Special Feature

Under these laws, the responsible person for a vehicle commits a speed limiter offence when a heavy vehicle that is required by law to be speed limited travels at a speed in excess of 115 km/h. Apart from the speeding offence incurred by the driver of the vehicle, the speed limiter is deemed to be functioning incorrectly and the vehicle operator is heavily penalised. This law applies to all vehicles, not just those registered in NSW.

The Safe-T-Cam program operated by the RTA in NSW is an initiative designed to reduce the risk associated with heavy vehicle driver fatigue, in order to prevent heavy vehicle crashes. By monitoring the time taken to travel between two known locations, the system can detect vehicles or drivers that may be exceeding safe limits on driving (work) hours or possibly falsifying log book entries. Safe-T-Cam also detects unregistered heavy vehicles that operate on NSW roads.

The RTA is introducing improved camera triggering systems that will be deployed from next year. This involves the installation of Transportable Infra-Red Traffic Loggers (TIRTLS) at 22 Safe-T-Cam locations. The TIRTLS enhance the Safe-T-Cam performance to overcome behaviours such as shepherding, where vehicles travel close together in an attempt to avoid camera detection.

Monitoring

The RTA operates seven heavy vehicle checking stations, sited strategically along major freight routes in the state. Heavy vehicle checking stations are an important tool to monitor and enforce vehicle condition, loading and driver fatigue en-route. Four of the stations have automated screening lanes, where a Safe-T-Cam camera will read the number plate and check earlier Safe-T-Cam sightings and registration records, while other sensors check the vehicle's weight and height. These data, combined with driver and vehicle offence histories, are used to determine if a vehicle should be directed into the checking station.

In addition to fixed heavy vehicle checking stations, the RTA deploys their 280 heavy vehicle regulation inspectors across 170 roadside inspection sites, where heavy vehicles can be safely stopped and checked. Inspectors are rostered and deployed using a risk-based approach to target locations and vehicles based on traffic flow, crash history, results of previous actions and seasonal changes in movements. This is on top of the annual roadworthiness inspection program, which ensures vehicles are maintained properly; where vehicle identification irregularities are identified, these are referred directly to the NSW police force.

In addition to all of the above, the RTA is increasing its team of chain of responsibility investigators, to be able to more effectively investigate parties in the supply chain that force drivers to take risks by setting unrealistic deadlines and ensure they are held accountable. The RTA is working with the NSW Road Freight Advisory Council to help the trucking industry develop a 5 Star Trucking Scheme, that would recognise and reward effort for those owners and operators who are achieving industry best practice for safety. The RTA is undertaking a pilot of electronic work diaries with other states to further improve heavy vehicle driver fatigue management and speed compliance.

Regular multi-agency activities include working with WorkCover NSW to visit truck stops and heavy vehicle rest locations, to educate drivers about fatigue management reforms and health and safety initiatives that relate directly to them. The RTA provides additional funding to the NSW police force to increase the visible police presence on the road and undertake enhanced enforcement above normal operating requirements.

The RTA is undertaking a campaign of targeted advertising, using radio and print media, and localised campaigns incorporating roadside advertising, variable message signs and bridge banners, to address safety issues like speeding, wearing of seatbelts, fatigue and drug use. All of these increase the profile of road safety in the heavy vehicle industry.

As Mr Bushby noted in his closing comments to his letter to the NSW Auditor General, 'In comparison to other states in Australia, NSW has the largest road transport enforcement workforce, the greatest number of checking stations, a Safe-T-Cam network across the state, and the highest level of investment and usage of technology in heavy vehicle compliance and enforcement. The RTA will continue to develop an integrated approach to heavy vehicle compliance and enforcement.'

Improving worker safety through better visibility

by Agota Berces, Traffic Safety Systems Division, 3M Australia

Road trauma represents a significant cost on society, and governments are developing various measures and safety programs to reduce the number of fatal accidents and serious injuries. The recent Safe Work Australia report [1] shows that in the 2006 to 2007 period, 453 people lost their lives in work-related injuries, with 295 dying of injuries sustained in the course of work activities. Of these 295 workplace fatalities, around 35% (103) people died in road-related trauma, which was a 32% increase on the previous reporting period.

The casualties from road trauma represent 13% of the national road toll, and the estimated costs in relation to workplace accidents comprise $1.5 billion annually. This amount, however, might not include medical expenses, rehabilitation, lost productivity, costs of investigation and vehicle damage, and write-off expenses, among other items. This figure represents a huge burden on our society, which is why cooperating stake-holders are open to investigating innovative technologies that can help reduce and prevent workplace death and injuries.

When discussing roadside safety from the occupational health point of view of roadside workers, several research studies have been carried out recommending the extensive use of personal safety garments combined with fluorescent colours and retroreflective materials. These have resulted in numerous regulations and measures implemented to protect the safety of workers and drivers.

As an example, a recent study by researchers at Queensland University of Technology (QUT) highlights the most effective configuration of retroreflective markers on road workers' protective gear, drawing the conclusion that the adoption of reflective markers in a biomotion configuration has the potential to be an affordable and convenient way to provide a sizeable safety benefit. Adding biomotion markings to standard vests can enhance the night-time conspicuity of roadway workers by capitalizing on perceptual capabilities that have already been well documented [2]. The benefits of using high visibility clothing providing both daytime and night-time visibility are indisputable.

Although better visibility of personnel working along roadsides has always been focused on intensively, not so many studies are available about the visibility of roadside objects and vehicles, which can also contribute indirectly not only to the safety of workers, but also to the safety of other road users. This paper aims to provide an overview of how high visibility markings of roadside objects and vehicles have helped to prevent accidents by introducing best practices from various industries, including mining, emergency response services and freight forwarders.

Roadwork zones – roadside vehicle safety

Between 1989 and 1992, 32 workers were killed while carrying out their jobs in road construction or maintenance. Safety is of high concern at roadwork zones, with workers being exposed to traffic movements and changing road conditions. It has been confirmed that roadwork zones show higher accident rates than non-work sections due to the change in the road environment and the distractions that may occur owing to construction activities.

As roadwork zones are set up relatively frequently due to the many projects improving or maintaining existing networks, not only are work site personnel endangered, but accidents may involve other road users, drivers, cyclists and pedestrians as well. A research project called ARROWS, funded by the European Union between 1996 and 1998, resulted in a practical handbook for roadwork zone safety to help traffic professionals, such as highway authorities, designers and contractors, create a safe road work design and operation.

Results of accident studies show that more than half the accidents on work zone areas of motorways are rear-end collisions (e.g., 60% in the UK, 63% in Germany). Those accidents, as well as sideswipe crashes, are found to occur mainly in the daytime, with higher traffic volumes. Another relatively common work zone accident type is collision with a fixed object, more commonly occurring at night-time and associated with inappropriate vehicle speeds. Finally, of special importance for road work zones are accidents involving collisions with road workers.

Generally, accident rates tend to be higher for work zones of shorter duration and for work zones utilizing full (rather than partial) contraflow [3]. Complementing the use of high visibility protective garments, it is also important to apply fluorescent and retroreflective markings to roadside vehicles to alert drivers and roadworkers to all vehicles on site in order to help prevent collisions with parked or moving objects.

Increasing vehicle visibility in the mining industry

Mines are networks of complex processing areas where the environment is monochrome with generally poor ambient lighting. Visibility is often limited and vehicles can be either large (such as haul trucks or earthmoving equipment) or relatively small (light vehicles and four-wheel drives). The terrain, combined with the absence of visual cues such as buildings and trees, means that vehicles are at a greater risk of collision and injury, particularly at poorly marked junctions. It is also essential for all road users on the mine site to be able to identify and recognise larger and smaller vehicles. All these indicate that there are many issues to be addressed to ensure workers' safety when navigating the road network within the mine site.

After having experienced a substantial number of near miss incidents, one of the Australian mining companies has started to investigate incidents related to poor visibility of their heavy vehicles by recording data about incidents resulting from people not being able to detect each other's machines. They initiated a visibility project run from 2005 and began to apply day- and night-time visibility markings on their vehicles. As an outcome of this project, there has been a dramatic decrease in incidents reporting visibility as an issue. Figure 1 illustrates the change in the number of reported near miss incidents.

Figure 1. Number of near-miss incidents reported to be related to poor visibility

Special Feature

Utilizing high-visibility markings combined with fluorescent colourants, especially fluorescent yellow-green, provides superior conspicuity during daytime, at dusk and dawn, and at night. Such markings can deliver exceptional luminance through multiple viewing positions. A key point to mention is that the optimum reflectivity and visibility is delivered not only at a long distance, but also at wide angles. The type and the size of the marked-up vehicle is easy to detect, and large number panels allow operators to be identified easily during shifts, as shown in Figure 2.

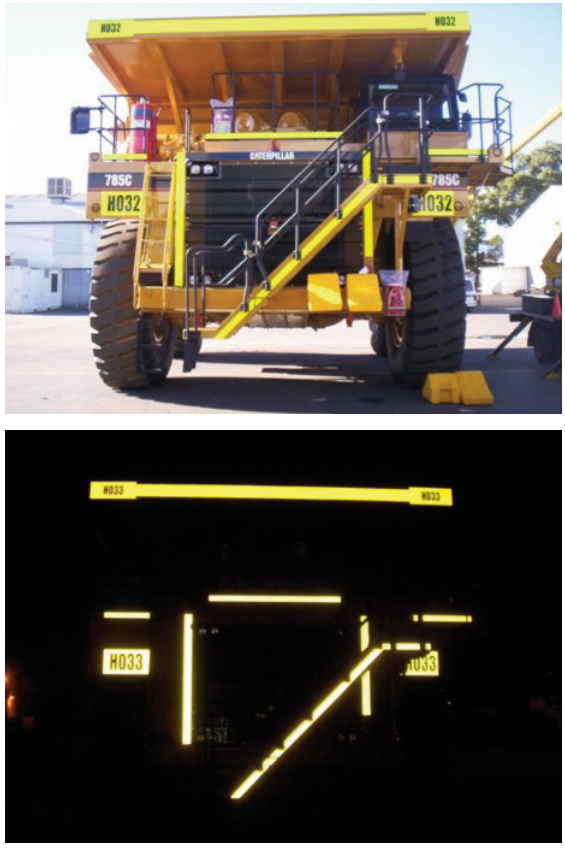

Figure 2. Haul truck day and night

Faster response through increased visibility in emergency services

Emergency response services are considered a dangerous operation. Response vehicles may drive at higher speeds, cross into oncoming traffic and enter controlled intersections requiring greater visual and audible detection for other motorists. Visibility and conspicuity are two very important factors to ensure emergency vehicle safety while on the roads or parked along roadways. Reducing the risk exposure of emergency services personnel servicing the public is a key focus area and some facts demonstrate how important it is to address this issue.

Studies conducted in the United States and elsewhere suggest that increasing emergency vehicle visibility and conspicuity holds promise for enhancing first responders' safety when exposed to traffic, both inside and outside their response vehicles (e.g., patrol cars, motorcycles, fire apparatus and ambulances) [4].

The importance of addressing vehicle characteristics and human factors to help positively affect the safety of emergency workers operating along the nation's roadways is starkly established by first responders' morbidity and mortality experience. Over the past decade, numerous law enforcement officers, firefighters and emergency medical services workers were injured or killed in roadside crashes throughout the United States [4].

It is clear that properly applied and maintained high visibility markings, including the use of fluorescent materials, can effectively increase the early detection of ambulance vehicles. An example of best practice addressing visibility can be attributed to St John Ambulance in Western Australia. During the past years, St John Ambulance Service introduced a new livery onto their vehicles that fulfil a twofold objective: safety and corporate identity (Figure 3).

Figure 3. St John Ambulance vehicles, Perth WA (Photo used with permission of St John Ambulance)

Avoiding accidents through increased truck visibility

Transport experts agree in stating that the mobility of people and goods affects our growth and well-being, making it one of the major socio-economic challenges of the 21st century [5]. Road transport is a complex system with implications based on several factors, including road safety, energy consumption and the environment. The transport and storage industry has the highest fatality rate of any industry in Australia. During 2006-07, one-fifth of all workplace deaths (59) were made up of a single occupation – truck driving [1] – from a total of 103 people dying as a result of road accidents. These numbers do not include accidents where death or serious injury occurred to a non-working individual, e.g., collision with a truck.

Numerous reports are available about the effectiveness of visibility markings aimed at reducing rear and lateral collisions. Visual perception is limited at night, which results in relevant

information not being received and more attention being required of the motorist. In this situation, trucks, which normally move relatively slowly, represent a potentially dangerous obstacle, especially since the fatality rates for drivers of passenger cars involved in accidents with them are very high on account of the high mass of the trucks.

About 40% of road accidents take place at night, dawn or dusk, in spite of the fact that not more than a third of the traffic is on the roads (compared to daytime driving). It can be concluded that driving at night is at least twice as dangerous as during the day [5].

The German Technical University of Darmstadt conducted an examination of night-time and daytime accidents between a test group comprising 1000 vehicles equipped with contour markings and a control group of 1000 vehicles without such measures. After two years of the installations, the conclusion was drawn that 95% of night-time collisions could have been avoided if trucks in the control group had had retroreflective visibility markings [5]. Figure 4 shows the difference in visibility at dusk between trucks with and without retroreflective contour markings.

Another study commissioned by the European Union and undertaken by the German TÜV Rheinland Group in 2004 [6] outlines the situation in the individual member states of the European Union. The study investigated the effects of the mandatory introduction of conspicuity markings for heavy vehicles by creating a detailed cost-benefit analysis for decision makers.

In the past, governments tried to minimize the negative impacts of heavy vehicle accidents by introducing national legislation, but as new technologies and borderless trade evolved, there was a crucial need to harmonize the international requirements, which led to a new European Directive in 2008. The European-wide study by TÜV Rheinland also contributed to the reasons why the European Union has decided to implement mandatory conspicuity markings for heavy goods vehicles and trailers in all member states. This is an excellent example of how the adoption of high performance retroreflective sheeting for usage in vehicle marking has resulted in another safety improvement for many road users.

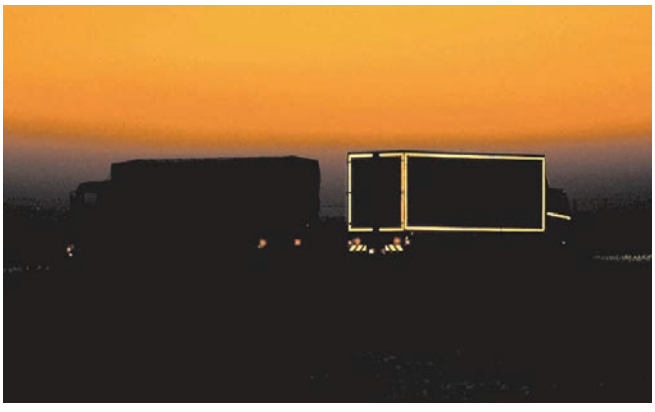

Figure 4. Unmarked and marked trucks at night

Summary

Australia has set a target to reduce the annual road fatality rate per 100,000 population by 40% between 1999 and 2010. The National Road Safety Strategy (NRSS) shows that by 2010 we can save 700 lives every year by improving safety of the roads (332 lives), improving the safety of vehicles (175 lives), improving driver behaviour (158 lives) and adopting smarter safety technology (35 lives) [7].

High visibility markings used not only on safety clothing, but also on roadside, emergency and heavy vehicles, can effectively contribute to achieving these targets and saving the lives of those who are working on our roads. The use of these markings is relatively low cost and is a practical solution to improving the visibility of these vehicles to all road users.

References

1. Safe Work Australia. Work-related traumatic injury fatalities, Australia 2006-0. Canberra: Safe Work Australia, 2009. pp.1, 10.
2. JM Wood. Research initiatives to improve the visibility and hence safety of road workers at night-time. Journal of the Australasian College of Road Safety, May 2010 pp. 23-24.
3. ARROWS Advanced Research on Road Work Zone Safety Standards in Europe, Project Coordinator NTUA (National Technical University of Athens, Greece) 1996-1998, p.9.
4. Emergency vehicle visibility and conspicuity study FA-323, August 2009 FEMA, pp.5, 7.
5. H.-J. Schmidt-Clausen, Contour marking of vehicles final report FO 76 / 00, Laboratory of Lighting Technology, Darmstadt University of Technology, p.8.
6. TÜV Rheinland Group. Conspicuty of heavy goods vehicles. European Commission, Directorate Gernal for Energy and Transport, 2004.
7. SaferRoads website, www.aaa.asn.au/saferroads