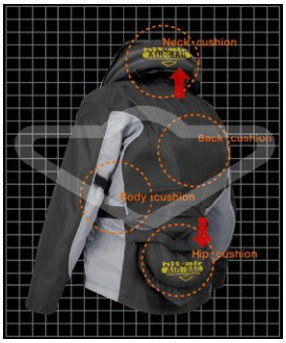
BP5: PTW Design and Protective Equipment

Reference: BP5 002	Title of Project:	**Airbag Jackets**
Version: 1	**Website:**	http://www.monash.edu.au/muarc/reports/muarc260.pdf www.munimadrid.es
Brief Description of Project:	Motorcycle Police in Madrid are now equipped with protective clothing that meets EN-1621 and has 'airbags' built into the jacket which protect the rider if they fall from their machine. An extract from a research paper published in Australia by Monash gives an overview: A recent development in motorcycle safety is airbags built into a rider's jacket. These systems involve the same principles as vehicle-mounted airbags, where upon detection of a crash situation the airbag is automatically deployed to minimise injury to the rider. However, the mechanisms of airbag jackets are different to those of traditional airbags. Jacket airbags come into effect once the motorcyclist has been thrown from the vehicle, rather than trying to prevent this from occurring. The jacket is connected to the vehicle through a cable, and when this connection is severed (the force of the rider being thrown from the motorcycle uncouples a pin or key in the jacket) the airbag inflates. The rider will still hit the ground with the same force, but they will be protected with a cushion of air surrounding their upper body. Airbag jackets are inflated by a carbon dioxide cylinder built into the jacket, which is less flammable than the gases used to inflate vehicle-mounted airbags. There are a number of commercially available airbag jackets. However, there is no existing independent evaluation of their effectiveness. Hit-Air conducted a shock-absorbing test on their airbag jacket, showing that this system was more effective than both a regular riding jacket and a jacket with additional padding. Airbags jackets, like vehicle-mounted airbags, are passive systems which serve to reduce injury severity. In addition to front-impact crashes, airbag jackets could be effective in a range of loss of control or multiple vehicle crash where the rider is thrown from the vehicle. The Hit Air system. takes approximately 0.5 seconds to fully deploy but offers some protection from about 0.2 s. For comparison a car based system, using an explosive inflation process, fully deploys in around 0.175 seconds. The system will not deploy until the rider separates from the vehicle, which may result in reduced protection for some rapid impacts.	

	There is a 30kgf trigger which should mean that stepping off a parked motorcycle without disconnecting the system will not result in an unnecessary deployment.  The Dainesse system, used by some motorcycle racers and due to go on public sale in 2010, utilises an ECU fixed to the motorcycle. The ECU inflates the air bag prior to the rider separating from the motorcycle providing full deployment at an earlier stage in the collision. This system focuses on protecting the rider's neck and upper spine.  Some systems can be recharged by the owner following deployment. Current designs of jackets including the airbag technology are virtually indistinguishable from similar garments providing standard CE rated protection. It is, however, recognised that there would be resistance to use of the technology from some riders and groups.
Monitoring Data:	There are no independent monitoring data available. There are claims on the manufacturers' websites that indicate positive results from simulated collision testing and 'testimonial' type case studies of impacts.
Results:	Manufacturers claim reduced impact injury in simulated and actual collisions.
Key Effective Conclusions:	Independent research is required to validate manufacturers' claims however, notwithstanding the issue of deployment speed, the technology would appear to offer improved levels of protection in many urban collision configurations. Data from the MAIDS study indicates that rider injuries to the spine and thorax are over-represented in the database. These are areas protected by the airbag jacket. Police in Madrid are trialling airbag jackets for their motorcycle officers.
Projects for Comparison:	Honda Motorcycle Airbag System (BP5 001). Yamaha ASV. Leg Protection systems.

Justification:	Although detailed independent research is required, current technology appears to offer the potential for improved rider protection in conjunction with conventional CE rated protection. The measure appears to offer the potential for reduction in risk of injury in a collision in line with eSUM objectives.