Improving Motorcyclist Safety: A New Helmet Integrity Monitoring Technology

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A motorcyclist’s helmet is essential to prevent head injuries in road accidents. When a helmet is subject to significant impact, its integrity can be affected and it may become unsafe for further use. However, little evidence of damage may actually be visible on the helmet itself. Motorcyclists are then faced with a difficult decision: buy a new, often expensive helmet, or take their chances and continue to wear a damaged helmet. The purpose of this research was therefore to design a novel technology to enable motorcyclists to reliably determine their helmet’s integrity post-impact, thus eliminating said expense vs safety dilemma. In this research, a new technology based on an electric circuit was developed for insertion as a new layer inside a helmet. This electric conductive layer (“ECL”) was intended to break upon impact, resulting in detection of the damage. In previous work (2018), the concept was investigated with small samples and yielded encouraging proof of concept results. In this new work, the evaluation was scaled up to real life motorcycle helmets. Three ECL designs were impact-tested in full-size helmets using a custom-built apparatus under controlled conditions. Testing parameters were selected to replicate real-life scenarios based on advice from the Snell Memorial Foundation—an authority in helmet safety. Results reveal that one ECL design performs as desired in tests. These findings may form the basis for further work on the integration of this ECL concept for full helmet application as well as in various comparisons with other industry standard tests.

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