

Teaching and Research Fellow

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About

Andreas Hoffrichter is Research and Teaching Fellow in Railway Systems Engineering with a particular focus on traction and railway vehicles.

Andreas has published several research papers in peer-reviewed journals and presented at numerous international conferences. He reviews papers in the fields of railway vehicle performance, novel railway propulsion system, and energy efficiency and environmental performance of railways.

His doctoral research was funded by the Engineering and Physical Science Research Council. Andreas is a leading researcher in the application of hydrogen for railway propulsion.

Qualifications

- PhD in Railway Traction, 2013. Thesis title: **[Hydrogen as an Energy Carrier for Railway Traction \(http://etheses.bham.ac.uk/4345/\)](http://etheses.bham.ac.uk/4345/)**. University of Birmingham.
- MSc in Railway Systems Engineering and Integration, 2012. University of Birmingham.
- BSc (Hons) in Transport Management, 2009. Aston University.
- Bankkaufmann, 2003. Kreissparkasse Tuttlingen.

Biography

Andreas Hoffrichter grew up in Baden-Württemberg, Germany. In 2003, he qualified as Bankkaufmann having trained with Kreissparkasse Tuttlingen. In 2006, he completed the Andere Dienst im Ausland as a volunteer at Camphill Communities California, USA. He went on to read for a BSc in Transport Management at Aston University before joining the University of Birmingham in 2009 to conduct doctoral research studies. Andreas read part-time, in addition to the PhD, for a MSc in Railway Systems Engineering and Integration, which he completed in 2012 with distinction. In autumn 2013, Andreas joined the Birmingham Centre for Railway Research and Education as a Teaching and Research Fellow.

Andreas was awarded the prize for the best PhD in 2013 in the School of Electronic, Electrical and Computer Engineering.

Novel railway propulsion systems, including alternative fuels and energy carriers, and hybrid drive-systems are Andreas's main research activities. Energy consumption and environmental impact analysis for railway propulsion on a well-to-wheel basis are part of his area of expertise. The UK's first practical hydrogen-powered locomotive called 'Hydrogen Pioneer' was developed by a team at the University and Andreas's research led to the adoption of hydrogen as the energy carrier for the vehicles propulsion system.

His teaching activities are on the railway Master programmes where he delivers lectures on railway traction, vehicle propulsion, and freight railways. Further, various business and economics content is taught by Andreas. Students directly benefit from his leading railway propulsion research.

Teaching

Teaching Programmes

- MSc in Railway Systems Engineering and Integration
- MSc in Railway Risk and Safety Management

Postgraduate supervision

As part of the railway MSc programmes, Andreas provides supervision of dissertation projects. Topic areas usually fall within his research interests and expertise.

Research

Alternative Fuels or Energy Carriers for Railway Propulsion

Currently, the majority of energy for railway propulsion is provided by diesel on a global level. Alternatives are required to address the increasing cost of the energy source the emissions that results from the combustion. Other fuels, such as natural gas and biofuels, and energy carriers, such as ammonia and hydrogen, are options for the railway industry. The application of hydrogen to railway propulsion is Andreas's main research area, originally as part of his doctoral studies. But his interests are in novel propulsion approaches for railways in general.

Discontinuous Electrification

The research relates to the operation of electrically-powered railway vehicles through gaps in electrification infrastructure or away from wayside electrification for certain parts of the train's route. Coasting through short gaps is an option. Hybrid vehicles with on-board energy storage devices that allow range extension are a further possibility. Bi-Mode or dual-mode propulsion systems where power can be supplied through wayside electrification or an on-board generator or both offer the greatest flexibility.

Freight Transport by Rail

In many countries railways transport passenger and freight on the same lines. In Britain, the focus is on passenger trains but an increase in freight transport by rail is desired. The research focused on freight-carrying vehicles that have a similar performance to passenger trains to allow easier integration with the current rail operation practice.

Publications

- Hoffrichter, A., Fisher, P., Tutchter, J., Hillmansen, S., & Roberts, C. (2014). *Performance evaluation of the hydrogen-powered prototype locomotive 'Hydrogen Pioneer'*. *Journal of Power Sources*, 250(0), 120-127. doi: 10.1016/j.jpowsour.2013.10.134.
- Hoffrichter, A., Silmon, J., Schmid, F., Hillmansen, S., & Roberts, C. (2013). *Feasibility of discontinuous electrification on the Great Western Main Line determined by train simulation*. *Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit*, 227(3), 296-306. doi: 10.1177/0954409712461341
- Hoffrichter, A., Silmon, J., Iwnicki, S., Hillmansen, S., & Roberts, C. (2012). *Rail Freight in 2035 - Traction Energy Analysis for High Performance Freight Trains*. *Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit*, 226(6), 568-574. doi: 10.1177/0954409712441753
- Hoffrichter, A., Miller, A., R., Hillmansen, S., & Roberts, C. (2012). *Well-to-Wheel Analysis for Electric, Diesel and Hydrogen Traction for Railways*. *Transportation Research Part D: Transport and Environment*, 17(1), 28-34. doi: 10.1016/j.trd.2011.09.002.

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