

Side Impact Crash Test for Powered Two-Wheelers

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Today, Powered Two Wheelers (PTW) are regarded as one of the most dangerous modes of road transport. For this reason, IDIADA coordinated and participated together with the project consortium in the European project “Protective Innovations of New Equipment for Enhanced Rider Safety” (“PIONEERS” hereafter, <https://pioneers-project.eu/>); within the European Union’s Horizon 2020 research and innovation programme (Grant agreement No 769054). This project aims to reduce the number of PTW fatalities and severely injured by increasing the safety performance, comfort and usage rate of Personal Protective Equipment (PPE) and the development of new on-board safety devices. As part of its role in PIONEERS, in Work Package 3 of this project (Advanced Testing Methods), IDIADA designed new full-scale crash test protocols for frontal and lateral motorcyclist safety. This paper focuses on the lateral test modes developed in task 3.3 of the project. These two crash modes were designed with the objective to validate two novel on-board safety systems that were developed in the PIONEERS project with the objective to reduce the severity of motorcyclist rider leg injuries. These safety systems were, namely, a lateral airbag system from DUCATI and a safety leg cover designed by PIAGGIO. By developing new test protocols, the PIONEERS consortium hoped to achieve a more realistic and robust test methodology providing better physical data for PTW OEMs (Original Equipment Manufacturers), as well as for on-board protective equipment and PPE suppliers.

As a result of the work conducted in PIONEERS T3.3, the two side impact test protocols shown below in Figures 1 and 2, were defined. Figure 1 represents the crash configuration for the test to evaluate the effectiveness of the DUCATI Lateral airbags, whilst Figure 2 shows the test protocol defined to assess the PIAGGIO safety leg cover. In both cases, the tests were designed to use a specialized Motorcyclist dummy (MATD) as motorcycle rider or, alternatively, a combination of a Hybrid III 50th percentile upper body and a MATD lower body. This paper explains the details of the test protocol definition for the two studied lateral impact cases in the framework of PIONEERS. It is important to note that, the two crash configurations indicated above were also chosen taking into account the design parameters of each of the on-board safety systems. The safety leg cover, for example, could be a potentially effective system at low speeds, as the damping material attached to the leg cover can reduce the severity of the impact on the rider’s lower leg. However, at high speeds, this system is out of its design range and is; therefore, not the most effective safety measure to prevent or mitigate injuries. On the contrary, the lateral airbag system is not designed for its deployment at low impact speeds. Thus, a higher impact speed was considered in this case.

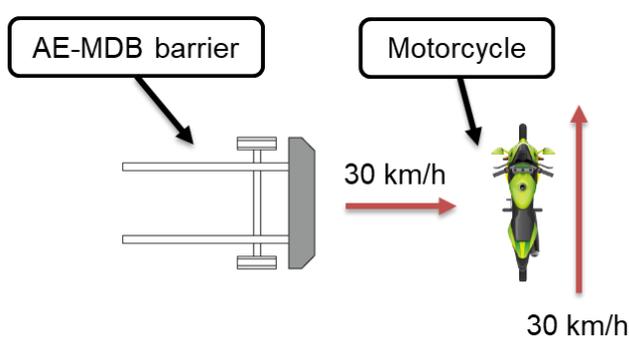


Figure 1: Side crash test proposed for lateral airbag system

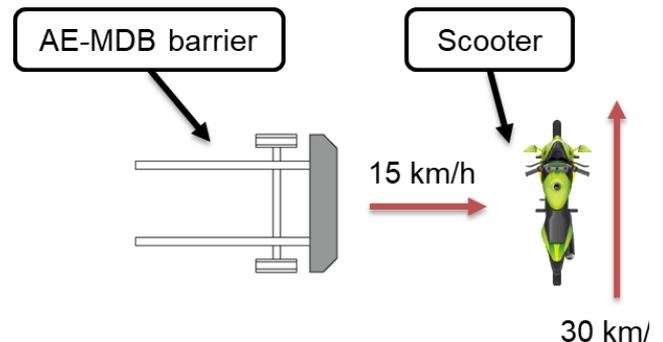


Figure 2: Side crash test proposed for safety leg cover