TRL to deliver first UK truck simulator

As part of an initiative sponsored by the Department for Transport via the Road Haulage Modernisation Fund, TRL will construct, host and operate the first ever UK Truck Driver Training Simulator (TDTS).

Simulators, often associated with the sophisticated training needs of airline pilots, are now being used extensively in the trucking communities throughout Europe and North America. The TDTS will provide truck drivers throughout England with an opportunity to access this technology.

The facility which will be based in TRL’s Simulation Centre is expected to be fully operational by November this year. Over 600 commercial vehicle drivers and their companies will assist in validating the training experience provided. A critical challenge will be how to secure sufficient numbers of driver trainees for the research programme. Commitment from the haulage industry is essential and it is crucial that drivers and companies register their interest to participate with TRL at the earliest opportunity.

A truck simulator provides a “real” experience; it duplicates the operation of a vehicle and reproduces a world outside. Simulators generate an opportunity to train and assess current or new drivers through a range of complex simulated experiences and events. Scenes are delivered with sufficient reality to ensure that the driver becomes truly immersed in the experience.

Both internal and external information is accurately reproduced ensuring drivers feel as if they are sitting in the cab of their own vehicle. Quality audio and visual systems contribute to making the experience as real as possible. The simulator is programmed to move to replicate the impact of acceleration, braking and gradients or the effect of particular loads.

Truck simulators can assist a trucking business in maximising productivity and minimising costs by providing a cost-effective training and potential recruitment solution. They provide opportunities to:

- Put drivers in situations impossible to demonstrate in reality due to the risk to personnel, equipment or other road users: e.g. rollover, icy roads, tyre blow out, brake failure etc.
- Monitor driver activity and response to different issues such as use of brakes, accelerator and gears and road positioning, response to signals and instructions.
- Repeat scenarios identically until the correct behaviour is demonstrated. This enables drivers to gain a clear understanding of the results of their actions.
- Tailor situations and lessons to the needs of individual drivers.
- Provide orientation on new equipment or improve new route or site familiarity.

TRL recognises that there are significant challenges to the logistics industry such as shortages of skilled drivers, an ageing driver pool and an inability to attract well qualified young people into the industry.

Whilst simulators are unlikely to provide the complete answer to these concerns, simulation technology provides an important tool in supplementing and modernising traditional driver training practice. This in turn produces specific opportunities to attract new recruits, monitor and improve current driver performance and enhance overall driver development.

To register your interest or to request further information, please contact the dedicated hotline on 01344 770555 or email: trucksim@trl.co.uk
Ensuring the safety of wheelchair occupants in vehicles

Accessibility regulations drafted under the Disability Discrimination Act (1995) will ultimately ensure that all forms of land-based public transport become accessible to wheelchair users. Ensuring the safety of wheelchair occupants in vehicles is a project commissioned by the Department for Transport. Its aim is to identify necessary changes in vehicle legislation/practice to ensure people travelling seated in their wheelchair are given at least the same level of protection in the event of an accident as other passengers. The project covered private vehicles, taxis, minibuses, coaches and urban buses. The safety of a wheelchair user travelling in an urban bus under normal operating conditions was also investigated.

Computer simulation modelling was used to identify the key factors likely to affect injury severity. Dynamic impact tests were then carried out, using the appropriate crash pulse for each vehicle type, to investigate these factors further and to test possible solutions. In each case a vehicle seated occupant was also tested to determine a comparable level of safety with the wheelchair occupant.

The research concluded with recommendations, for example:

- Additional safety features in vehicles (e.g. the addition of a head and back restraint compliant with ECE Regulation 17 to reduce head and neck injuries);
- requirements for restraint systems to ensure both the occupant and their wheelchair are sufficiently restrained; and
- space requirements to ensure the occupant is appropriately protected from injury likely to be sustained from their surroundings.

A full report on the project will be published shortly. Copies will be available both from the TRL Information Centre and from the DfT website, www.dft.gov.uk

Contact: Marianne Le Claire 0980
Contact: Peter Bignell 0125 to arrange dynamic tests of wheelchairs and tiedowns enquiries@trl.co.uk

Wheelchair seated occupant with a head and back restraint
Stabilising highway slopes using bioengineering

The failure of the shallow slopes adjacent to highways, i.e. soil movements resulting from instability, causes widespread and costly maintenance problems. Current slope stabilisation techniques involve using a variety of proven hard engineering approaches, such as granular replacement, soil nailing/piling, or the use of geosynthetic reinforcement. An alternative bioengineering technique makes use of live willow poles that are installed to depths of approximately two metres into clay slopes. The live poles provide immediate reinforcing action and subsequently grow to provide the long-term benefits (e.g. prevention of erosion, root reinforcement and moisture modification) associated with established trees. As the technique appears to offer significant benefits in terms of ecology, aesthetics, sustainability and finance, validation research was required prior to its application on UK highway slopes. TRL was commissioned by the Highways Agency to develop an installation methodology and to trial the technique over a number of years to verify the potential engineering benefits.

In association with bioengineering partner Geostructures Consulting, previous world-wide experience of the use of live willow poles was collated as part of a literature review, and adapted to form a draft specification for the installation of live willow poles into highway slopes (see TRL Report 508). In spring 2000 and 2001, some 900 live willow poles were installed at four trial sites on the UK network. The two cuttings and two embankment sites are monitored regularly for above ground growth, soil moisture regime and in situ root development via miniature video cameras placed down transparent access tubes at selected locations. Towards the end of the project, a number of poles will be exhumed to assess the extent of their root systems. The results of the field trials will enable the preparation of a standard procedure for using the live willow technique as a routine method for prevention of shallow slope failures.

Contact: Donald MacNeil 0526 enquiries@trl.co.uk

Filter Drain Maintenance

There are about 10,000 kilometres of filter drains around Britain’s trunk road and motorway network. Problems of standing water caused by clogging, and aggregate displacement from vehicles leaving the carriageway, are considerable. In particular, stone scatter presents a major safety hazard with significant clean-up costs to the Highways Agency and police forces nationwide. These problems combine together to reduce pavement life and increase maintenance and renewal costs.

TRL has investigated an innovative system that recycles and stabilises the top 600mm of filter material on-site. The recycled material can meet the specified grading, and is almost entirely free from detritus which can be disposed of on-site in a controlled and environmentally-friendly way. Stabilisation is achieved by installing StableDrain®, a reinforcement product, within the reinstated filter material. The system provides a safe and cost effective solution, returning the drain to a fully functional state. Heavy goods vehicles may traverse the drain without loss of control or sinking into the drain. Importantly, it is possible for the whole operation to be carried out in safety from the hard-shoulder, thus maintaining a free flow of traffic on the motorway network.

The system known as StoneMaster® and developed by Carnell Contractors Limited, has been monitored by TRL on the M1 in Leicestershire and subjected to trafficking trials on TRL’s test track.

Contact: Guy Watts 0367, enquiries@trl.co.uk
TRL and Rail

“Britain’s railway has suffered from decades of continual under-investment, a shortfall that has been magnified by recent growth. This is something I am determined we put right. Notwithstanding this, since privatisation passenger ridership has increased by 36%, over 20% more trains are running, and there is nearly 50% more freight carried on our railways rather than clogging up our roads.”

Richard Bowker, Chairman, Strategic Rail Authority, January 2003

Critical issues face our changing rail industry, issues which need to be tackled effectively, whilst controlling the impact of cost. Increasing demand for rail travel is driving the need for capacity utilisation and new rolling stock, and reinforcing the need for effective infrastructure management. Allied to this is the pressure to improve service and punctuality, the drive for continued improvement in safety and reliability and a continuous reappraisal of how the industry should tackle operational issues most effectively.

All these aspects combine to produce constant fresh challenges for rail professionals. With its unique set of transferable knowledge and skills, TRL is already undertaking a wide range of work for the rail sector to help it address some of these challenges.

Safety

Historically, the focus of safety research in the rail industry has been on avoiding accidents. Driver adherence to signage is an important factor in operational safety. To ensure effective communication of information, TRL, on behalf of Railway Safety, has recently evaluated the potential of new signage materials as alternatives to currently specified materials. Using specialist software and a testing rig designed by TRL to validate the results, the latest micro-prismatic and retro-reflective materials were assessed in terms of aspects such as luminance, chromaticity and glare. The intensity and distribution of the light output of train lamps and the positioning of signs were also investigated to determine optimum arrangements.

TRL is now looking at exactly how signals and signs are observed by drivers, again on behalf of Railway Safety. Subject to risk assessment, eye-tracking equipment will be used to monitor train drivers' visual strategies on specifically chosen routes. The cognitive processes behind these strategies and the outcomes will also be examined. The objective is to enable the rail industry to improve driver training and the interfaces with visual data outside, and possibly inside, the cab. TRL's long-term strategy is to develop its already impressive capabilities into a world-class centre for simulation research and training both in rail and other transport modes.

Many other aspects of TRL's human factors work are relevant, including studies into impairment and its recognition. Another aspect of operational safety to which TRL has contributed is a review of current and future rail technology and its potential to emit electromagnetic waves. These can potentially disrupt not only the television and radio broadcasting spectrum (which is the responsibility of the Radiocommunications Agency, TRL's client for the work) but other operating systems within the train itself and important signalling systems. Regulations exist to cover these requirements but it is important to consider future needs to ensure the safe operation of the rail network.
Over recent years, the rail industry has begun to adopt the principles of passive safety (i.e., protecting occupants in an impact) into rail vehicles. TRL has been a world leader in road vehicle passive safety for many years and this experience can provide significant benefits to the rail industry. TRL is using its understanding of human injury, its impact testing facilities and its expertise in numerical modelling and simulation to increase driver and passenger protection. This work includes the crashworthiness of rail vehicles, the use of energy absorbing structures, safe vehicle interior design, restraint design, occupant crash kinematics, and injury prediction and analysis. One recent project involved numerical modelling and design advice for a new rail seat to meet proposed ATOC (Association of Train Operating Companies) crashworthiness standards.

Accident Investigation

TRL’s experts can rapidly preserve complex incident scenes, such as the Selby accident, using state-of-the-art laser scanning equipment. Scanning produces a three-dimensional model of an environment or object, from which scene plans and precise measurements can be obtained. TRL’s specialist skills in computer modelling, simulation and reconstruction technologies enable further analysis of the scanned data to investigate accident characteristics, causation and to produce visualisations of incident sequences.

Scan of the Selby accident scene

Track

The Footprint project aims to characterise the dynamic interaction between a road or rail freight vehicle and its infrastructure, so that its economic performance and environmental footprint can be defined. Noise, vibration and dynamic loading are all included in identifying a vehicle’s environmental footprint. TRL, with a number of organisations involved through the EUREKA initiative (a Europe-wide network for market orientated, hi-tech industrial research and development), is using its modelling expertise to develop a cost allocation model for rail freight vehicles that takes account of all the costs imposed by the vehicles. This work builds on TRL’s roads-based experience of developing cost-effective maintenance strategies based on whole-life costing and the allocation of costs to road freight vehicles. A better understanding of the true costs of road and rail freight vehicles will support the selection of routes with the lowest environmental impact. The work is expected to encourage the development and use of more environmentally-friendly vehicles and infrastructures.

These themes of environmental consideration and sustainability are key. Another ongoing project sees the TRL Structures Hall being used to assess an innovative way of recycling plastic. The Wales Environment Trust are supplying rail sleepers composed of different plastic mixes, which are undergoing loading tests to ascertain their performance. The project is funded under the Landfill Tax Credits Scheme by BiffAwd with a 10% contribution by National Railway Supplies.

Bridges

TRL has been examining software for the analysis and assessment of masonry arch bridges. Recommendations have been made to Network Rail on the suitability of particular programs for different levels of assessment and structural geometry. TRL has also used its experience of road bridges to assist Mouchel in their work for Network Rail on specifications for waterproofing rail bridges.

Looking forward, there is huge scope for fresh ideas to meet the changing needs of the rail industry in the 21st century. Of potential are innovative techniques for structural condition assessment and monitoring to minimise track access and hence increase safety; the exploitation of new technology, for example in passenger communication systems; integrating rail with other transport modes; economic assessment, performance indicators and best practice, of which TRL has experience in the aviation and freight logistics fields…..the list goes on.

In presenting ambitious new targets for improving Europe’s railways, the European Rail Research Advisory Council said, “the most important aspect…is that research is highlighted as a priority based on a vision of what rail will be like in 2020.” TRL’s ever-evolving capabilities can help the rail industry achieve this vision.

Contact: Robert Flenley 0007, enquiries@trl.co.uk
TRL in Africa

TRL’s close association with Africa dates back to 1955 when its leading edge research in transport for the UK Government’s aid agency (now the Department for International Development) and other aid agencies began. TRL has worked in most of the Anglophone and many of the Francophone countries, opening, at various times, offices in Kenya, Botswana, Ethiopia, Ghana, Uganda and Zimbabwe. The research has covered a wide range of topics within the main themes of:

• reducing road accidents and improving road safety
• reducing the cost of road infrastructure and the cost of vehicle operations
• improving the provision of cost-effective transport
• increasing the efficiency of national and regional transport systems,

whilst enhancing the understanding of engineering and geotechnical science and promoting environmentally sensitive development of non-renewable natural resources.

Throughout most of this time the aid agencies have focussed primarily on overall economic development and this has influenced both the aid projects themselves and the research that has been commissioned to support them. TRL’s pioneering work in several areas, for example, in road pavement engineering and in transport economics, is well known and has been published in a series of guidance documents and manuals in the Overseas Road Note series. In recent years, the international aid programme has been targeted more directly at reducing the poverty of the poorest people in the world and this has shifted the focus of the research.

Rural Roads

During the last few years TRL, with various partners, has been carrying out a series of research projects to develop innovative approaches to the planning, design, construction and maintenance of rural roads in Southern Africa. A current project funded by the British, Norwegian and Swedish aid organisations and commissioned by the Southern African Transport and Communications Commission is to combine the results of this earlier research together with additional local knowledge to create guidelines that are acceptable across the region. This is being achieved in partnership with national stakeholders from 14 countries to ensure that the final product fully reflects the needs of the region. It is anticipated that when the recommendations in the guidelines are applied, cost savings in the range £10 - 15 million per annum can be made. The final draft of the guidelines has been completed and publication is expected shortly.

Labour-based techniques

Labour-based methods using techniques and equipment that are often quite different to conventional road building approaches provide a cost effective and successful approach for the construction and maintenance of much of the rural road network. The approach also provides a means of achieving wider socio-economic objectives including the development of small contractors, employment creation and poverty reduction. TRL in partnership with the International Labour Organisation is implementing a programme to improve the overall provision of rural roads through labour-based techniques. The programme is being undertaken in Ghana, Uganda and Zimbabwe with support from DFID and the Danish aid agency, and it will be extended to a further three countries over the coming year.

The International Focus Group

Closely connected with TRL’s research in Africa is the formation of the International Focus Group (IFG) - a partnership of institutions and practitioners from developing countries committed to the provision of sustainable transport for the poor. The group continues to grow with a vision to be the leading platform for articulating and disseminating information on rural road engineering within the context of poverty reduction and for identifying research needs. After its inaugural meeting at TRL in January 2002, the programme has continued with further meetings in Cambodia and Ghana. Membership now extends to about twenty countries. Communication of its work is through production of a newsletter, CD-ROMs and its website: www.transport-links.org/ifg.htm

Contact: Stuart Colwill 0821, enquiries@trl.co.uk
Contracts recently won

Department for Transport
• Development of the Vehicle Inspectorate accident database: Phase 2
• A study to improve the control of PUFFIN pedestrian crossings within the SCOOT UTC Systems
• A review of UK starting amber timing at traffic lights
• Assessing test procedures and new technologies to measure vehicle noise
• A project looking at measures to reduce over-height vehicles striking bridges
• Research into the experimental provision of a shared cycle and motorcycle advanced stop line

Highways Agency
• Provision of accident data and analyses in support of the HA safety strategy
• A project to look at pavement condition assessment techniques, long life pavements and value management for road schemes
• Production of a Sustainable Construction Handy Guide
• An extension to the fatigue performance of orthotropic decks project
• The production of a specification for thin surfacing on bridge decks

Other contracts
• Development of Indicators for secondary and recycled aggregates markets, whole life costs of secondary and recycled aggregates and development of new materials for secondary and recycled aggregates, all on behalf of DTI and WRAP
• Crack and seat pavement maintenance on the M11, on behalf of URS-Carillion
• An extension to the anchor bolt testing project for Cleveland Bridge
• A review of pedestrian accessibility in Eltham, South West London for Greenwich Council
• Research into rural accessibility indicators and the development of an accessibility assessment methodology for the Countryside Agency
• Looking at the performance of standard width cycle lanes on substandard width roads for Camden Council

Personalised Travel Planning

Bracknell Forest Borough Council has commissioned TRL Limited to assist them in the development and implementation of their Personalised Travel Planning project – “Travelling Your Way”. Bracknell Forest Borough Council is one of the 14 successful local authorities who bid to the Department for Transport for funds to explore the potential of Personalised Travel Planning.

Personalised Travel Planning has been found to be very effective in helping individuals to change their travel behaviour through the promotion of alternative forms of transport. Similar projects in Australia have experienced a 14% reduction in car trips, whilst in the UK, pilots schemes in Frome and Gloucester have seen reductions in car trips of up to 9% (Gloucester).

£50,000 has been granted to Bracknell Forest Borough Council, who through the assistance of TRL Limited will test the use of individualised marketing and will focus upon life style changes, such as changes of employment, moving house and retirement as opportunities to change travel behaviour. The project will be conducted in partnership with the Bracknell Forest Business Travel Forum, comprising of companies within the Borough who are committed to reducing the impact of commuter travel in and around Bracknell.

It is anticipated that this project will assist these companies in developing and promoting travel planning. As well as its key role of carrying out the monitoring and evaluation of the project, TRL will also be involved in the development of the marketing materials for the project.

Contact: Lynn Basford 0705, enquiries@trl.co.uk

Traffic Software Workshops

SCOOT
A two day workshop
14 - 15 May 2003
For details contact TRL’s Software Bureau 0758
softwarebureau@trl.co.uk
**Andrew Mackay MP visits TRL**

The Rt Hon Andrew Mackay, MP for Bracknell, (immediately right of the television screen) visited TRL recently with Stuart Turkington and Bracknell Forest Councillors, Jim Finnie and Bob Wade.

They came to discuss recent developments in transport and, in particular, the potential of new technologies. Andrew was very impressed with the role TRL plays, both nationally and internationally, and was interested in the experimental work he viewed in the virtual reality driving simulator. Whilst on site, the visitors took the opportunity to see the progress being made on TRL’s new building, which is well on schedule for occupation in the summer of 2004.

The visit was hosted by Rod Kimber, Director of Science & Engineering, David Goody, Finance Director and Nigel Eastwood, Director, Transportation.

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**TRL wins prestigious AA Road Safety Award**

At this year’s annual AA Awards ceremony at the Savoy Hotel in London, TRL was presented with an award in recognition of its outstanding contribution to motoring in pioneering innovative work in accident investigation using the 3D laser scanner. The award was collected by Sue Sharland, Chief Executive and Paul Forman, Head of Investigations and Risk Management from the Rt Hon Alistair Darling MP, Secretary of State for Transport.

TRL’s Laser Scanning technique helps investigators gather detailed, accurate and consistent visual records at a crash site, allowing the examination to be completed quickly and thoroughly. The full aftermath of an accident can be captured in 3D in less than 20 minutes of the equipment’s arrival at the scene.

Others honoured during the course of the evening were:

- Sir Peter Baldwin – for his services to road safety and for his work on behalf of disabled and disadvantaged people;
- Britax – for its contribution to improving child safety in cars;
- Honda – for its pedestrian-friendly vehicles, work that TRL was also involved in.

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**Honour for Chief Research Scientist, Richard Lowne**

Congratulations to Professor Richard Lowne who received an OBE in the Queen’s New Year Honours for his services to vehicle safety. Richard has extensive experience at TRL and is Chief Research Scientist, Biomechanics, honoris causa.

In the early part of his career, Richard first undertook research on road structures and skidding resistance, but it is his later work on biomechanics and injury prevention for which he is best known.

Since 1974, Richard has been responsible for studies of human tolerance to injury and restraint systems for both adults and children, working on all aspects of occupant protection, the development of anthropometric crash dummies and pedestrian protection. Ground breaking work on the protection of children in cars has had enormous benefits in both human and societal terms.

Richard is an active member, on behalf of the UK, of many international committees responsible for the advancement of vehicle safety and is a Special Professor of Biomechanics at the University of Nottingham.