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7 solutions developed within the project aimed to improve rider safety

During the second half of the PIONEERS lifespan, the Project has developed the solutions that have been identified in the first half.

One of the four main pillars of the PIONEERS project was to develop a new set of PPEs for motorcyclist, which exceed the current state of the art. The four industrial partners of the project worked in parallel tasks within WP4 each aiming at developing enhanced PPEs for the four main regions of the human body addressed by the project, which are head, upper torso, pelvis and lower legs.

DAINESE developed novel energy absorbing concepts for the manufacture of **helmet** liners with advanced brain protection. The technologies explored was 3D printing and the use of modular structures made with more conventional and cost-effective manufacturing processes. A replacement for standard EPS liners was sought. These liners have 2 fundamental limits which were addressed with the new technology: they are unable to manage efficiently impact that cause sudden and dangerous rotations of the head and they are not breathable.

REV'IT! developed a **protective inflatable**, as well as the garment to accommodate this PPE, aiming to improve the brand's state-of-the-art in thorax protection. Throughout the development process different manufacturing methods, technologies, structures, and airbag designs were investigated to optimize the protective performance of the inflatable. This process resulted in an airbag system incorporated in a comfortable garment. The PPE complies to the applicable European standards for both airbag and motorcycle apparel

MOTOAIRBAG developed a **new airbag for thorax protection**. The focus was to enlarge the use of protective airbag meeting EU standard. End user price, user-friendliness, high protection, reliability and comfort guided the development. A complete working prototype was produced and passed the EU protective requirements.

DAINESE developed a new concept of **protection for the pelvis**. Motorcycle crashes are the most common cause of traumatic urogenital injury, but there were no countermeasures for their prevention. The solution explores the protective potential of technical clothing against soft tissue injuries caused by the fuel tank in the genital area.

ALPINESTARS developed a touring **boot prototype** with improved protective performances. After having selected the technical features to be enhanced, the development consisted in the design of the impact absorption elements and the internal ankle structure. The constructed prototype has been tested against impacts on ankle and shin, inversion/eversion and flexion/extension. The results have been compared with the ones of the most widespread touring and sport boots.

Achieved results in terms of on-boarding systems are two demonstrators for lateral impact mitigation installed on vehicles: namely safety leg cover suitable for scooter type vehicles and motorcycle side airbag.

PIAGGIO developed a **Safety Leg Cover** started from the same concept of the genuine standard leg covers by simply adding two or three protective items fixed inside the cover, matching the legs position. Such elements are solid or articulated bars made of materials characterized by following features: lightness, high absorbing power, low memory, quick reshape performance.

DUCATI developed a **motorcycle side airbags** from the preliminary idea of an effective way to reduce rider's leg injuries in lateral impacts with cars that occur quite frequently. It is worth to mention that no motorcycle model equipped with a side airbag protection system is available on the market yet. The knee airbag modules were fitted on a Ducati Multistrada vehicle taking into account the layout of the other parts like exhaust system, engine and fairings.

Find below the video that shows these solutions:

<https://youtu.be/0g9lQTIVQv4>