

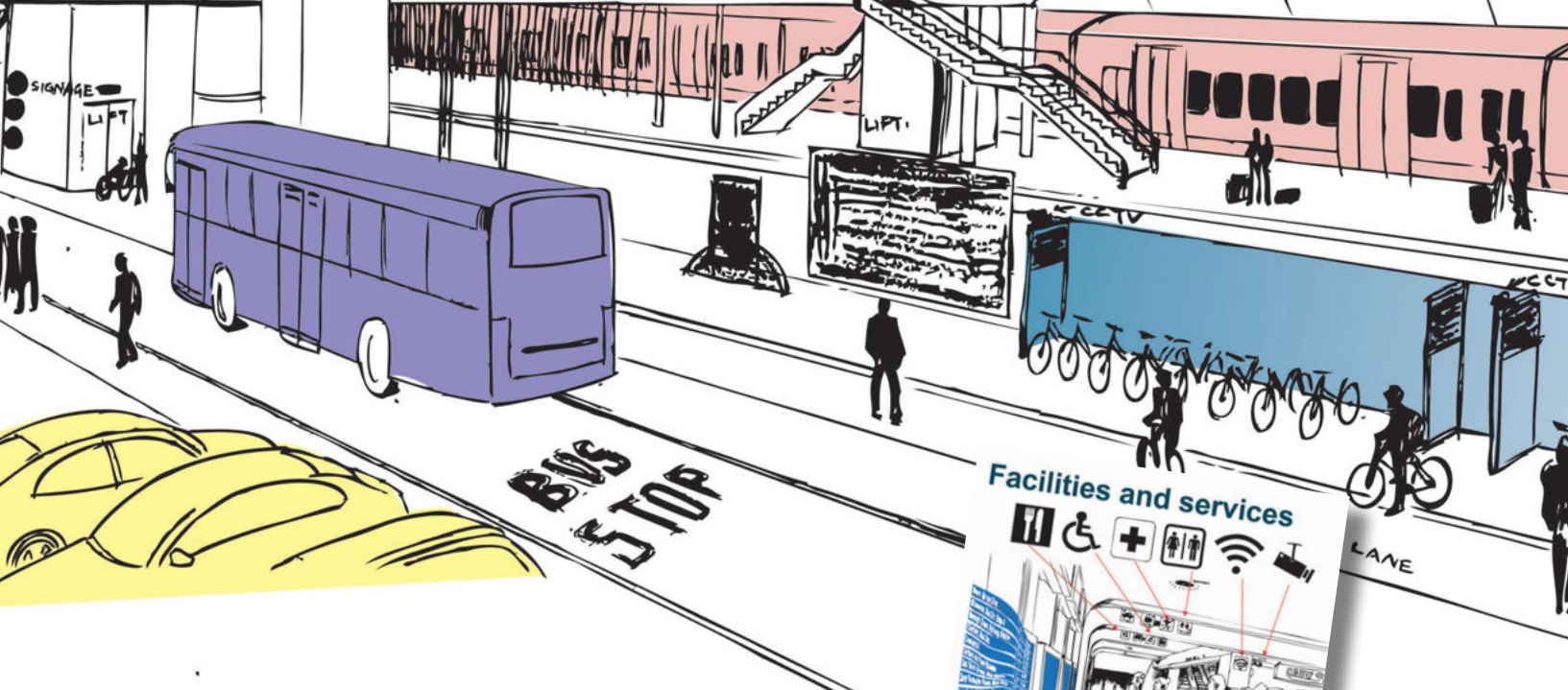
**CITY-HUB**  
HEATHER ALLEN

**WIRELESS CHARGING**  
DENIS NABEREZHNYKH

**iROADS  
INNOVATIVE ASSET  
MANAGEMENT SOFTWARE**  
BARRY CLEAVE

## New child seat testing facility in China

For many years, there has been an increasing demand for child seat testing from China which has been met through our UK based impact sled facility. The next logical step was to provide customers with a more local testing and certification service to help them manage timescales and shipping costs. Working with IQTC, TRL designed and built a new state-of-the-art testing facility based in China's Guangzhou Science City development. See page 7.



# City-HUB

**TRL is a partner in a major European Commission 7th Framework research project called City-HUB ([www.cityhub.imet.gr](http://www.cityhub.imet.gr)), which brings together 11 leading research institutes from across Europe.**

The project compares and contrasts successful multi-modal interchanges in a number of countries, including Finland, Spain, Greece, Hungary and the United Kingdom. Interchanges play an important role in increasing the attractiveness of seamless, smart, clean and safe intermodal public transport. City-HUB is designed to help fill some of the gaps between the roles and responsibilities of those that might own and/or operate the interchange, the transport operators, local authorities, private sector interests and the passengers. The project aims to develop guidelines and principles that can be transferred between Member States.

TRL led the work package on Efficient and Smart Design which included identifying and defining best practice under a number of themes and topics, including connectivity between modes, information systems, facilities and services, building elements, and energy efficiency. A passenger survey was undertaken to capture users' views and preferences relating to the different aspects and elements for defining a smart and efficient interchange in the case study locations across Europe: Moncloa in Madrid; Kamppi in Helsinki; Ilford one of CrossRail's interchange points near Redhill in South London; Köbánya-Kispest in Budapest, and the new railway station at Thessaloniki in Greece.

The survey also investigated the overall satisfaction of users (both male and female) at the different locations, as well as looking in more detail at the most important aspects for users. These included the provision of information, waiting areas, safety and security, services, shops and cafes, transfer communication and access.

Overall, satisfaction levels were found to be significantly influenced by both interchange characteristics and conditions, and the individuals' characteristics and behaviour. Users were generally satisfied; women more so than men. Younger people valued interchanges to be of higher quality. Although the examples studied had different features, the most important factors for all of them, according to the users' requirements

and preferences were: Travel Information, Safety and Security, Transfer Communication and Services.

As part of the project, TRL developed a Guide for Efficient and Smart Design. This guide provides a checklist of good practice guidance for interchanges, based on the work undertaken in the project to date, covering:

- **Governance (ownership and governance, management and operation structures, stakeholder engagement)**
- **Organisation of the facilities (spatial organisation, connections between transport, movements and flows within the interchange, movements and flows within the wider interchange area)**
- **Making the interchange attractive (transport services, information and intermodal services, interchange design and management, safety and security)**
- **Users (understanding the interchange, inclusivity, facilities)**

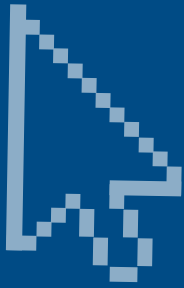
From this, eight guiding principles were developed. These are considered to be fundamental to the design, development and operation of efficient and smart interchanges and are:

- **Clarity of purpose and functions**
- **Accessibility**
- **Legibility**
- **Intermodality**
- **Management and ownership structures**
- **Financing and business models**
- **Regulations and legal aspects**
- **Dynamism and relevance**

Work on the project is on-going until spring 2015, and includes the development of the City-HUB Model. The guidance produced to date, along with the final outcomes of this research, will be beneficial to TRL's UK based work for Transport for London and local authorities, as well as with clients overseas, particularly those in the Middle East and Africa.

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# TRL News goes digital

TRL News was first published in January 1992 and for over 22 years has been providing subscribers, clients and the transport community with information on our latest research and innovative thinking.

The time is now right for us to embrace a digital TRL News so this will be the very last hard copy newsletter you will receive from us. In future we will send you an email with a link to our website where you will be able to download a copy of the recently published newsletter in pdf format.

We already have email addresses for many of our TRL News subscribers, however, this is probably not the case for those of you who subscribed many years ago. To ensure you receive an email alert whenever TRL News is published and available for download, please can we ask you to re-enter your details at [www.trl.co.uk/trlnewsreg](http://www.trl.co.uk/trlnewsreg) If you are not sure we have your email address, please just register again and rest assured we have clever systems to remove any duplicates and ensure you only receive one email notification from us.

We hope you will continue to enjoy TRL News in its digital format and if you have any comments or suggestions, we would be delighted to hear from you. Please feel free to email [mediaenquiries@trl.co.uk](mailto:mediaenquiries@trl.co.uk)



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## TRL launches new website [www.trl.co.uk](http://www.trl.co.uk)

**We have launched a brand new website showcasing our world class research, consultancy, testing and certification activities.**

The website highlights the growing number of innovative products and solutions we provide to our clients and emphasises the ever increasing services we offer to an extensive number of clients based right around the globe.

Visitors to the site can view a wide selection of case studies which highlight just some of our activities. With clients in over 145 countries, and over 800 projects alone completed in 2013, there were a lot to choose from!

If you are looking for outputs from our research, over 4000 published TRL reports are available as free downloads and easily searchable in the Reports and Publications section.

Something new to this TRL website is the "Academy Future View" section. The Academy reinforces TRL's scientific and engineering excellence and serves as a focal point for the mutual exchange of ideas and opinions. "Future View" gives TRL researchers the opportunity to put forward their expert opinion on a variety of current topics. Visitors to the website are encouraged to read and re-visit on a regular basis as these thought pieces and opinions will be regularly refreshed.

Chris Davies, TRL's newly appointed Marketing Director was a driving force behind the website project: "The new website has been



designed to provide the ultimate user-friendly experience with improved navigation and functionality throughout. Visitors to the site will get top level information on the range of solutions we offer but we are encouraging people to contact us to discuss their individual requirements in more detail. This is just Phase One of the website update: we are already looking at Phase Two, so would encourage visitors to re-visit and keep up to date with the changes we will be implementing. We welcome your feedback!"

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# Wireless Charging

The use of electric vehicles can help to improve local air quality in cities and reduce transport related CO<sub>2</sub> emissions, as long as the electricity they use is from non-CO<sub>2</sub> (or low-CO<sub>2</sub>) sources. In this case, all types of Electric Vehicles (EVs), including Plug-in Hybrids and Range Extended EVs, can help to achieve these reductions and improvements: and the higher the proportion of the journey that is completed in pure EV mode, the greater the positive impact.

Although EVs are not the only technological solution that can help reduce transport related CO<sub>2</sub> emissions and air pollution, it is one of the most market ready solutions and also contributes to the long-term goal of energy security and oil independence in the UK. However, the take up of EVs has been slower than expected in the UK and across most of the EU.

TRL has carried out a number of consumer and driver behaviour studies, including the Energy Technology Institute funded EV consumer behaviour studies and the assessment of the roles of the Plug-in Car Grant and Plugged-in Places scheme in electric vehicle take-up for the Department for Transport, as well as others. Some of the key findings seem to indicate that limited range (compared with traditional vehicles), high purchase price (much of which is due to expensive batteries) and the need for faster and more convenient charging infrastructure are some of the main reasons for the slower than expected take up.

Therefore, even though 96% of car journeys in the UK are under 50 miles, there is mounting evidence to show that with current charging infrastructure provision, consumers do not perceive the circa 100 mile range of typical EVs as being sufficient. In the absence of a breakthrough in on-board energy storage, one possible solution is to use opportunistic charging of EVs using wireless power transfer (WPT), sometimes also referred to as Inductive Power Transfer (IPT), to make charging fast and easy so that top-up charging can be used throughout the day to avoid running out of charge.

Indeed wireless charging is already a reality across a number of sites in Europe, where it has facilitated the operation of purely electric buses where otherwise it would not be possible, either due to vehicle range or due to the required size, weight and cost of batteries. The evolution of the stationary systems to dynamic, to allow vehicles to pick up energy from road embedded infrastructure as they drive over, is also closer than may seem with the technology already demonstrated and even in operation in some countries, and others planning to trial it in the next few years.

The use of WPT to improve the practicality and range of EVs is becoming an increasingly important research topic in Europe and across the world. TRL's involvement in key European and UK research projects places us at the heart of likely future developments, research needs, possible barriers and challenges and possible impacts on the transport and the energy sectors. Some of these key project activities are outlined below as examples of ongoing research into wireless charging and how it is applied to different parts of the transport sector.

## UNPLUGGED: Wireless Charging of Electric Vehicles - European Commission co-funded project

Coordinated by FKA in Germany and including 17 partners from 7 countries, UNPLUGGED aims to investigate how the use of wireless charging of EVs in urban environments improves the convenience and sustainability of car-based mobility. In particular, assessment of how smart wireless en-route charging infrastructure can facilitate full EV integration in the urban transport system while improving customer acceptance and perceived practicality. UNPLUGGED will achieve these goals by examining in detail the technical feasibility, practical issues, interoperability, user perception and socio-economic impacts of inductive en-route charging. Two wireless

charger prototypes are being built in the project, one high and one low power.

TRL is investigating how such wireless charging systems could be implemented in the urban transport environment and to contribute to the assessment of possible socio-economic impacts of en-route wireless charging solutions. We are also undertaking a social acceptance study to investigate attitudes of different stakeholders to implementing wireless charging solutions in cities and performing an evaluation of possible social-economic impacts if such systems were introduced, in terms of CO<sub>2</sub> reductions, costs and air quality improvements. Later in the project we will be working closely with our project partner Transport for London (TfL), to assess the feasibility of integrating wireless charging systems into the urban streetscape.

## Electric Boulevards – Low Carbon Network funded project

TRL is undertaking this project together with Western Power Distribution (WPD) who is the Distribution Network Operator (DNO) in Milton Keynes, where 8 inductively charged, fully electric buses have been recently launched as part of a demonstrator programme. The buses use very high power, 120kW, wireless charging systems at each end of the route. TRL is working with WPD to understand what the possible impacts are for DNOs of using such high powered systems on the distribution network; how bus usage, driver behaviour and other parameters can affect this and whether there are opportunities for DNOs to use the chargers and buses to provide additional services, such as Vehicle to Grid (V2G) services.

In order to gain an understanding of possible charger utilisation, energy demand, from the network and to perform a sensitivity analysis of the anticipated demand, TRL has carried out preliminary modelling in the project. This shows that under optimal operating conditions, two chargers should provide sufficient opportunistic charging throughout the day to ensure all buses are able to complete the route with contingency battery capacity remaining of at least 35% by the end of the day. It was also found that the two charger arrangement could allow for tolerance to reduced power transfer efficiencies of up to 70%, equivalent to 84kW, assuming all other parameters remain under optimal operating conditions throughout the day. Future work includes analysing data from the distribution network and the buses in order to determine whether the charging events create any disturbances on the network and if so then why, of what magnitude and under what set of circumstances.



## ZeEUS: Zero Emission Urban bus System - Research and demonstration project European Commission co-funded project

Coordinated by UITP, the International Association of Public Transport and including 40 partners from 10 countries representing all of the key stakeholders, the ZeEUS project aims to facilitate the widespread introduction of electrified bus systems in Europe by demonstrating a number of different technological solutions for electric buses. These will operate as part of regular bus services in eight European cities, including Glasgow and London. Subsequent analysis of the results will lead to the development of guidelines and tools to assist with the implementation of such systems.

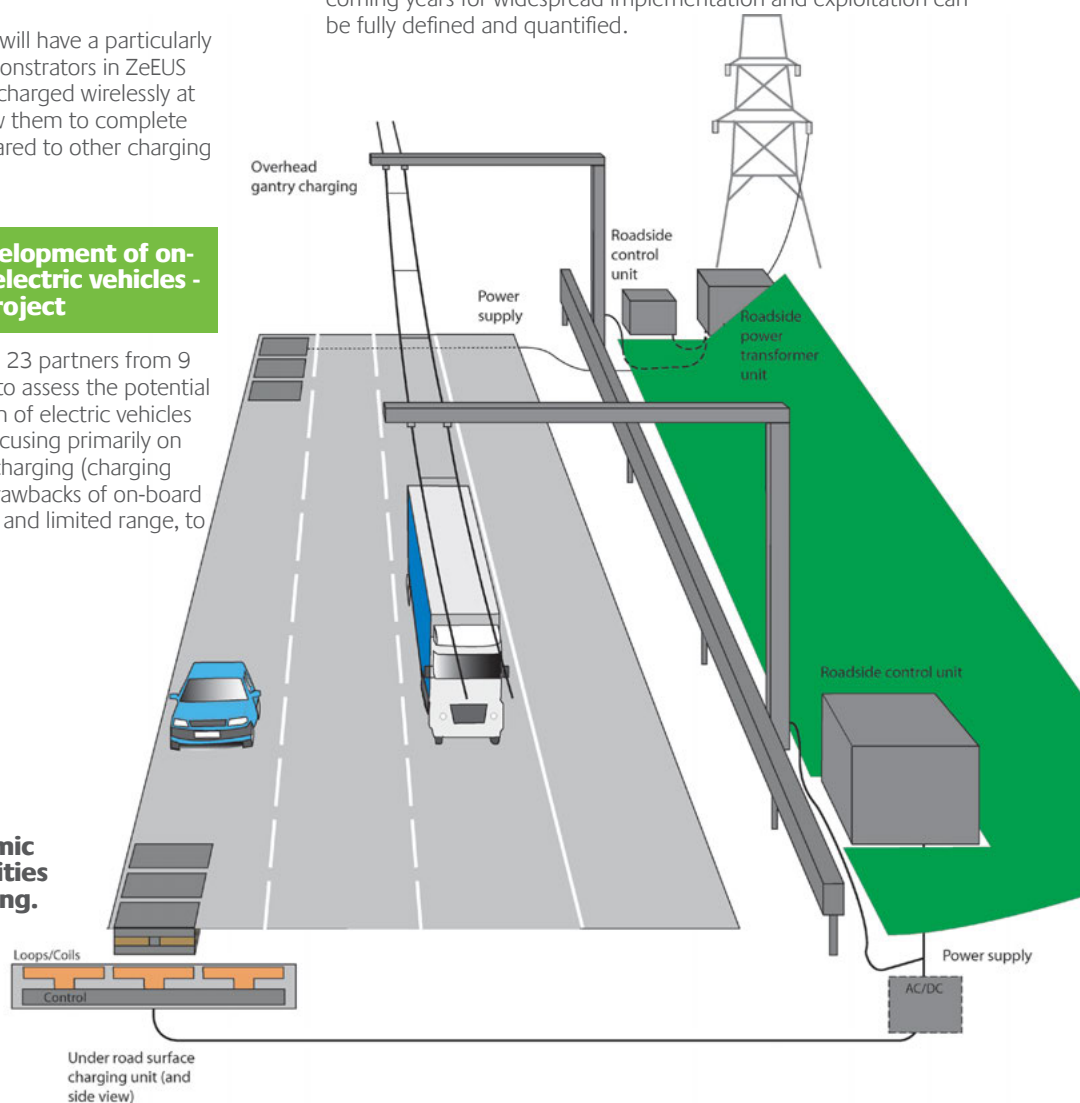
TRL is developing the evaluation for both of the UK demonstration sites. In London this is being established and led by TfL and in Glasgow by Alexander Dennis and Strathclyde Partnership for Transport. Across the project as a whole, TRL is helping to define the demonstration key performance indicators and is developing the trial methodologies for data collection and evaluation.

The electric buses being deployed in the UK will have a particularly unique element as they will be the only demonstrators in ZeEUS that will use wireless charging. Buses will be charged wirelessly at bus terminals during the day, which will allow them to complete longer routes with higher frequencies compared to other charging technologies.

## FABRIC: Feasibility analysis and development of on-road charging solutions for future electric vehicles - European Commission co-funded project

Coordinated by ICCS in Greece and including 23 partners from 9 countries, FABRIC is in response to the need to assess the potential and feasibility of a more extensive integration of electric vehicles in the mobility and transportation system, focusing primarily on dynamic wireless charging. Use of dynamic charging (charging while driving) would allow nearly all of the drawbacks of on-board battery packs such as increased weight, cost and limited range, to be avoided.

### Conceptualisation of FABRIC dynamic on-road charging showing possibilities for wireless and conductive charging.



Within the project, TRL is leading the development of charging solutions. The actual technology will be developed by the solution provider partners and based on identified requirements, defined specifications and architectures. As well as wireless on-road charging solutions, contact (or conductive) on-road charging solutions will also be investigated. TRL is currently leading the identification of requirements for a complete on-road charging solution and will identify developments required to bridge the identified technological gaps between existing solutions and requirements from users/stakeholders.

We will also be undertaking work to develop methodologies for installing the charging equipment in the road infrastructure, define testing and verification methodologies and lead data analysis following the demonstration of the developed technologies at two test sites in France and Italy.

It is hoped that FABRIC will provide a pivotal contribution to the evolution of e-Mobility in Europe by identifying the benefits and costs in absolute terms so that the investments required in the coming years for widespread implementation and exploitation can be fully defined and quantified.

## Summary

As the technology surrounding wireless charging develops and matures, it is important to understand if it is likely to have an impact on the take-up of EVs and whether it will affect how they are used. Understanding the implications on other road users, energy suppliers, electricity distribution network operators and transport operators, will also be important to ensure that the technology is integrated into the transport and energy eco-system in a coherent way and does not produce unwanted interactions.

Furthermore, it is also possible that stationary and dynamic WPT technology can also serve as an enabler for achieving the overall political and environmental goals of transport decarbonisation

and improvement of local air quality at national and city levels. Understanding how to maximise the potential of this technology is key.

TRL, with its network of contacts and partners across the UK, Europe and the world, is at the forefront of generating evidence-based research that helps to understand the implications and opportunities presented by this new technology.

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# Unlocking the value of your asset management data

iROADS is part of a comprehensive asset management service, comprising asset management software and consultancy, TRL delivers to its clients around the world. Of value to all road owners and operators of whatever size, covering the spectrum of unpaved rural roads in developing countries to state of the art motorways and trunk roads, TRL facilitates robust highway asset maintenance decision making.

iROADS is the outcome of TRL acquiring asset management consultancy and software development company, Appia Infrastructure Solutions Ltd in 2013 (now known as TRL Appia). The starting point was their existing Scheme Engineer and associated suite of pavement management tools which incorporated decades of asset management knowledge, understanding and research, plus practical implementation of solutions and tools. From this has emerged the cutting edge software product iROADS, a comprehensive asset management system suitable for all situations.

However, unlike many competing products, TRL offers a complete solution for road owners and operators by not only providing the technical product, but being able to deliver a total solution by setting up, implementing and training clients on the system, with ongoing support and consultancy in future years.

iROADS system fulfils many functions at many different levels. At the highest level it provides information on network performance, future condition, budget requirements and financial performance to senior managers, directors and government. At the technical level, it provides robust analysis for the delivery of works programmes and understanding of how network condition and performance will behave based on the proposed maintenance works to engineers and technicians. Furthermore, iROADS is able to account for "non-engineering" factors in the analysis of maintenance priorities. This allows for factors such as political or economic areas of concern, priority routes, regeneration programmes or where trade and tourism may be affected positively or negatively by road condition, to be taken into account in the analysis. This ability to define any asset, to hold comprehensive information on that asset and its condition, then analyse and report on it, is a major strength of iROADS.

iROADS has an intuitive modern interface which users of current Microsoft software and operating systems will be completely familiar as it uses a combination of Ribbon toolbars and dropdown menus with an explorer style sidebar. The main screen defaults to a map based display of the network using free online mapping where available. This map interface is also used for locating and identifying the assets and associated information. The functionality is organised into a number of toolkits that relate to particular areas of work or business. The functionality and toolkits "exposed" to the user can be restricted based on client requirements or user privileges to make the systems as simple or complex as the situation requires. iROADS can be implemented as a single user system or across a network with multiple users. iROADS can also be accessed through the internet allowing remote operation of the system.

iROADS is currently being used by several authorities and consultants in the UK on local roads as well as trunk roads and motorways. TRL Appia is working with the Roads 2000 initiative in London to analyse roads across London and determine the "top 50" sites for maintenance.

Internationally, a pilot implementation of iROADS to demonstrate the Asset Register (network, inventory and condition information for roads and bridges) has been undertaken through the Department for International Development Nigerian Infrastructure Advisory Facility for Nigeria and a full implementation is currently being delivered through a project in Uganda with Fugro.

iROADS delivers cost-effective, robust maintenance solutions for all road owners and operators. Anyone wishing to find out more about how iROADS can help with their asset management requirements, can sign up for one of TRL Appia's FREE training events in November by emailing [cwallis@trl-appia.com](mailto:cwallis@trl-appia.com) or calling 08444 439222. For more information on iROADS, please visit [www.trl-appia.com](http://www.trl-appia.com)

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# New child seat testing facility in China



**TRL has been developing performance standards and protocols for child restraint systems (CRS) for many years. This work is based on extensive research into injury causation in vehicles, as well as an extensive programme of accident investigation and vehicle design to improve occupant safety.**

Our work on child safety in vehicles means that child seat designers, manufacturers and distributors call upon TRL to test their products in support of their development programmes and to test to European Regulations R44 and R129.

Most of the child seats destined for the European market are manufactured in Southern China and many TRL customers have been looking for TRL to set-up test facilities closer to this manufacturing base. TRL responded to this request with a new state-of-the-art testing facility, based in Guangzhou's "Science City" development, which was opened earlier this year. TRL designed the facility in conjunction with IQTC (the Inspection, Quarantine, Technology Center), the Guangdong region's agency responsible for the safety and performance of a wide variety of products entering and leaving the Chinese market.

The Transport Restraint System Laboratory was opened by IQTC Director Mr Zheng, TRL's Chief Executive Rob Wallis, British Consul General Alistair Morgan and GDCIQ Deputy Director General Mr Zhan.

In his opening ceremony speech, British Consul General, Alistair Morgan, said "I believe that this facility fits the growing demand for high quality testing and the co-operation between IQTC and TRL matches British excellence in design and engineering with IQTC's role to improve safety in Southern China."

IQTC Director Mr Zheng added in his address: "We are proud to be working with TRL to implement child restraint testing here in China. We have a goal to improve safety and we believe that working with TRL will provide a quality of testing, certification experience and product development advice that will lead the CRS market in China."

Summing up, GDCIQ Deputy Director General, Mr Zhan concluded; "Our future depends on our children and passenger transport safety is a priority for China. Statistics show that road transport is the number one cause of death for children under 14 years old here. It is important that we work together to encourage both the use and design of CRS in China. It is therefore a great pleasure to

see IQTC and TRL working together at the very start of this improvement process. They will strengthen product quality and improve safety for all transport users, but especially our children."

TRL first began negotiations with IQTC in early 2011, signing a Memorandum of Understanding which expressed the intention to work together to improve child safety throughout China.

In May 2013, a contract was signed between TRL and IQTC for the purchase of an impact sled rig with associated component parts and technology, to enable IQTC and TRL to begin testing child seats in China in early 2014.

The TRL project team travelled to China in November 2013 to begin the installation of the impact sled rig. The facility has now been commissioned with up-to-date technology such as high speed photography, lights, video analysis and data processing software, in addition to the required instrumentation to test to regulation R44 and the new China "CCC" child restraint regulations.

Plans are now focussed upon working with IQTC to build child seat testing volumes for the facility, as well as using this base as a stepping stone to develop further testing and transport related opportunities in the region.

To this end, TRL will be working with IQTC to provide technical know-how from the UK, as well as marketing, sales and operational support for the facility in line with a jointly developed three year plan for the growth of the facility's business.

Rob Wallis, Chief Executive of TRL commented; "Our strategic alliance with IQTC is a very important focus for TRL. By working together we will enable improvements in transport safety and help develop the CRS market, both in China and internationally."

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# Prestigious win for TRL project in Qatar

**TRL has scooped a prestigious Green Mind Award for the best Green Innovation project in Middle East and North Africa (MENA).**

The project, "Investigating Recycled Aggregate Materials in Construction", aimed to reduce the amount of solid waste accumulating in Qatar and MENA and provide a practical solution for a cheaper and sustainable aggregate supply into the region. As a result, the Qatar Construction Specifications will be updated and a recycling target developed for the National Development Strategy.

The project, funded by the Qatar National Research Fund (QNRF), beat off stiff competition from over 720 other entries from 12 countries in MENA. 27 projects were then shortlisted into 9 categories with 3 finalists in each. After a presentation to the Jury on 2nd April in Beirut, Khaled Hassan, Regional Manager,

Qatar and Akin Adamson, Director, Middle East Region, were subsequently invited to attend the award ceremony.

Following on from extensive laboratory tests, full scale site trials are currently under way to demonstrate how recycled aggregates can be used in practice. As well as providing greater confidence in their use, the use of research-based evidence to develop and implement new technologies will enable government organisations and the construction industry to establish reliable and sustainable infrastructure.

Khaled Hassan said: "It is a great honour to win this award and importantly, through the Green Mind Award organisation encouraging investors, there is every potential for the results to be implemented across the region." The awards ceremony was broadcast on National Lebanese television (LBCI and LDC) in April.



Pictured with the award are, from left to right, TRL's Khaled Hassan and Akin Adamson

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## TRL wins the CIHT John Smart Road Safety Award



Pictured with the award are, from left to right: BBC Breakfast's Business Journalist, Steph McGovern, Peter Weddell-Hall and Elizabeth Heaton from the Driving and Vehicle Standards Agency, Graham Grayson and Shaun Helman from TRL and CIHT President, Sheila Holden.

**TRL's work has been recognised with a major award from the CIHT. Our entry for the John Smart Road Safety Award was for Hazard Perception Testing in the GB Driving Theory Test.**

It encompassed basic and applied research and implementation work that was funded by the Department for Transport (DfT) and undertaken by TRL and other organisations (the then Driving Standards Agency, the National Foundation for Educational Research, and the University of Reading) as part of the TRL Behavioural Studies Programme. The resulting test, which has been implemented in GB since 2002, was shown in the "COHORT II study of learner and novice drivers" to be associated with a fall in novice driver collisions.

Using DfT monetary figures for lost economic output, human and medical costs associated with road casualties, and the police, insurance and damage costs associated with accidents, it has

been calculated in subsequent work that this fall in accidents has represented an annual saving of over £89.5 million. Dr Graham Grayson, who oversaw the development of the hazard perception test while working at TRL in the 1990s and early 2000s said: "It is excellent to see that the judges for this award were impressed that hazard perception testing was not only based on good quality basic and applied research, but also that its impact on road safety has been properly evaluated."

Other countries are now beginning to consider hazard perception testing as part of their licensing, and are learning from the experience GB has in this area. Dr Shaun Helman, who is TRL's Head of Transport Psychology, said: "This is an excellent example of how TRL's evidence-based approach to interventions in road safety can achieve real results."

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Creating the future of transport

