Rolling Stock Centre of Excellence

A partnership between the rail supply industry and a consortium of eight universities has secured £92 million to fund research aimed at establishing the UK as a world-leading centre of railway excellence. The funding will be boosted by £64 millions of support from 17 industrial partners including Alstom, Siemens and Bombardier Transportation.

Newcastle University, through NewRail and the Design Unit, have been involved in the successful bid for the UK Research Partnership Investment Fund (UKRPIF), which will be used to create three linked world-class centres of excellence, forming the research heart of UKRRIN:

These centres of excellence, together with existing UK Rail Test Centres, are the foundation of UKRRIN (The UK Rail Research and Innovation Network), bringing together the UK rail supply industry and academia to undertake world-leading research and innovation in rail.

The UKRPIF funding will be used to create three linked world-class centres of excellence, forming the research heart of UKRRIN, which will focus on:

- **Digital Systems** - located at the University of Birmingham.
- **Rolling Stock** – led by the University of Huddersfield in collaboration with the Newcastle University and Loughborough University. It will focus on high value rolling stock systems, whole life asset optimisation and through-life management, and energy management.
- **Infrastructure** - led by the University of Southampton in collaboration with the University of Sheffield, Loughborough University, the University of Nottingham and Heriot-Watt University.

Within the Rolling Stock Centre of Excellence NewRail will develop a new structural integrity and crashworthiness facility. This enhanced facility is viewed as of vital importance in future designs as the industry is moving towards more lightweight materials for train construction. Of particular interest to the rolling stock sector is the performance of materials e.g. single and multi-material joints can be investigated and fracture mechanics used to produce data that can be used to model whole vehicle performance.

Further information from newrail@ncl.ac.uk

www.newrail.org
4th Conference on Transport and Research in the Danube Region

The 4th conference on Transport and Research in the Danube Region - "Let the Future In" was held on 6th and 7th November 2017 in Ljubljana, Slovenia. The Conference continued the previous tradition of having an Information Day and a Brokerage event as well as aiming specifically at two topics: 1. opening the floor for proposals, ideas and other suggestions concerning transport research in the Danube region for the next EU framework programme and; 2. Opening the discussion on future new jobs as generated by recent transport research.

Professor Mark Robinson, Director of NewRail gave a Keynote speech on Tuesday 7th November, titled "Skills and competences needed by the Transport workforce of the future". He used the outputs from the SKILLFUL and the Deliverable led by Dr Evangelos Bekiaris of the Hellenic Institute of Transport.

The vision of the SKILLFUL project is to identify the skills and competences needed by the Transport workforce of the future (2020, 2030 and 2050 respectively) and define the training methods and tools to meet them. He reported on Step 1: Identification of Future Trends/ Needs & Best Practices which includes the identification of future trends and the impact on jobs that are likely to affect the European Transportation system and lays the necessary foundations for the implementation of the appropriate educational/ training programmes and relevant curricula, methodologies and tools for configuring their wider context. The research has shown that the driving forces that will affect the future transport system are:

1) Electrification in all transport modes and alternative fuel technologies;
2) Wide range of digitalisation and connectivity in all modes;
3) Autonomous and unmanned transport systems (from drones to road and rail automation and robots for logistic operations);
4) Information technologies and telematic applications;
5) Cooperative Systems and V2X interfaces;
6) Traffic and big data handling methods.
7) Mobility-as-a service (MaaS) enabling services (carpooling, car sharing, DRT and FMS schemes, etc.);
8) Personalisation of services;
9) Integration of infrastructure-based and in-vehicle services.
10) Transport on demand schemes that adapt flexibly to the kind and number of objects to be transported;
11) Retail and (e)commerce development;
12) Transport workplace flexibility.

For further information on the SKILFULL project please contact:
Dr Marin Marinov – marin.marinov@ncl.ac.uk

www.newrail.org
New projects

F3 – FasT Frequent Fulfilment

Under the Innovate UK, Rail 4 programme, NewRail has been successful with the project F3 - FasT Frequent Fulfilment. The project will run from 01 October 2017 to 31 September 2018.

The overarching objective of the project is to investigate and validate whether an innovative integrated rail/inter-modal product and service can compete on commercial (end to end cargo movement), technical, operational and asset management terms within the competitive domestic logistics market which is dominated by all road solutions. This objective will be achieved by demonstrating quantifiable monetary advantages to shippers, forwarders and wider cargo interests to the point where the new product and service offered is capable of a routinely accepted, practical and integrated element in domestic logistics networks. Other non-accounting benefits arising from the adoption of this new product and service offer will be identified and quantified.

OptiYard Project – Kicks-off

The OptiYard project, which is a Shift2Rail project under the coordination of UIC, has made an excellent start at the project kick off meeting in October 2017. The meeting took place in the UIC offices in Paris and was well attended by all 13 partners, Shift2Rail representatives and external experts from RNE. All participants have now set up their plans to provide tools and algorithms to enhance decision support systems in rail freight yards and connecting networks.

These tools and algorithms will directly be applied to achieve enhanced rail freight yard capacity and efficiency. The OptiYard project will run for 24 months. NewRail is responsible for all tasks related data analytics and data management in real time.

To meet the needs of S2R and Horizon 2020, OptiYard will design a decision support tool for yard managers that will help them to optimise processes and manage their yards more efficiently. It will do this in real-time, with interaction with relevant networks. The processes must be performed in real-time, to guarantee on-time delivery and operational efficiency, particularly for single wagon transport. OptiYard addresses critical operational points of the transport chain (both rail marshalling yards or as transfer points to other modes) to improve capacity and reliability and will facilitate real-time interaction between yard and relevant network IT systems that allow for software based planning and ultimately optimisation of single wagonload and blocktrain operational processes.

Building on the current state of the art and practice, the ambition of OptiYard is to provide a fully functional software module where real-time yard management, interaction with the network and ad-hoc timetable planning will be simulated in real-time. The optimisation module and algorithms will be proven for large and complex freight transport networks, and integrate well with IP5 activities.

For further details about F3 and OptiYard please contact:

Dr Marin Marinov at marin.marinov@ncl.ac.uk

The FAIR Stations (Future Secure and Accessible Rail Stations) is a project co-financed by the Shift2Rail initiative of the European Commission and runs from September 2017 to August 2019. The objective of the project is to develop solutions for improved user flows within the station and platform train interface, considering key design factors such as security, safety, baggage handling, ticketing, design for accessibility, information & signage and climatology. Tools to be applied to achieve this are:

- Passenger needs assessment and Passenger flow modelling;
- Station design algorithm that optimises passenger flows for continuing and emerging operational design requirements;
- Engineering design of a train and/or platform based mechanism to facilitate independent boarding and alighting of PRMs.

The FAIR Stations Consortium is Coordinated by STAM, Italy and composed of leading European companies, associations and universities engaged in the field of Research, Technology and Innovation. They will carry out research in complementarity with two Shift2Rail call for member’s projects PIVOT and IN2STEMPO. The project had its kick off meeting in Genoa, Italy on the 27 and 28 September 2017. Partners presented their workflow for the project overall and then focussed on setting up the framework to manage the initial tasks concerning dissemination activities, setting up the Advisory Board and Steering Committees, involvement in TRA2018 and internal and external communication activities.

For further details concerning the project please contact:
Dr Emmanuel Matsika emmanuel.matsika@ncl.ac.uk

ARSS Project
Active Radius Steering Suspension for Rail Vehicles

The ARSS project was awarded by the Vehicle Dynamics Competition, through RRUKA/RSSB with the objective to fit an Active Radius Steering Suspension, an innovative technology based on actuators developed for the aerospace industry, to an existing UK rail vehicle, to demonstrate that the subsequent enhancement in the bogie steering capability can significantly reduce damage mechanisms at the wheel-rail interface. The project aims to design, fit and test an integrated ARSS solution into the bogies of an HST trailer car, with the aim of demonstrating that the system can reduce the damage mechanisms at the wheel-rail interface and therefore reduce the Variable Usage Costs/Variable Track Access Charge (VUC/VTAC).

The project consortium consists of three partners: Grand Central - a UK TOC, NewRail, Newcastle University, and Liebherr Sunderland Works – a branch of the Liebherr Group. NewRail is responsible for validating the system efficiency through modelling and simulation of vehicle-track interactions, and will also support the industry partners in developing the control system of the actuator. In the final phase, NewRail will support the testing activities that would validate the solution in real railway environment.

For further information on project progress please contact:
Dr Cristian Ulianov – cristian.ulianov@ncl.ac.uk
INNOWAG Project completes first year

The INNOWAG project, which is co-financed by the Shift2Rail initiative of the European Commission has completed its first year. The objective of the project is to increase the rail freight competitive profile by developing the next generation of lightweight and intelligent freight wagons. To achieve this three essential Work Streams have started:

- Work Stream 1: Cargo condition monitoring;
- Work Stream 2: Wagon design;

The project will integrate innovative technologies for cargo condition monitoring into a novel high performance lightweight freight wagon, with predictive maintenance models for increasing European rail freight sustainable competitiveness. The project also aims to develop a rail freight service that fits the needs of modern manufacturing and supply chain requirements, which will contribute to increasing rail freight capacity through the wagon design and deadweight reduction. This will improve freight logistic capabilities by offering real time data on freight location and conditions, through smart self-powered sensors and ICT technologies. It will increase RAMS and reduce LCC by implementing modern and innovative predictive maintenance analytics, models and procedures.

A qualifying part of the INNOWAG project development is the integration, correlation and exploitation of results into the other projects of the Shift2Rail members so that the emerging solutions are ready for exploitation into the marketplace.

The INNOWAG Consortium is Coordinated by Newcastle University, UK and composed of leading European companies, associations and universities engaged in the field of Research, Technology Innovation and testing, Advanced rail material production, Wagons maintenance, Rail operations and ICT Fleet management.

To date the project has completed:

- WP1: Benchmark, Market Drivers and Specifications has been completed and deliverables submitted;
- WP2, WP3 and WP4 had their Kick-off and these WPs have held internal 2 workshops;
- A coordination meeting with the complementary S2R project FR8RAIL was held in Berlin (before the above workshop).

For further information on project progress please contact:
Dr Cristian Ulianov – cristian.ulianov@ncl.ac.uk

www.newrail.org
NewRail are a partner in the DESTINATE project, a SHIFT2RAIL project that aims to develop tools and methodologies for railway noise simulation and cost-benefit analysis of mitigation actions of interior and exterior noise. For accurate noise prediction, it is essential to characterise the structure-borne and airborne sound sources accurately in order to create valid input for sound prediction simulation models. The calculated interior and exterior noise can be auralised and visualised in a studio to evaluate the sound quality and sound comfort of potential mitigation measures in the vehicle design process. DESTINATE aims to further develop cost effectiveness prediction and thereby create the foundation for powerful tools to support decision-making on noise & vibration mitigation measures.

NewRail is involved in all the technical Work Packages, with a focus on characterisation of noise sources and mitigation measures, active windows technology, and track parameters for cost effectiveness prediction tools.

Contact Project Leader: Dr Cristian Ulianov and visit the DESTINATE project website.

ETALON - Energy Harvesting for Signaling and Communication System

The ETALON project is a SHIFT2RAIL Joint Undertaking that runs from November 2016 to October 2018. The objective of the ETALON project is the adaptation of energy harvesting methodologies for trackside and on-board signalling and communication. ETALON will contribute to the enhancement of train integrity functionalities, providing a suitable supply for on-board integrity (particularly targeted at cases where trains do not have any power supply available on the wagons) and a robust radio communication system between vehicles that could be the basis for a train integrity check. ETALON will also contribute to the reduction of cost, providing an energy harvesting solution for Smart Radio connected wayside objects and implementing an off-board radio communication system with object controllers that could minimise trackside infrastructure, particularly cabling.

NewRail, supported by the Swan Centre for Energy Research will be actively involved in:

- WP2: System Architectures, Specifications and Technical Coherence
- WP3: Communication Solutions
- WP4: Energy Harvesting Solutions
- WP5: Prototype Development, Validation and Testing of the Proposed Solutions
- WP7: Outreach and Networking

Within these work packages the principal roles of NewRail will be to assist in the specification, design and development of the on-train and trackside energy harvesting solutions and the on-train communication system. In addition, NewRail will have a role in the design and implementation of the testing and validation of the prototype systems, including the leading role in the laboratory and controlled environment testing of the prototypes.

Contact Project Leader: Dr Cristian Ulianov and Visit the ETALON project website.
The CAPACITY4RAIL: ‘Increasing Capacity 4 Rail networks through enhanced infrastructure and optimised operations’ project is successfully completed with the 4 years long duration starting in October 2013 and finishing in September 2017. To pave the way for the future railway system, delivering coherent, demonstrated, innovative and sustainable solutions, the CAPACITY4RAIL achieved the following aims:

- Track design: transversal approach for infrastructure solutions for conventional mixed traffic and very high speed, integrated monitoring and power supply, reduced maintenance, new concept for highly reliable switches and crossings.
- Freight service options with longer trains, lower tare loads, automatic coupling, enhanced braking, modern, automated, intelligent, fully integrated system for efficient, reliable and profitable freight operations.
- Operation and capacity: traffic capacity computation for freight and passenger, models and simulators for planners: capacity generation, traffic flow, resilience to perturbations, ability to recover from disturbance, computerised real time information to customers and operators at any time.
- Advanced monitoring: Integration of Advanced Monitoring Technologies in the design and building process, for an easier-to-monitor (self-monitoring) infrastructure with low cost and low impact inspection.

NewRail was primarily involved in research and development (R&D) work exploring new concepts and options for an integrated pan-European rail freight services. Important outcome on this includes deliverables titled: ‘Requirements toward the freight system of 2030/2050’; ‘Novel rail freight vehicles’; ‘Co-modal transhipments and Terminals’; ‘Catalogue: Rail Freight Systems of the Future’.

The study finding suggests that it is possible to reduce GHG emissions for all modes but rail will still be the most efficient mode by 2050. An estimation of the effects of a mode shift (as noted above) to rail transport applying the world’s ‘best practice’ shows that such a mode shift to rail can reduce EU transport GHG emissions over land by about 20%, compared with a baseline scenario. In combination with low-carbon electricity production a reduction of about 30% can be achieved. A developed rail system, as suggested in different deliverables, can thus substantially contribute to the EU target of reducing GHG emissions in the transport sector by 60% compared to 1990 levels. To enable such a mode shift and to manage the demand for capacity, there is a need for investment at national and European level.

An important outcome of this R&D was the publication of journal paper: Islam, DMZ, Ricci S, Nelldal B-L (2016) Islam, DMZ, Ricci S, Nelldal B-L (2016) How to make modal shift from road to rail possible in the European transport market, as aspired to in the EU Transport White Paper 2011, European Transport Research Review, Vol. 8, Article, No. 18

For further information please contact:
Dr Dewan Islam – dewan.islam@ncl.ac.uk
RETRACK Project has successful result

NewRail were a partner in the RETRACK European funded project whose main objective was to develop, demonstrate and implement an innovative and market-tested trans-European rail freight service along the West-East corridor linking the North Sea gateways and the Black Sea gateways with potential expansions.

As a result of the project, the Hamburg-based leasing and logistics company VTG has created Retrack GmbH & Co KG as a wholly-owned freight operating subsidiary of its VTG Rail Logistics division, by renaming its former Bräunert Verwaltung and Bräunert Eisenbahnverkehr businesses.

Retrack emerged from the EU-backed four-year Reorganisation of Transport Networks By Advanced Rail Concepts project launched in May 2007 which saw operators, shippers and research bodies co-operate in an effort to simplify and improve the reliability of cross-border wagonload freight offerings. NewRail was a major partner and the Freight & Logistics manager, Thomas Zunder project managed the pilot service.

Retrack has applied for SiBe Part A national safety certification in Germany, which would enable it to apply for Part B international certification. Following an audit by TÜV Rheinland, VTG Rail Logistics is also certified to transport hazardous waste within Germany.

Videos from the final RETRACK conference are available at: https://vimeo.com/44373722

The peer reviewed article: How far has open access enabled the growth of cross border pan European rail freight? A case study is available here: http://dx.doi.org/10.1016/j.rtbm.2012.12.005

Further information can be sourced from Freight & Logistics manager tom.zunder@ncl.ac.uk

Award for ERASMUS teaching

Dr Marin Marinov has been awarded 1,200€ for Erasmus teaching mobility in Politechnica University of Bucharest, Romania. Over 4 working days he will deliver lectures on:

- Urban Freight by rail;
- Rail freight yard management in real time and data analytics;
- Skills development and rail transport systems;
- Engagement of rail transport professional;
- Dissemination of research outcome and promotion of RailUniNet.

The lectures will add value to NewRail and Newcastle University by promoting the profile of our teaching and learning esteem and attracting more students to enrol on post graduate and doctoral programmes. The engagement with professionals will pave the way to new horizons for more joint ventures and collaboration between industry and scholars plus the dissemination and promotion of research outcome and RailUniNet will increase our research profile and motivate more researchers to seek collaborative projects with our staff.

After the lectures have been completed Dr Marinov will inform colleagues in Newcastle University through internal meetings that Erasmus+ is an excellent scheme to set up collaborations with other HEIs in EU. Case studies and good practices from Marin’s own experience will be shared and discussed.
Conferences and Events

Fourth International Conference on Railway Technology: Research, Development and Maintenance: Incorporating: The Eighth International Symposium on Speed-up and Sustainable Technology for Railway and Maglev Systems (STEC182018)

This event focusses on the search for a fast, reliable and cost effective means of transport that presents better energy efficiency and less impact on the environment that has resulted in renewed interest and rapid development in railway technology. Following the success of many special sessions on railway technology, held over the last few years in the Civil-Comp Conference series, this new conference series was created in 2012. This year the themes for this conference will include (but are not limited to):

- Rolling Stock
- Infrastructure
- Energy and Environment
- Signalling and Communication
- Planning and Operations
- Strategies and Economics

NewRail will be represented at this event by Dr Marin Marinov who will be running several sessions to support Railway2108.

Contact marin.marinov@ncl.ac.uk for further information concerning the NewRail contribution.

Call for Abstracts are invited for oral presentations at the conference on the above themes and should be submitted by 15 December 2017. Please visit - http://www.railwaysconference.com/

Smart Cities Conference – Fifth Edition

The “Development and Urban Planning” research working group are organising the Smart Cities Conference, which will be held on the 7-8 December 2017 at the National University of Political Studies and Public Administration (SNSPA), in Bucharest, Romania.

NewRail will be represented by Dr Marin Marinov who will be a co-chair for the Plenary Session (I) on Smart Governance, Chaired by Associate Professor PhD. Diana Camelia IANCU (SNSPA).

Further information can be accessed at: http://eu-smartcities.eu/events/smart-cities-conference-romania

www.newrail.org
Recent Papers


Clarke, G and Islam, DMZ (2017) Rail freight at a turning point - what direction will it go? Logistics Research Network (LRN) 2017, Southampton, September;

Islam, DMZ; Mortimer; P, Li, D; Robinson, M, (2017) How helpful are the Network Rail proposed changes to charges and contractual incentives in PR18 to securing a modal freight from road to rail?, Logistics Research Network (LRN) 2017, Southampton, September;

Dr Marin Marinov has co-written a paper with James Kelly, an undergraduate on the MEng Mechanical Engineering programme, which has been accepted for publication in the Urban Rail Transit journal. The article is titled: Innovative Interior Designs for Urban Freight Distribution Using Light Rail Systems James Kelly; Marin Marinov. The article focusses on high pollution levels and congestion in urban centres that are an increasing concern for local councils in the UK. Heavy goods vehicles delivering urban freight to city centres are a leading cause of this problem. This paper discusses the concept of using light rail networks to deliver freight to city centres from surrounding businesses. Specifically, various innovative designs are considered for the interior of the metro carriage and developed into visual models using Autodesk Inventor software. A full evaluation of all the designs developed is completed, resulting in a proposed design for consideration. The conclusion reached is that the proposed interior design is viable and coincides with the future metro fleet designs and concepts. For the full article contact: marin.marinov@ncl.ac.uk

A further new publication from Dr Marin Marinov will be out soon:

Singhania V, Marinov M. An event based simulation model for analysing the utilisation levels of a railway line in urban area. PROMET 2017. In Press.

This paper offers a simulation model for analysing the utilisation levels of a railway line between Edinburgh Waverley and Glasgow Queen Street. Specifically, a segment of this line has been simulated using Simul8 to study the impacts of freight trains on passenger trains. The utilisation levels of this segment have been observed in three scenarios: utilisation existing state where all scheduled passenger trains and a few freight trains are observed; utilisation in future state where more freight trains are input in available time gaps running at their actual speed; and utilisation future state where freight trains are input in available time gaps running at speed equivalent to a passenger train. A decomposition approach is implemented. The results suggest that extra freight trains can be input into the current timetables without impeding the current scenario, allowing a reasonable increase in utilisation of the rail line. Please contact marin.marinov@ncl.ac.uk for further information.
New People

Dr Liang Cheng - Research Associate

Dr Cheng has more than 7-year experience in non-destructive testing & evaluation and structural health monitoring in electromagnetics, thermography and ultrasonics, including four years in eddy current pulsed thermography and three years in EMAT and guided wave. He has strong skills in R&D, project management, system development and evaluation, signal processing and feature extraction algorithms with applications covering renewable energy, oil and gas, power generation and rail.

Currently, he is working with NewRail on the INNOWAG project on condition monitoring of wagons and on the DESTINATE project on noise reduction. liang.cheng2@ncl.ac.uk

Dr. Chi Liu - Research Associate

Dr Liu completed his PhD on human responses to vibration at the Institute of Sound and Vibration Research at University of Southampton in 2016. He started to work there as a senior research assistant since 2015 and then a research fellow since completing this PhD, on developing a track-to-passenger-perception model to study the effect of speed and track geometry on the ride comfort of railway vehicles.

His main research interest is railway vehicle dynamics, structural dynamics, human responses to vibration, and sound and vibration control. The main aim of his work is to gain a better understanding of dynamic structures. He has been assigned with important tasks on modelling and simulation of railway dynamic systems in EPSRC projects, European and UK funded projects and other collaborative initiatives with industry partners. He is currently working on the INNOWAG project on validation and evaluation of light weight designs of wagons, and the ARSS project on design of an active steering system for a bogie of a passenger train. Chi.Liu@newcastle.ac.uk

Completed PhD

Asım Önder

NewRail is pleased to congratulate Asım on his PhD studies on composite material applications for railway vehicle structures, particularly focussing on impact damage behaviours of composite materials/structures subjected to mid-to-high velocity impacts from objects. He has returned to Turkey to the Anadolu University, Institute of Transportation Studies. Asım was a popular member of NewRail and will be missed. We wish him all the best!

Farewell to staff moving on

Dr Paulus Aditjandra CMIHT, MCILT, Research Associate and Teaching Fellow

Paulus has moved on from NewRail and is now working for Newcastle University on the VALUMICS project.

Clare Woroniuk has left the Rail Freight and Logistics Group to take up a new role with the rail team in a leading engineering and design consultancy in the UK.