

european
railway review

LEVEL CROSSING SAFETY SUPPLEMENT

Infrabel progressively
increases safety at
level crossings

Ann Billiau, Director-General, Rail Access, Infrabel

Portugal raises the
tempo of level
crossing safety
initiatives

Paulo Soares de Melo, Director of Level Crossings, REFER

Level crossing misuse
– not a traditional
policing solution

Miles Flood, Chief Superintendent (Territorial Policing),
British Transport Police (BTP)

SPONSORS

WaveTrain™ Systems AS

Ann Billiau

Director-General, Rail Access, Infrabel



Infrabel progressively increases safety at level crossings

Infrabel, the Belgian railway infrastructure manager, is continually working on increasing safety at level crossings on its network. This article highlights the strategic priorities and the most important achievements concerning safety at Belgian level crossings.

Cross-border collaboration for safe level crossings

International Level Crossing Awareness Day (ILCAD) took place on 7 June 2012 which offered a platform for more than 42 countries around the world to pay special attention to this specific safety issue, with the overall message being: Act safely at level crossings.

According to statistics from the UIC (the International Union of Railways), which organises ILCAD every year, nearly 98% of

Nearly 98% of accidents at level crossings in Europe are caused by motorists and pedestrians who do not pay attention to traffic signs and level crossing signals

accidents at level crossings in Europe are caused by motorists and pedestrians who do not pay attention to traffic signs and level crossing signals.

Cross-border collaboration between infrastructure managers, railway operators, public bodies, and European organisations is therefore an absolute necessity.

17% fewer accidents at Belgian level crossings in 2011

In 2011, Infrabel reported 48 accidents at level crossings on its network, resulting in eight fatalities as opposed to 49 accidents and nine fatalities in 2010. There has been a significant decline over the last two years in comparison to the period 2005-2009 when an average of 58 accidents and an average of 14 fatalities were registered.

This signifies 17% fewer accidents in 2011



A simulation to show the construction of a bridge-section for the level crossing elimination project on the Hasselt–Liège line

and a 43% decrease in the number of fatalities when compared to the period 2005-2009. But every victim is, and remains, one too many, so the toll remains heavy to bear every year.

Another notable result is that in 2011, more than half of the accidents occurred at level crossings on port and freight lines, primarily in and around the Port of Antwerp. This has prompted Infrabel to develop an action plan together with the railway operators and the Port of Antwerp.

The statistics from 2011 also reveal that 90% of accidents at level crossings involve vehicles (cars, lorries, delivery vans, tractors, motorcycles), while 10% of the accidents involve vulnerable road users (pedestrians or cyclists), however, pedestrians and cyclists run the greatest risk of being involved in a fatal accident because a person is, naturally, less protected than a vehicle.

Safety strategy: eliminating level crossings

The Belgian railway network is one of the busiest networks in Europe and currently has 1,879 level crossings – 1,640 of which are public crossings and 239 private crossings. Approximately 94% of public level crossings (1,539) are equipped with active signalling (barrier and/or traffic lights). The remaining 6% (101) are equipped with

passive signalling (traffic signs) and are located on quiet railway lines (e.g. port lines).

In 2011, Infrabel eliminated a total of 21 level crossings – 14 of which were on the public

eliminated level crossings due to the closure of certain tracks on the network). In 2012, the elimination of another 15 level crossings is planned so that, by the end of December 2012, there will be 1,864 level crossings on the Belgian network. This project is in keeping with the strategy to eliminate as many level crossings as possible per year (an average of 15 to 20).

Infrabel is committed to raising awareness among the general public about the importance of level crossing safety

railway network and seven were private crossings. Since its inception on 1 January 2005, Infrabel has eliminated 225 level crossings (as recorded on 01/01/2012, which includes the

Since its inception on 1 January 2005, Infrabel has eliminated 225 level crossings

Therefore, two major pilot projects are currently running: the elimination of five level crossings on the Brussels–Dendermonde line and 15 on the Liège–Hasselt line. They serve as model examples for increasing safety step-by-step and they fit into a larger mobility plan in consultation with the partners involved in that environment. At the same time, Infrabel is developing mobility alternatives with the construction of, among others, a bridge, tunnel, bicycle path or parallel road. Integration of these alternatives into the surroundings in each case occurs in close collaboration with the local public bodies (city, municipality, province, and region).



Infrabel has recorded a significant decline in the number of accidents at level crossings over the last two years

Safety strategy: modernise and raise awareness

A second component of the strategy includes the continuous modernisation of level crossing infrastructure. This includes making adjustments and introducing innovative systems to the level crossing itself and to further improve the safety and comfort of the crossing.

But despite the efforts to eliminate and modernise level crossings, the most common causes of accidents are due to recklessness, carelessness, haste and failure to observe traffic regulations and signs.

In 2012, the elimination of another 15 level crossings is planned so that, by the end of December 2012, there will be 1,864 level crossings on the Belgian network

For this reason Infrabel regularly organises a campaign to promote safety at level crossings. The goal is to continually make road users and the general public aware of the potential dangers at level crossings and to encourage them to observe traffic regulations at all times.

After earlier awareness campaigns via brochures, posters, TV adverts, educative school packages etc., in 2011 Infrabel worked together with students from university colleges of fine arts to design creative posters which were distributed at level crossings that are most vulnerable to accidents, in stations and at more than 2,600 junctions of the Belgian railway network.



In 2011, Infrabel invested approximately €15 million in eliminating, replacing and modernising its level crossings

New action plans at level crossings and elsewhere on the network

Infrabel is investigating additional new avenues to reinforce its 'safety at level crossings' action plan. For instance, there is a plan in place to install traffic cameras at level crossings that are most vulnerable to accidents in order to register and issue ticket-fines to violators, and in doing so, increase safety awareness at these specific crossings.

Other areas also need addressing, including crossing the tracks in stations, stops and along the open track sections of the railway network. From 2009 to 2011, there were, on average, 16 accidents recorded annually and as a result there were an average of 11 fatalities per year. Infrabel is continually increasing safety on its railway network by, among other things, making

adjustments to infrastructure (constructing additional underpasses and installing extra signals) and by integrating them into their campaigns (external and internal).

Cooperate and invest in increased railway safety

In 2011 – as in previous years – Infrabel invested approximately €15 million in eliminating, replacing and modernising its level crossings. In 2012, Infrabel is continuing unabated its efforts for a progressive increase of safety at level crossings on the entire Belgian railway network. The strategy therefore remains the same: eliminating and/or modernising level crossings and continually informing road users.

Let one thing be very clear: in our society, we must all continue to work together diligently

and across borders to make everyone respect traffic regulations and be aware at level crossings, because saving a minute of time is not worth endangering a human life.

BIOGRAPHY



Ann Billiau has been Infrabel's Director-General for Rail Access since November 2011.

Ann's previous Infrabel positions have included Account Director for the Rail Access Directorate (2005-2007) and Head of the Department for Customer and Products in the Rail Access Directorate (2007-2011). Ann has also held professional positions at SNCB including Project Leader for ICT Projects and Account Director of the ICT Department. Ann is a Master of Mathematics and a Master of Advanced Studies in Geophysics and, since October 2011, has been a Member of the Board of Directors at TUC RAIL.

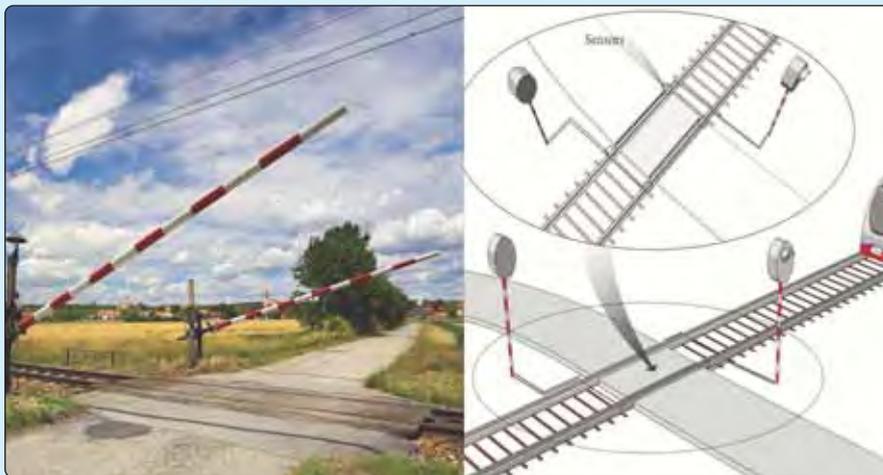
WaveTrain Systems contributes to railway safety

WaveTrain Systems AS (WTS) is a company dedicated to railway safety, and in particular safety at level crossings. With our systems and solutions, based upon new novel technology, we are one of the most exciting new suppliers to the railroad industry.

Safety at level crossings

In Europe there are more than 120,000 level crossings that are either unsecured or exposed. These crossings do not have any warning systems with lights and/or sound. Some of them do only have the St. Andrew's Cross, where it is stated that you should stop, look and listen.

society more than €1.4 billion each year. WaveTrain will help railroad authorities meet their strategic target of zero tolerance in the field of safety and accidents on level crossings. Our system and solutions are patented world wide and they follow the EU standards EN 50-XXX regarding safety and certification.



If you don't see anything, you might cross the tracks. All railroad authorities agree that this way of securing the unsecured and exposed level crossings are not enough and have been searching for new novel technology solutions with a cost beneficial price. They have now found their solution in WaveTrain Systems. Our system reduces the costs for Infrastructure Owners by a minimum of 10 times, compared to the conventional systems that are offered today.

Saving lives and reducing social costs

Each year throughout Europe there are approximately 1,250 accidents with an average of 330 casualties at level crossings alone. These high numbers of accidents and deaths cost the

WTS Level Crossing Warning System and WTS Mobile Train Detection System

We have developed a robust and reliable warning and safety system for these level crossings – the WTS LCWS. We detect the train through waves in the tracks and then by analysing the waves we set off lights, sound warning or any other protection/warning our clients would like to implement.

Our WTS MTDS are based upon the same technology, but instead of having a fixed installation, our clients will be provided with the system in a mobile suitcase. The systems are then temporarily placed on the tracks to warn the maintenance crew that a train is approaching.

Competitive and technological advantages

Our advantages and our system and solutions sets apart from today's conventional solutions by:

- No cabling along the rails in each direction from the level crossing
- Reduced installation time
- Substantial lower cost
- Proactive
- Multi-solution.

Customers

Our clients are the owners and operators of railroad infrastructure, e.g. Jernbaneverket (Norway), Banverket (Sweden), BaneDanmark (Denmark), ADIF, FEVE, FGC, Euskotren and ELECTRANS (all Spain), Deutsche Bahn (Germany), AIF (Romanien), SNCF (France), REFER (Portugal), AAR (US) and Network Rail (UK).

BIOGRAPHY



Richard Aaroe is CEO of WaveTrain Systems AS and received his education from the Norwegian Military Academy ('the national centre of excellence for leadership'), the Norwegian Business School of Administration as well as from George Washington University in the United States specialising in leadership, management and administration. He has 26 years experience from Project Management, Chief of Operation in various companies, and has held several positions as Board Member. Prior to WaveTrain, Richard held Senior Management positions in national and international companies.

CONTACT DETAILS

WaveTrain Systems AS

WaveTrain Systems AS
 Vollsveien 19, 1366 Lysaker,
 P.O. Box 23, 1324 Lysaker, Norway
 Tel: +47 22 77 99 40
 Email: info@wavetrain.no
 Web: www.wavetrain.no

Paulo Soares de Melo
Director of Level Crossings, REFER

Portugal raises the tempo of level crossing safety initiatives

Accidents at level crossings are a globally recognised problem that must be addressed by a number of stakeholders from the rail and road industries, and from private and public sectors. In 2010, in Europe alone, it was reported that approximately 360 people were killed and more than 300 seriously injured in a total of 619 accidents, occurring on more than 120,000 existing level crossings. These disturbing numbers should encourage the industry to share experiences and good practices, as well as promote awareness campaigns to underline the risks of using level crossings and highlight safety rules.

Statistics in Portugal

In Portugal, the strong growth in traffic recorded from the 1980s, as well as increasing train speeds, significantly increased the risk of using level crossings, and it became necessary to create a set of conditions aiming to effectively reduce the number of accidents.

In 1999, the Portuguese railway network had 2,494 level crossings, and 154 accidents were reported with a FWI (Fatalities and Weighted Injuries) rate of 28.2. As a consequence, in December 1999, a new law-decree was published that included a Directive on Level Crossings, which, among other things, created the following conditions:

- To establish new level crossings – all newly-

built railway crossings will either be an underpass or an overpass

- To ensure that railway and road network managers draw up plans for the removal of the highest risk level crossings
- To close level crossings that have an alternative crossing less than 700m away
- To install active protective equipment on level crossings where conditions allow.

Level crossing closures programme

The first objective to be reached by 2006 was soon established; to significantly reduce the number of level crossings that existed in 1999 and to reduce the level crossings per km density from 0.89 to 0.5,

which was considered to be the reference value at European level.

An intense programme of level crossing closures soon followed and, by 2004, there were 1,476 crossings on the Portuguese railway network which corresponded to a density level of 0.52 level crossings per km, thus achieving the objective ahead of schedule.

Upgrading level crossing protection equipment

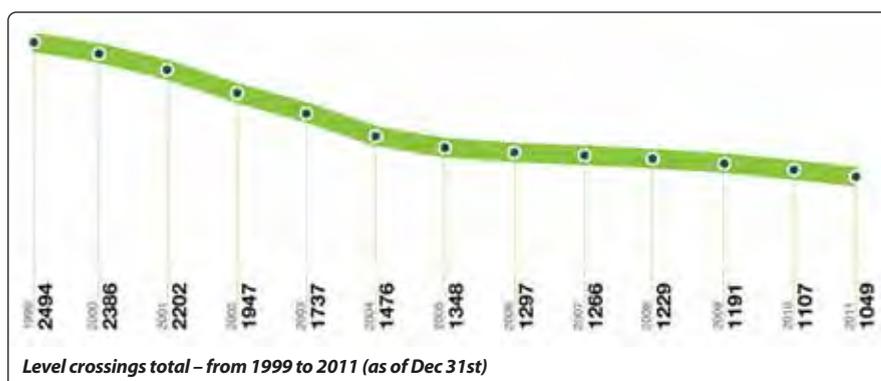
Alongside the closures programme, an upgrade of level crossing protection equipment also took place, helping to significantly increase the protection level on approximately 300 level crossings.

Redefining the original objectives

In 2004, 102 accidents at level crossings were recorded and although this was a reduction of 34%, it unfortunately fell short of expectations and so it was decided that the objective needed redefining.

The focus was then shifted to the higher risk crossings and new goals were set for 2009 and 2015: to reduce the number of accidents recorded in 2004 by 50% (target 2009), and to reduce the number of accidents recorded in 2006 by 60% (target 2015).

A risk analysis approach was implemented, first with a process developed in-house and later with a more powerful risk analysis tool, developed in a partnership with Arthur D. Little. This tool identified the risk drivers and risk levels for each crossing, as well as establishing a cost benefit analysis, which enabled the implementation of adequate



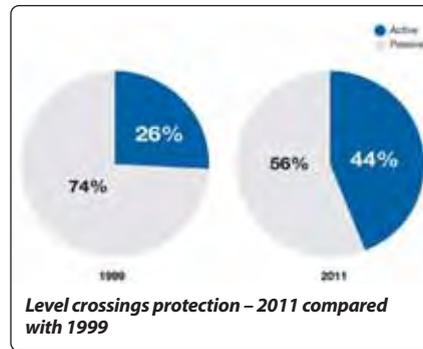
mitigation measures, based on consistent risk and economic criteria.

These approaches enabled REFER to concentrate available resources on the higher risk level crossings and on the risk drivers for each type. Thus, while maintaining the programme of level crossing closures, some additional measures were implemented, including:

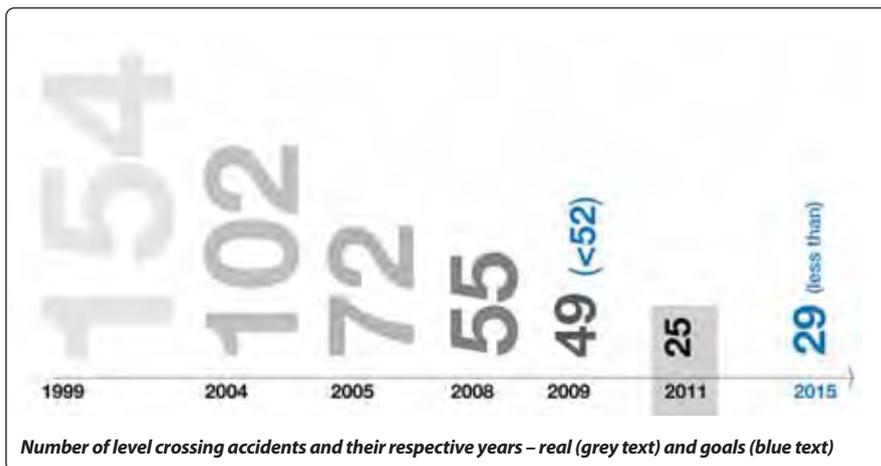
- Upgrading automatic level crossings that have just lights and bells as warning signals, with half-barriers
- Upgrading passive crossings to automatic half-barrier level crossings
- To ensure all train drivers sound the train's horn as they approach a passive level crossing
- The removal of obstacles near passive crossings to increase the visibility of approaching trains
- To integrate a system that alerts train drivers via radio if the barriers are not closed on level crossings with manual user-side protection

Engineering projects

REFER is keen to make use of the fiber-optics that already exist on its entire infrastructure with a number of initiatives that would reduce the risks at level crossings, but with low-cost solutions.



The first project is called 'Remotely Guarded LC' and is a type of level crossing only to be used on lines with few trains and low numbers of level crossing users. The Remotely Guarded LC is



- To implement new electronic bells on active level crossings in urban areas
- Integrate the use of rubber anti-slip pavement
- Establish the use of LED lights at automatic level crossings, even on the barriers
- Effectively segregate pedestrians and road vehicles at crossings
- To use obstacle detection systems, with double-half-barriers, by using radar, video and induction loop technology
- To implement a system on every automatic level crossing that enables immediate and automatic identification of that level crossing when an emergency call is reported from that site (giving a unique crossing number).

permanently closed and remotely monitored by CCTV and only opens on request. This solution reduces the value of upgrading a passive level crossing by approximately €30,000.

The second project is called 'Simplified Automatic LC' and is to be used on lines where train speeds are low and where there is a high density of level crossings. This solution costs approximately €70,000 to implement on an automatic half-barrier level crossing – approximately 40% less than the normal cost.

Another important initiative was to involve road infrastructure managers which helped to establish partnerships and protocols, which resulted in the sharing of responsibilities and costs, and deciding where changes in road layouts near level crossings were needed.

Awareness campaigns

One of REFER's principal commitments is awareness campaigns. REFER has participated in all level crossing awareness days (first European and now International), as well as maintaining its own campaign called 'Pare, Escute, Olhe' ('Stop, Listen, Look') continuously since 2009.

This campaign is rolled out across several means such as TV, radio, newspapers, internet and social networks, and teaches and promotes good practice, while highlighting unacceptable behaviour at level crossings.

REFER also published a Green Book on safety at level crossings as well as the results of a public consultation.

Results so far

The overall results so far have been very positive; the objectives set in 2004 and 2006 have been achieved. In 2009, 49 accidents were recorded (the goal was less than 52), and in 2011, 25 accidents were recorded, thus already surpassing the goal set for 2015 (to have less than 29 accidents).

REFER's integrated and systematic approach over the last 12 years has resulted in a reduction of 58% of the number of level crossings, an increase in the number of level crossings with active protection and, more importantly, a reduction of 84% in the number of accidents.

Funding and the future

This success has come at a cost of approximately €338 million. Yes, positive results have been achieved, but the future will be challenging. Funding will be much more difficult to obtain, and the stress of modern life and urban expansion are some of the factors that will continually increase the strain on level crossings.

The involvement and cooperation of other institutions and stakeholders, awareness campaigns, low-cost and ingenuity solutions, are all crucial in determining the success in years to come.

BIOGRAPHY



Paulo Soares de Melo is a Civil Engineer and was awarded an MSc in Structures from Cardiff University in Wales, UK. He started his career as a site and project manager for several construction projects, mainly roads and urban infrastructures. He now works for REFER and has been especially connected to the Level Crossing Department, becoming its Director in 2009, where his main concern is to reduce accidents at level crossings.

Miles Flood

Chief Superintendent (Territorial Policing),
British Transport Police (BTP)



Level crossing misuse – not a traditional policing solution

During 2009, British Transport Police (BTP) undertook a fledgling project which has fundamentally transformed the way in which the force deals with level crossing misuse. Until then, level crossing misuse had been addressed in the traditional policing manner, with offenders being reported to courts across the country for prosecution.

However, with ever increasing levels of misuse, the associated risk to public safety and disruption to the rail network, it was recognised that the issue needed to be addressed differently. The disruption not only damages the reputation and safety of the rail industry, but has a huge economic cost attached. The chosen decision was to undertake a fundamental review of the way in which BTP dealt with this unacceptable behaviour.

Fortunately, BTP has a long heritage of aligning itself with the needs of the rail industry and partnership policing. So, after a period of soul searching and in-depth research and analysis, it was found that this was not an enforcement project that was needed, but more a risk reduction strategy. Having reviewed the current processes and procedures from cradle to grave there were numerous spin-offs. Some of which fell more within the remit of a rail industry partner and some that fell within the remit of the police.

It was established that a cohesive and joined-up media strategy was key and that this involved the utilisation of all forms of media,

from the traditional tried and trusted methods of the printed page and television to emerging social media tools such as YouTube and Twitter. It was quickly recognised that it was not only important to raise the profile of offending but equally as important to highlight the real dangers that this sort of behaviour presented. Taken forward by Network Rail, in partnership with BTP, national campaigns were soon rolled out on all available platforms.

However, on the policing side, it became apparent there was still some work to be done, and in the first instance a root and branch review of how offenders were detected was conducted. It was found that traditional policing methods were labour intensive and had not kept pace with the technology that was now available. Also, due to an offence often being the word of a police officer against a member of the public, there were always some challenges in court due to the lack of visual evidence and submitting the necessary paperwork to court was becoming onerous and time-consuming.

The decision was taken to develop a cutting-edge mobile solution. Funding was

sourced from Network Rail and the first Mobile Enforcement Vehicle (MEV) was brought in to service in January 2011. BTP designed the system to exacting specifications in order to meet all the necessary legal requirements. The vehicle's on-board technology was able to collate all the relevant information into an easy format and was designed to be operated by one officer with the necessary equipment to collate all paperwork to prosecute at the roadside.

This enabled BTP to consolidate its policing assets in the current financial climate without reducing enforcement activities. In reality, the opposite was true. Due to the reduced paperwork and follow-up investigation required and the ensuing increased evidential standard, officers were able to stay on the frontline line for longer.

Officers were now working with a system that combined high-definition video with Automatic Number Plate Recognition which seamlessly integrated with the necessary police systems. The evidence produced was of such a high standard that the numbers of not-guilty pleas being entered at court date plummeted. Accused people were being shown no mercy at the court, as there was now undisputable video evidence, showing the court the true nature of the offences instead of an officer's written description.

At the moment, there are three Network Rail

funded MEVs out on the road – with a further 10 being deployed by October 2012. By this time, the force will have the capacity to cover every route in the country with a level crossing.

The MEVs are a partnership project and this has remained critical to the project's success. The officers are deployed following a four-weekly industry-wide tasking meeting. Rail industry partners collate information from a number of sources; including control room incidents, computer logs or direct reports from train drivers and other staff. This intelligence-led approach enables the vehicles to target crossings where the risk could be evidenced. After only six months there was an incredible 448% increase in the number of offences detected. However, after the MEV had been deployed to location an average of six times, the offending rates were reduced by 33% and are still falling further with continuing enforcement.

It is important to remember that the roll-out of MEVs is not just an enforcement project. Although enforcement forms one of the key strands, so does education and awareness. BTP follows the four Es principle and where possible works to improve road layout and signage in partnership with local authorities. Our area school liaison officers visit schools where problems have been reported. One interesting development that research has provided is that it is apparent that a majority of offenders live very locally to the level crossings where offences are being recorded which has allowed for very locally targeted communications and community engagement.

As part of a further review, BTP looked at how it processed offenders. The premise being that if risk reduction is now at the heart of what we do – is court always the best option? Does someone learn as a result? Although the primary function of a police officer is to preserve life, in his review of road traffic law, Dr. Peter North wrote: *'Surely it must be in the interest of public safety to re-train the transgressor rather than to punish as this will have benefits towards their and the public's safety, particularly if this training is angled towards their failings.'*

From this it was established that there was now a captured pool of individuals who have proved that they pose a risk not only to themselves, but to other road users. So a decision was taken that some of these people could possibly be re-educated, making them safer on the roads for themselves and others.

It was discovered there was a fundamental

link from an offender's hazard perception that leads them to follow a decision path where their driving behaviour and actions were acceptable to them. The offender would be offered a course – which they pay to attend – but which would allow them to avoid points on their driving licence. However, they would have to attend, complete and pass the course to avoid prosecution and they would also only be allowed to undertake one course in a three-year period. The judiciary was receptive and those deemed unsuitable for the ground-breaking scheme were faced with a massively increased sentencing regime.



Network Rail and the British Transport Police have introduced a purpose-built marked police van fitted with nine cameras to tackle level crossing law breakers

Photo Source: www.networkrail.co.uk

The courses are made available at a selection of locations and times. The benefits of the course also sit firmly with the position of the force in avoiding the MEVs being regarded as some sort of cash cow or being utilised to target motorists – similar to the uncomplimentary image sometimes labelled on speed cameras.

The whole ethos of the project is to steer away from this. All MEVs are highly-visible, are fully liveried and marked as a police vehicle. They are not a covert resource and are not deployed to catch people – but to encourage safe driving practices for all. The courses whole-heartedly endorse that message and, instead of only handing out fines and penalty points, help drivers improve their driving habits.

The project continues to evolve and whilst this has been a real team effort particularly by the committed officers who operate the vans, as with many projects, the enthusiasm of one individual has really made this an ongoing success. That individual is Constable Chris Shepherd, who, through his dedication and innovative approach, is not only responsible for a number of the creative ideas but continues,

through his commitment to level crossing safety, to drive the project.

As stated, this is a real partnership approach and there are currently new partnerships being forged with other agencies such as the Driver Vehicle Licensing Agency, other police forces and the Office of Rail Regulation to name a few.

The possibility of developing the use of fixed assets at locations where offending appears persistent and apparent are being explored. Techniques to target problematic non-public road crossings such as foot crossings or user-worked crossings are being discussed. This involves the deploy-

ment of train tracking systems and user information systems in order that people using the crossings can make far better informed decisions.

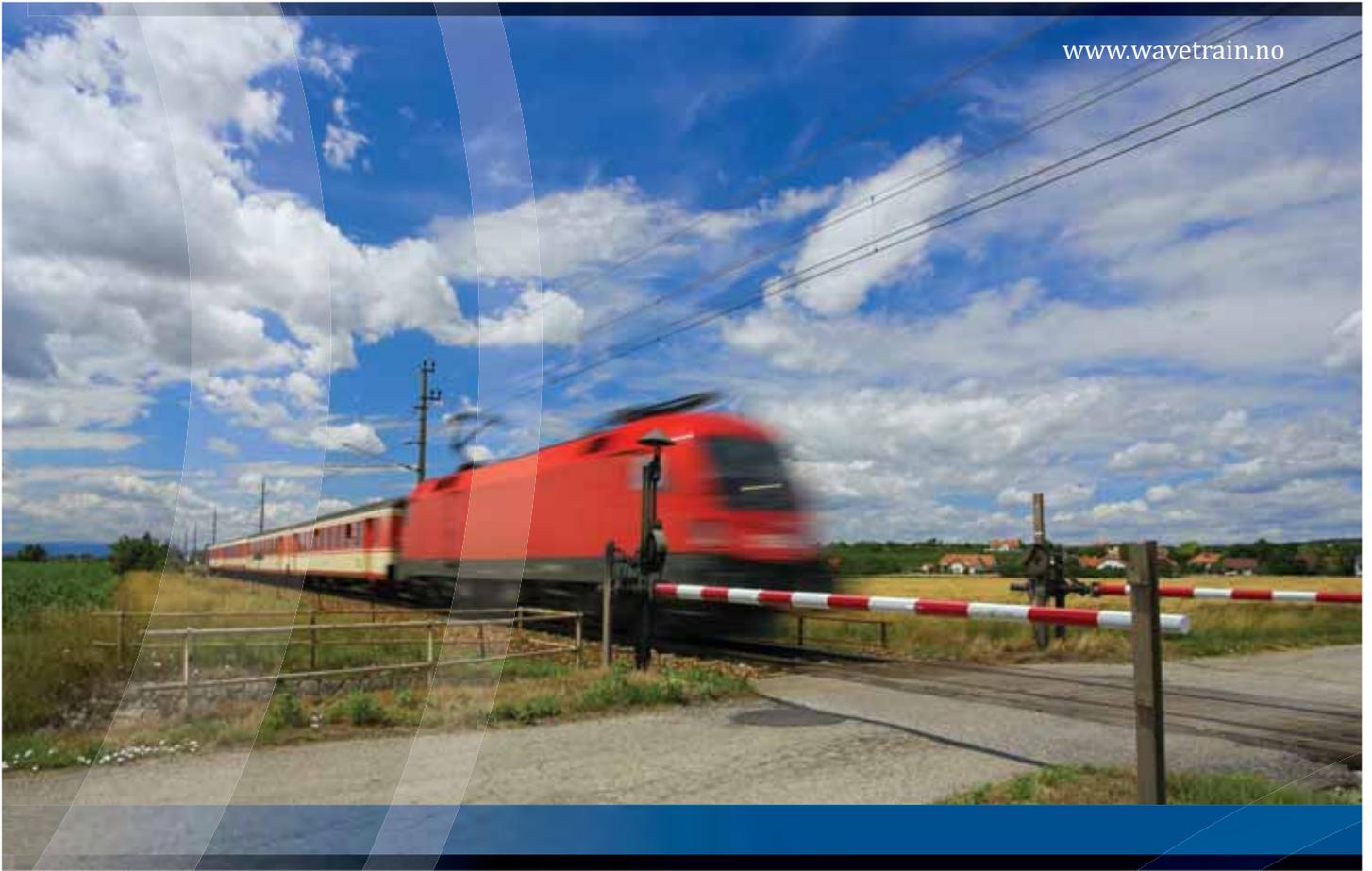
The use of the media is also essential, with the feeding-back of relevant court results to the public, and equally importantly the partners, being integral.

Risk reduction is at the centre of what BTP does and reinforces the guiding principle that the force and rail industry partners want to make the rail network safe, secure and free from disruption.

BIOGRAPHY



Chief Superintendent **Miles Flood** has 26 years' service with the British Transport Police and is currently Head of Territorial Policing. He has held a number of roles including Area Commander for London Underground – where he started his career as a Constable. He has successfully completed the Home Office Strategic Command Course and has gained experience in a variety of departments – in uniform and as a detective – in all ranks as well as areas within London and outwith.



WaveTrain Systems ensure accurate and safe detection of approaching trains at level crossings and maintenance areas



- Detecting soundwaves through rails and activating warning indicators
- **Proactive** solution, detecting trains in advance
- All components installed **within 15 metres** from level crossing or maintenance area
- Substantial **reduced installation time** and maintenance
- **Lower cost** for the operators, both purchase and maintenance
- Multi solution
- Fulfilling EU regulations
- **Similar or equal solutions do not exist**

WaveTrain Systems AS

Adress: Vollsveien 19, 1366 Lysaker, P. O. Box 23, 1324 Lysaker, Norway

Phone: +47 22 77 99 40 E-mail: info@wavetrain.no