SPEED Fact Sheet

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Powered Two Wheelers and Speed, how to bring about reductions in speed-related collisions?

Introduction

'Powered Two Wheelers' (PTWs) is the generic term for motorbikes, mopeds and other motorised two wheel vehicles. In 2006 they represented 16% of all road deaths for only 2% of the Kms driven on the road network (ETSC, PIN 2nd annual report 2008). For the same distance travelled, the risk for riders being killed in road collisions is on average 18 times the risk of car drivers (ETSC, 2009). Alarmingly, PTWs are the only type of vehicles for which the number of road deaths is not decreasing. While the number of road deaths has declined considerably in the past decade in Europe, the number of killed PTW riders rose in 13 out of 27 countries (ETSC, 2009). Understandably this is because the use of PTWs is on the rise (as they are often a mean to avoid congestion, or an environmentally friendly alternative to the passenger car) but also because of the intrinsically vulnerable nature of the users of PTWs.

MAIDS, the "Motorcycle Accidents In Depth Study", is the most comprehensive in-depth data currently available for Powered Two-Wheelers (PTWs) accidents in Europe. The investigation was conducted during 3 years on 921 accidents from 5 countries using the OECD common research methodology. The study indicates human factors as the primary accident contributing factor in approximately 87.9% of all cases:

	Frequency	Percent
Human PTW	344	37.4
Human Other driver	465	50.5
Vehicle	3	0.3
Environmental	71	7.7
Other Failure	38	4.1
Total	921	100

To understand the human causal factors better, a set of human failure response codes was developed (perception failure, comprehension failure, decision failure, and reaction failure). The study identifies a perception failure on the part of another vehicle driver as the primary contributing factor for collisions (36.6% of cases), which means the inability of the other vehicle's driver to perceive the PTW or the PTW rider. This emphasises the need for information campaigns to target all road users (ie: not only PTWs users), as is the case for example in the latest Belgian Road Safety Institute campaign called "Ne vous laissez pas surprendre par les motards" ("Don't let bikers take you by surprise") calling for drivers of all vehicles to look out for PTWs at all times. However it also importantly emphasises the need for PTWs users to be aware of the principles of defensive driving, which includes of course watching one's speed. MAIDS also lists other major human factors including "Decision failure" on the part of the PTW rider (13% of all cases) and "Perception failure" on the part of the PTW rider (12% of all cases).

When it comes to speed management, PTWs are a type of vehicles for which much work is needed, as many 'traditional' speed management measures need to be tailored to their special needs. Speed detection and measurement devices for example are not in all cases optimised for the detection of the speed of PTWs. PTWs are also typically capable to reach high speeds very quickly thanks to their capacity to accelerate faster than other vehicles, and it is of paramount importance that a difference in speed compared to the surrounding traffic is kept to a minimum. In MAIDs, a difference in speed compared to the surrounding traffic was identified as a contributing factor for PTWs in 18.0% of all cases and a contributing factor for the other vehicle in 4.8% of all cases.

The following sections of this Fact Sheet put forward what can be done to foster PTWs' safety, with a particular link to speed management. There is a range of actions that can be taken in the fields of training, enforcement, vehicle technology (including the development/deployment of ABS and ISA systems for PTWs), anti-tampering and gradual access to PTWs.

Training/Education

Initial training: FEMA the European road riding motorcyclists' federation, FIM the World motorcycle sport federation and ACEM, the European motorcycle manufacturers' association, developed the Initial Rider Training (IRT) programme, funded by the European Commission. This is funded on the basis that initial rider training in Europe does not meet riders' needs. It is believed that IRT can improve pre-licence training and will reduce the number of riders killed and injured. The programme provides a structure for initial motorcycle training. The content is generally similar to the UK's

Compulsory Basic Training programme. The partners' intention is for IRT to become the European standard for initial training. Importantly, IRT stresses the need to balance machine control with hazard awareness and social responsibility. Information about IRT can be accessed online: http://www.fema.ridersrights.org/IRT/index.php

Rehabilitation: In the United Kingdom a strong accent is placed on the rehabilitation of riders who have committed certain offences, including speeding offences. 'RIDE' courses (Rider Intervention Developing Experience) are courses for motorcyclists who are allowed to attend the course where there is evidence to prosecute them for a range of traffic offences. This course has been specifically designed for motorcyclists because the motorcyclist fraternity has different needs from the general motoring community and they are without doubt the most vulnerable of road users. Such courses are in line with the UK's Motorcycle Enforcement Strategy that came into force in 2008 (see below) with an emphasis on securing compliance through education, encouragement and advice.

Enforcement for PTWs

Speed detection and measurement devices are not in all cases optimised for the detection of the speed of PTWs. Enforcement authorities should therefore be encouraged to adapt or replace their equipment in-use in order to equally treat PTWs in speed enforcement. In France, the report prepared by the interministerial road safety observatory to evaluate the impact of the automatic speed control system between 2003 and 2005 stated that "the very small proportion of rearward facing radars poses a real problem for detecting PTWs, which are by far the type of vehicles least complying with speed limits" (ONISR, 2006).

Licence plate visibility and harmonisation across Europe should also be considered. The effectiveness of enforcement depends strongly on the chance of getting caught violating the rules. To increase this risk, automated detection should be deployed, but this is only reliable when licence plates have a certain size, colour and layout. The rules for the configuration of licence plates vary across member state and there are many examples of plates that are hard to detect automatically.

Enforcement activities (routes/times) should be optimised and justifiable using PTW safety data. Venues and timing of speed enforcement in general should be directed by crash figures: on roads or at junctions that show a high volume of collisions with speed as a contributing factor speed enforcement should be increased. A good example of the use of intelligence for enforcement campaigns can be found in the UK's Motorcycle Enforcement Strategy that came into force in 2008. This strategy was developed by the Association of Chief Police Officers (ACPO). The strategy was driven by the recognition that within the UK, police forces adopted many differing strategies when dealing with motorcyclists and that this could result in a lack of focus on key safety issues and lead to distrust and animosity amongst motorcyclists. The strategy states that enforcement should be intelligence led and targeted, and that it is important to use intelligence to indicate the optimum time of the day, week, month and year to organise campaigns and deployment strategies. The strategy recommends to link annual enforcement and education campaigns with the Department for Transport 'THINK' calendar of events (to integrate enforcement with education). Regarding technology the strategy states that all available techniques should be considered, such as overt, high visibility patrol vehicles, covert unmarked vehicles, digital recording equipment and air support where possible. Importantly, the strategy, while stating a clear intent to deal appropriately with serious offenders, has a strong emphasis on securing compliance through education, encouragement and advice. One consequence of this is the development of diversionary courses available in the UK (RIDE, Rider Risk Reduction) to offer certain offenders an alternative to prosecution. The Strategy can be consulted online: http://www.acpo.police.uk/asp/policies/Data/motorcycle_enforcement_strategy_website.doc

I S A for PTWS

Intelligent Transport Systems also have the potential to significantly improve road safety of all road users. However, some ITS applications will need specific development and adaptation to enable them to be used on PTWs, due to their intrinsic characteristics. Previous research, whether on technical aspects or on user response on Intelligent Speed Assistance (ISA) has been almost exclusively for cars rather than for motor vehicles in general. There are strong arguments against moving towards an implementation that is limited to one class of vehicle, even a majority class. These arguments relate in part to equity — why should some drivers or riders be free to speed when others are not — but also to the safety and environmental impacts of ISA.

In terms of safety, high speed variance is related to risk and leaving one or more groups of vehicle without ISA in a network where most vehicles had ISA would potentially increase speed variance. This is particularly an issue for PTWs, since these would not, in most circumstances, be restrained by slow moving vehicles in front. Any policy move that would make PTWs more attractive as the only general class of vehicle on which speeding was possible would be highly undesirable.

But, if the equipping of PTWs is desirable from a policy perspective, there are technical aspects to take into consideration for reasons of vehicle stability and handling: it is inadvisable to apply deceleration inappropriately to a PTW. Therefore an ISA system for PTWs may be able to restrict acceleration, but will only be able to use deceleration in a way that causes no sudden change in engine power.

A fundamental requirement for the ISA motorcycle is to have smooth, progressive power reduction that does not unsettle the rider. In addition, there are more severe space and weight issues on PTWs than on cars, so that miniaturisation of the ISA system is a prerequisite. It is recommended that further research in this area is undertaken in order to develop a safe and effective ISA system for PTWs. One of the latest reports of an ISA Trial for motorcycles was recently published by the UK Department for Transport and can be found here: http://www.dft.gov.uk/pgr/roads/vehicles/intelligentspeedadaptation/motorcycletrial.pdf

Gradual access to certain engines

Restricting the engine capacity for beginner motorcyclists has proved to be a successful intervention. In the UK in the early 1980s, the maximum engine size of a motorcycle that learners could ride was reduced from 250cc to 125cc; accompanied by a limitation on the maximum power output (9kW). As a result, many inexperienced motorcyclists transferred to less powerful vehicles, leading to an estimated 25% reduction in casualties among young motorcyclists (WHO, Worldbank, 2004). In Malaysia, increasing the legal riding age from 16 to 18 years was also found to have great benefits (WHO, Worldbank, 2004). In its Blueprint for the 4th Road Safety Action Programme ETSC recommends that while implementing the Driver Licence Directive, European Member States seek to encourage drivers to undertake progressive access to PTWs by recognising the experience gained on lower PTW categories.

Consultation on a proposal for a Framework Regulation on type-approval of two-and three wheel motor vehicles

The European Commission recently launched a proposal for a type-approval regulation for two and three wheel motor vehicles (much like the type approval that there is for other vehicles). This proposal aims at replacing 14 existing Directives by a single framework Regulation. While regretting that the proposal does not go further into efforts for reducing speeding, ETSC responded to a number of questions that are of relevance here, including advance Braking Systems, and anti-tampering:

Advanced braking systems

ETSC experts are of the opinion that ABS and advanced breaking systems should gradually become mandatory for all PTWs and that riders be educated regarding their use and benefits. The variety of other advanced braking systems should be evaluated for their safety impact and, if more cost-effective, be considered as an alternative to ABS.

A number of new technologies have been progressively adopted in cars over the past decade and the European Commission has taken the lead on this, by for example making the electronic stability control, (ESC or ESP) mandatory in all new cars and commercial vehicles sold in the EU from 2012, with all new cars being equipped by 2014. The penetration of advanced braking systems for two and three-wheelers is, on the contrary, falling behind. Only mere 35% of street models available in Europe were equipped with an advanced braking system in 2008 whether as standard or optionally. EU legislation is therefore needed to push ahead with the introduction of vehicle safety technologies having a great life saving potential.

The safety effect of advanced braking systems for vehicles considered is well known and understood. In particular, it can do much to eliminate the dangers of overbraking in a straight line. Research shows that the average rider can only apply 56% of the available braking in an emergency (Ecker et al. 2001). Another field experiment has shown that the average rider underestimates the effectiveness of the front brake: asked to perform an emergency stop on a training track, the average rider used the front brake with only 42% of its potential (Vavryn and Winkelbauer, 1998). In contrast, the rear brake was used with 169% of its potential. In total, the average rider decelerated at 6 m/s, which is less than a modern 40 tonne truck would achieve. Thus, it is obvious that in a real-life emergency, the rider will often not be able to apply a reasonable deceleration. In that case, either they cannot avoid a collision with the obstacle, and/or the collision speed is higher.

The safety benefit of ABS is relatively well documented. For example, Sporner and Kramlich (2000) claimed that in 93% of collisions in which riders fall down as a result of sliding, these could have been mitigated were their vehicles fitted with ABS. The study of Transport Canada and National

Highway Traffic Safety Administration showed that fatal motorcycle crashes per 10,000 registered vehicle a year were 38% lower for ABS models than for their non-ABS versions.

The cost benefit ratio of mandatory equipment of all motorcycles by ABS was estimated within the ROSEBUD project as high as 1.1-1.4 (9.39-11.24), the estimates in brackets are for the scenario of having a special tax initiative. Nevertheless, it is recognised that the C/B ratio would be smaller for small powered two-wheelers.

Anti-tampering

The ETSC is of the view that physical measures aimed at reducing tampering of vehicles, would only make sense once accompanied by regular random spot checks performed by well-trained officers. Practically zero enforcement of technical standards contrasts with the strict enforcement of regulations imposed on other types of vehicles. A fair treatment of all road users in respect to the regulations in force is needed. Moreover, the lack of enforcement of vehicle-related regulations may further enhance the feeling of impunity of riders in respect of traffic law.

In this respect, ETSC suggests introducing a common European labelling system of the different parts of vehicles facilitating the assessment of vehicles in respect of tampering during their on spot inspection by Police officers. Other measures facilitating on the spot inspections should be further developed and applied.

In Madrid a campaign has been developed as a counter-measure to PTW tampering. Mobile speed cameras and dynamometers have been supplied to law enforcement units to allow them to carry out campaigns that monitor compliance with technical requirements for two-wheeled motor vehicles. The aim of this initiative is to combat motorcycle and moped tuning to increase power and speed. To date, the Road Traffic Directorate has acquired 9 speed cameras that will be given to local councils in return for their commitment to report on the results of their use. A similar campaign using mobile testing equipment has begun in London, including the seizure of offending PTWs.

Conclusions

Much can be done to reduce PTWs collisions, and speed management for this particular type of vehicles is an area of work of paramount importance. While it is important not to stigmatise motorcyclists as speed enthusiasts, PTWs are typically capable to reach high speeds very quickly thanks to their capacity to accelerate faster than other vehicles, and are therefore likely to expose their riders to great risks. Improved rider's training and rehabilitation, improved targeted enforcement, the deployment of vehicle technologies including ABS and ISA, anti-tampering, and gradual access to PTWs, all have the potential to bring about reductions in speed-related PTW collisions.

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Speed Fact Sheets

Editor and circulation:

Gabriel Simcic
gabriel.simcic@etsc.eu

For more information about ETSC's activities and membership, please contact:
ETSC
Avenue des Celtes 20
B-1040 Brussels
Tel. + 32 2 230 4106
Fax. +32 2 230 4215
E-mail: evgueni.pogorelov@etsc.eu
Internet: www.etsc.eu

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