






**BP5: PTW Design and Protective Equipment**

<b>Reference:</b> BP5 013	<b>Title of Project:</b>	<b>Motorcycle Helmets, Standards</b>
<b>Version:</b> 1	<b>Website:</b>	<a href="http://www.dft.gov.uk/rmd/project.asp?intProjectID=7962">http://www.dft.gov.uk/rmd/project.asp?intProjectID=7962</a>
<b>Brief Description of Project:</b>	<p>The use of a suitable motorcycle helmet is a legal requirement for at least some riders in all EU countries. The standard specified in European regulations is ECE 22.05. In the UK approved helmets carry the BSI 'Kitemark'.</p> <p>Helmet types include 'full face', open face', 'flip-up' and 'half' or 'shorty' helmets.</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  </div> <div style="width: 45%;"> <p>Performance tests identify full face helmets as providing the greatest protection from the largest range of common impact events. Some riders prefer open face or half helmets for other reasons such as fashion or greater comfort in hot weather.</p> </div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  </div> <div style="width: 45%;"> <p>Helmet construction includes 2 key elements. The <b>shell</b> is constructed of fibreglass, polycarbonate or other extruded plastic sometimes with Kevlar or similar material incorporated. The function of the shell is to protect the energy absorbing <b>liner</b> from external intrusion and resist abrasion in a slide following a collision.</p> </div> </div> <p>The liner provides almost all the energy absorbing protection for the head and brain.</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  </div> <div style="width: 45%;"> <p>Performance testing for the various standards simulates common impacts. The test for ECE 22.05 requires slightly higher impact speeds than the current US DOT and the private SNELL test has additional impact configurations. In the UK the recently introduced SHARP rating purports to provide additional information on protection through a 5 star rating system.</p> </div> </div>	

	<p>One of the reasons sometimes advanced for not wearing a helmet is that they will not provide life-saving protection at high speeds, however research in Australia appears to show that 90% of PTW collisions occur at speeds where an approved helmet would provide protection and this is certainly true of almost all urban PTW impacts.</p> <p>Eye protection is a crucial safety factor to prevent impact from external objects and reduce long term damage. For full-face and modular helmets this is achieved via a flip up visor. For open face helmets goggles or protective glasses are usually used. In Europe there is regulation covering protective eye-wear, visors and goggles ensuring that they are 'anti-scratch' as far as possible.</p> <p>Regulations prohibiting the use of heavily tinted visors are in place and enforced in some countries. These regulations are based on the amount of light allowed to pass through the visor.</p> <p>An additional safety issue is visor 'fogging' due to condensation from the rider's breath, especially in colder climates. Helmet venting systems are not tested as part of ECE 22.05. There are 'anti-fogging' treatments available and new 'double-visor' technology appears to provide an effective remedy.</p>
<p><b>Monitoring Data:</b></p>	<p>There has been considerable research into the effects of helmet wearing and mandatory helmet use. Due to the number of states in the USA that have introduced and then repealed helmet laws there is a wealth of data providing conclusive evidence of the effects. Research in Italy into the introduction and subsequent enforcement of mandatory helmet use confirms this research.</p>
<p><b>Results:</b></p>	<p>Muller (Muller 2004) used Florida crash data from 1994 to 2001 to conduct an interrupted time series analysis. His study concludes that the repeal of the motorcycle helmet-use law resulted in a 48.6% increase in motorcyclist deaths. Even after adjustments for concurrent increases in motorcycle registrations and/or in miles travelled were used, the increase was 21.3% and 38.2%, respectively. Hotz et al. (Hotz, Cohn et al. 2002) also studied the effect of the repealed motorcycle Helmet Law in Florida. Their study used data from the University of Miami/Jackson Memorial Medical Center. They reported that the number of brain injuries of motorcycle riders in this hospital almost doubled (from 18 to 35) after the repeal of the helmet law and the number of fatalities quadrupled from 2 to 8 for comparable time periods.</p> <p>Following a review of PTW casualties in Louisiana from 1999 to 2005, Schneider (Schneider (2006) concluded that there was an increase in risk of fatality of 77.3% when not wearing a helmet.</p>

	<p>Research into the effects of a helmet law supported by enforcement in the Romagna region in Italy (Servadei et al..2003) showed that helmet use increased from an average of less than 20% to over 96%. A comparison of traumatic brain injury (TBI) incidence in the Romagna region shows that there was no significant variation before and after introduction of the revised helmet law, except for TBI admissions for motorcycle-moped crashes where a 66% decrease was observed. In the same area TBI admissions by age group showed that PTW riders aged 14–60 years sustained significantly fewer TBIs. The rate of TBI admissions to neurosurgery decreased by over 31% and epidural hematomas almost completely disappeared in crash injured moped riders.</p> <p>There has been some research linking the weight of a helmet to increases risk of neck and upper spine injuries but the alternative trauma to the head and brain appears to be potentially more severe.</p>
<b>Key Effective Conclusions:</b>	<p>The use of an approved motorcycle helmet, correctly adjusted and fastened, significantly reduces the risk of head injury in PTW collisions at normal urban speeds.</p> <p>The counter argument rests on issues of comfort and/or fashion. Some research does link helmet weight with neck and upper spine injuries.</p> <p>Research supporting the use of helmets tested to an acceptable standard appears overwhelmingly conclusive.</p>
<b>Projects for Comparison:</b>	Motorcycle protective clothing (BP5 012).
<b>Justification:</b>	The promotion and mandatory use of an approved motorcycle helmet appears to provide one of the most effective counter measures to life-threatening injury in a PTW collision and therefore supports the objectives of eSUM WP3.