



## Synopsis

### Improving Train Dynamics through Turnouts



Dynamic train-track interaction in turnouts is far more complex than on ordinary tangent or curved tracks. The geometrical design, dictated by the function of a railway turnout, leads to additional disturbances compared to the normal response of a vehicle on plain line track. The largest disturbances occur when the wheels are transferred from stock rail to the switch rail in the switch panel and in the crossing panel when the wheels pass the gap between wing rail and nose rail.

The current presentation discusses recent developments in the modelling of train-turnout interaction and methodology for switch design optimization. Both the track layout and track gauge optimization, and track stiffness optimization will be discussed. The other topics that will be covered in the presentation include:

- Common damage mechanisms of S&C and some statistical data of S&C failures
- Wheel-rail contact modelling in S&C
- Train-track interaction modelling through a turnout in wide-frequency range
- Model validation by field testing
- Future improvements in design of S&Cs

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# Institute of Railway Technology

*presents the*



## Stephen Marich Annual Lecture in Railway Engineering

**Wednesday, 2 March 2016**  
at  
**The Pavilion**  
**Arts Centre Melbourne**



## Stephen Marich Annual Lecture in Railway Engineering

### About the lecture

The Stephen Marich Annual Lecture in Railway Engineering is organised by the Institute of Railway Technology, the leading track and vehicle railway research centre in Australia. This annual railway industry event honours the 40 year contribution of Dr Stephen Marich to the industry. Dr Marich is one of the pioneers of heavy haul railway research in Australia and has been directly involved in the development and implementation of a range of wheel/rail management strategies and track designs across all sectors of the rail industry. He has authored and co-authored over 90 technical papers, and authored two postgraduate courses in railway engineering. Stephen received the Railway Technical Society of Australasia Individual Award in 2000 and is the only Australian inducted into the International Heavy Haul Association Hall of Fame.

The annual lecture series will contribute to the advancement of railway industry by sharing technical knowledge from leading experts in the field. This event is endorsed by the Railway Technical Society of Australasia (RTSA).

Tonight's lecture will be delivered by Professor Elias Kassa and his keynote address will be entitled "Improving Train Dynamics through Turnouts".



### About Professor Elias Kassa



Elias Kassa is a Professor of railway engineering at the Norwegian University of Science and Technology and is responsible for teaching and research activities related to railway track engineering.

Elias is a railway expert with years of experience in design, design review, research and training for railway engineering projects. His research focuses on studying the dynamic interaction of the train and track, and the resulting damage developments such as wear and plastic deformation on the switch rails, using numerical modelling and field experiments.

Some of the research areas of Professor Kassa are wheel-rail interface management, benchmarking of dynamic simulation tools, railway turnouts geometry optimization, and train-track interface investigation.

Until 2011 he was a Research Fellow at Imperial College London where he acted as Director of Research for the Future Rail Research Centre (FRRRC), and a Research Associate at Manchester Metropolitan University, UK.

He has published several articles in journals, magazines, edited technical reports and conference proceedings, all dealing with railway vehicle-track interaction and other railway subjects. Professor Kassa is member of the editorial board of the Railways 2016, board of academic members at the IC-ARE2015, international advisory committee for BCRRA (Bearing Capacity for Roads, Railroads and Airfields), and scientific committee for the ICRT and the ICRE 2016.

Professor Kassa and his collaborators in UK, Sweden and Germany have received the prestigious T A Stewart-Dyer and Frederick Harvey Trevithick Prize in 2011 for the paper "Geometry and stiffness optimisation for switches & crossings, and simulation of material degradation".