



BP5: PTW Design and Protective Equipment

Reference: BP5 003	Title of Project:	Antilock Braking Systems
Version: 1	Website:	http://monash.edu.au/muarc/reports/muarc260.pdf
Brief Description of Project:	<p>Motorcycle ABS is designed to provide effective braking whilst avoiding loss of control arising from wheel-lock.</p> <p>Early systems were essentially mechanical and whilst they provided reduced risk of loss of control, the ‘cadence’ effect was unlike normal braking ‘feel’.</p> <p>Current systems use a sensor on each wheel to assess motion. Under braking if the wheel stops the brake pressure is momentarily released to prevent skidding and loss of control.</p> <div data-bbox="397 1102 1019 1423" data-label="Image"> </div> <p>BMW have introduced ABS on most of its production motorcycles and refined the system over the last 2 decades. (Photo © by Jeff Dean.) Other manufacturers have introduced their own ABS but it is still largely confined to ‘high-end’, large capacity tourers.</p> <p>Research into ABS has stretched over 5 decades or more and there is sufficient evidence to accept that, in a panic braking situation, ABS will provide more effective and controlled stopping.</p> <p>There is some resistance to ABS from sports riders who correctly claim that a practiced and experienced rider on a good dry surface can stop marginally more quickly without ABS. However, research consistently shows that, in crisis braking, ABS stops the motorcycle more quickly, especially on wet or poor surfaces.</p> <p>ABS also prevents ‘stoppies’ and intentional skids and this is viewed as a negative by some risk taking riders.</p>	

	<p>Cost is a key drawback. There are low-cost variants which claim ABS properties and a retrofitting capability but these have not been independently tested.</p> <p>http://www.tcbbrakesystems.com/motorcycle-brakes-tcb.html</p> <p>Several manufacturers are developing cheaper ABS which could feature on mass produced PTWs in the near future.</p>
Monitoring Data:	<p>Braking simulation tests show consistently improved stopping performance in crisis situations. Structured monitoring using collision data is lacking but research from a variety of sources (Maids, DfT In-depth Motorcycle Accident Study) shows loss of control under braking is a significant factor in urban PTW collisions.</p>
Results:	<p>Performance based research conclusively shows improved 'panic' braking performance from ABS with reductions of between 1.5 and 5m in stopping distance. Anecdotal evidence suggests much improved collision avoidance; for example the California Highway Patrol experienced no rider fatalities in 5 years after switching to BMW motorcycles with ABS.</p> <p>Research by Sporner and Kramlich (2001) indicates that ABS would reduce collision occurrence in PTWs by 10%. They estimate that around 54% of collisions would be either avoided or reduced in severity.</p> <p>Sporner, A., Kramlich, T. (2001) Motorcycle braking and its influence on severity of injury. In proceedings of the 17th ESV conference. Paper no 303</p>
Key Effective Conclusions:	<p>ABS is proven to reduce braking distance and therefore improve collision avoidance in crisis situations.</p> <p>The current restraining factor is predominantly cost although sports motorcycle riders and extreme risk takers perceive a lack of feedback from ABS.</p> <p>Given the preponderance of junction collisions in urban areas where other drivers fail to give way to the PTW, ABS has potential to reduce the frequency of collisions and the severity in those which do occur.</p> <p>In the summary of their research into motorcycle braking systems BAST gave the following, succinct recommendation: <i>ABS should be used on all two-wheeled vehicles wherever possible.</i></p>
Projects for Comparison:	<p>Advanced Braking Systems (BP5 004).</p>
Justification:	<p>If the cost constraints could be overcome, ABS installation could be extended to small capacity urban/commuter PTWs providing potential for reducing collisions and casualties.</p> <p>The measure appears to meet the eSUM objective for WP3, BP5 in contributing to the reduction in risk of collision through technological improvement in PTW design.</p>