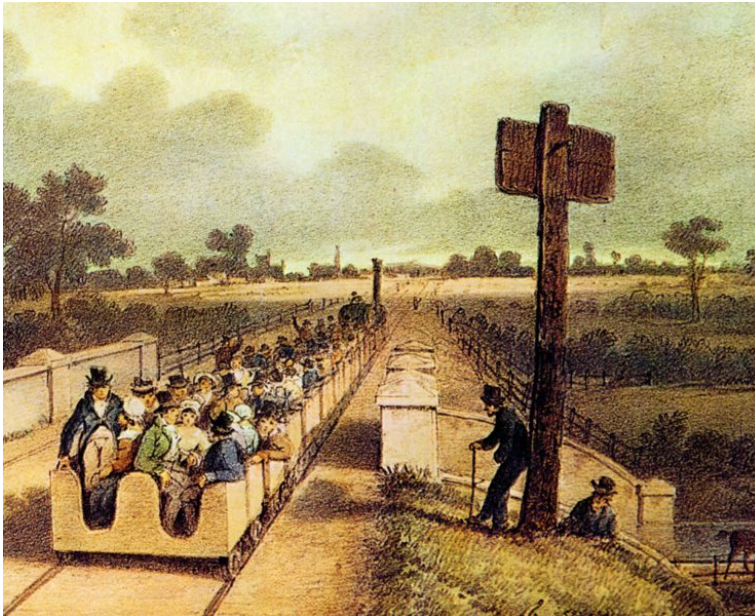
Stockton and Darlington Railway – the world's first operational steam passenger railway operated in north-east England from 1825 to 1863.



Successes in the UK Rail industry in research and innovation



Liverpool and Manchester Railway – the First inter-city steam powered railway opened in 1830.



Successes in the UK Rail industry in research and innovation



London Underground – World's first underground railway and also the first to operate electric trains.



Photo by Henry Flather shows the construction, undertaken between 1866 and 1870, of the Metropolitan District Railway's underground lines which included the destruction of houses

Successes in the UK Rail industry in research and innovation



Tilting Trains – British Rail's Advanced Passenger Train (APT), an experimental High Speed Train that introduced tilting in the 1970s. Speed record of 162.2 mph in 1979. Proved the principle.



APT tilting train: The laughing stock that changed the world – BBC News

Successes in the UK Rail industry in research and innovation



"MAGLEV" – The world's first commercial maglev opened in 1984 in Birmingham. Developed by British Rail, this floating capsule out to the airport was technologically miles ahead of anything in the world at the time. 35 years later Japan is developing a 500km/h maglev train between Tokyo and Osaka!

More recent successes

Vampire vehicle dynamics multi-body simulations

VAMPIRE © Courtesy Alan Minnis



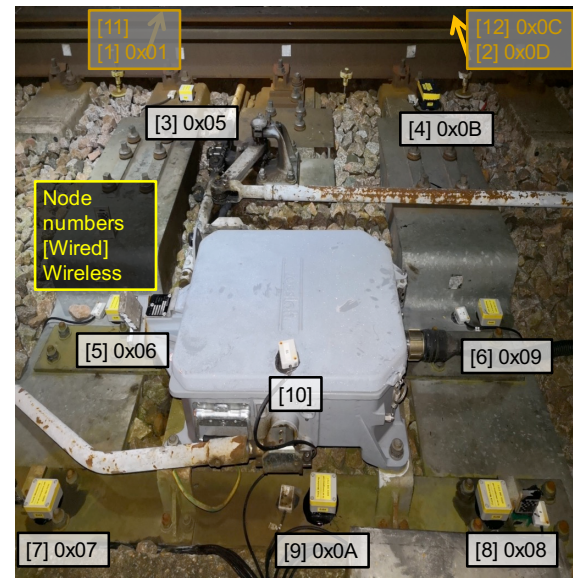
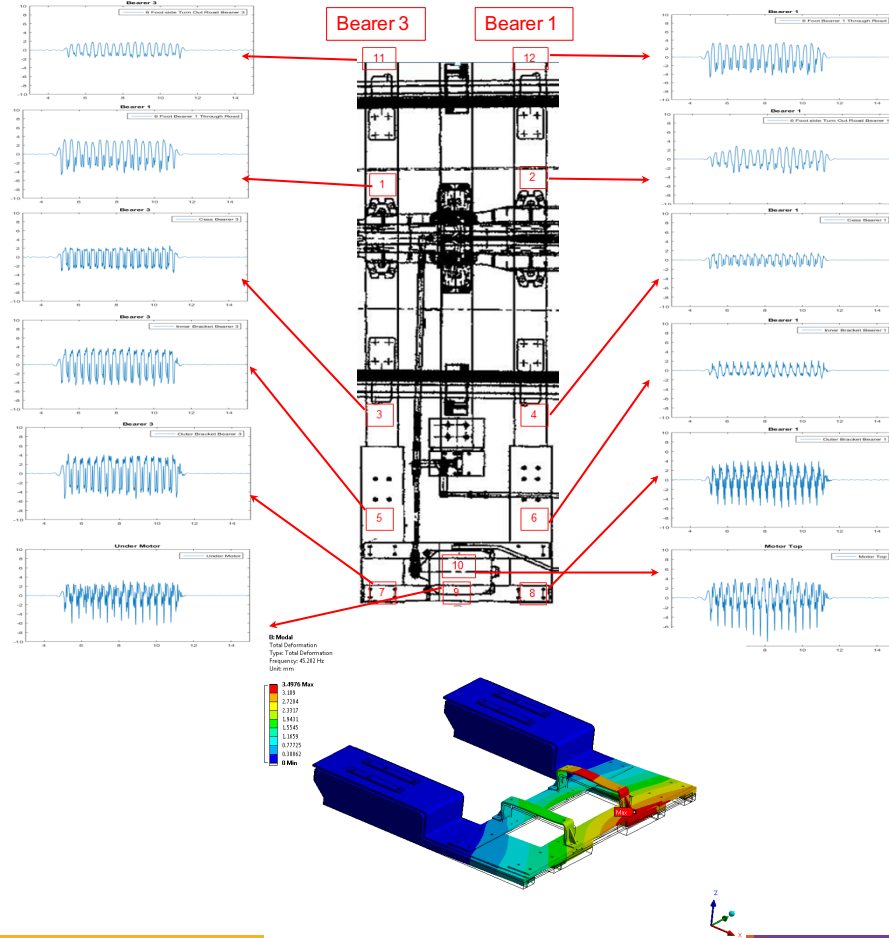
Case Study – Excessive Vibration of a Special Points



Before



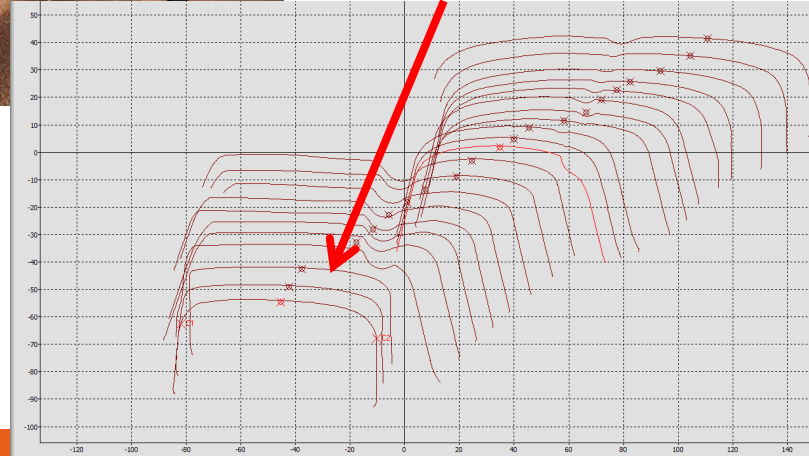
Initial Investigation



Further Investigation



Dip in rail profile at the weld repaired section



Before



After



The key integrity of Research and Development for Rail is

1. Collection of extensive and appropriate data to understand the behaviour of the system.
2. Understanding of the limitations and assumptions of the analytical modelling, including validation of the models.
3. Extensive modelling scenarios (sensitivity analyses) to identify all eventualities including the failure modes.
4. Better testing facilities, with representative loading conditions, to de-risk implementation.
5. Full controlled trials in service to identify any gaps from the modelling and testing.

Enjoy the day!

Remember ..

- 1. Always measure the correct data*
- 2. Understand the root cause*
- 3. And apply the correct solution*