

Further Research on Attachments Mounted on an Approved Motorcycle Helmet: Do they Increase Injury Risk?

Dan Leavy, David Beck

Centre for Road Safety, Transport for NSW

Abstract

There has been growing demand for fitting aftermarket attachments, typically cameras and communication devices, onto motorcycle helmets. Previous research found that in some cases, attaching devices to a helmet caused the helmet to fail one of the tests specified in the two design standards referenced in the NSW Road Rules 2014. A further study was carried out to assess how this relates to an increased risk of injury to the wearer in a crash. The results, which are currently being peer reviewed, indicate that fitting devices to an approved motorcycle helmet is unlikely to pose an additional risk.

Background

The NSW Road Rules 2014 require motorcyclists to wear a helmet that complies with Australian Standard 1698 or UNECE Regulation 22.05. Both standards have conditions for fitting attachments and have a test to check that projections incorporated into a helmet detach easily in a crash. In 2015, the Centre for Road Safety (CRS) carried out a series of tests on helmets fitted with various attachments; these found that some attachments caused the helmet to fail the projection tests (Suratno & Leavy, 2017). In 2017, CRS carried out further tests using more recent technologies and a new methodology to determine the injury risk that helmet attachments may pose in a crash.

Method

The recent research involved two sets of tests. All tests used an instrumented biofidelic Hybrid III headform rather than the standard headform specified in the standards' tests, as this provided a more realistic response to the forces imposed on a person in a crash. Phase 1 applied the tests and associated injury assessment criteria specified in the standards. Phase 2 involved a world-first test protocol using a rig developed specially for the Consumer Rating and Assessment of Safety Helmets test program to assess the level of trauma sustained to the head and neck by a person wearing a helmet in a crash. This test involved dropping a helmeted Hybrid III head and neck assembly onto a moving striker plate, which applies radial and tangential loads to the helmet and attachments (Figure 1). Control tests were carried out on helmets without any devices attached to them. Data recorded by the Hybrid III headform were used to assess the likely injury outcomes.

This research also investigated if the material used to attach a device to a helmet affects the injury outcome, and whether an adhesive could be used that would allow the helmet to pass the standards' tests regardless of the type of device attached to it.

Overall, 72 tests were carried out on seven types of helmets using three different cameras and two different communications devices.

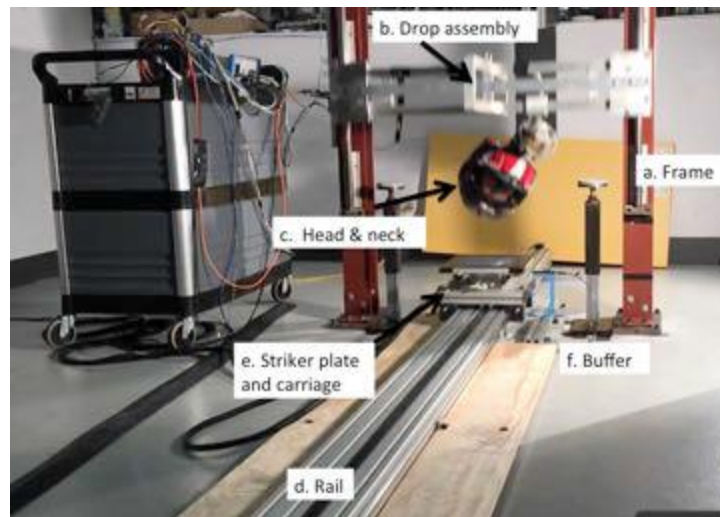


Figure 1. Rig used in Phase 2 tests

Results

Failures were recorded in 14 of the 32 Phase 1 tests but the Hybrid III headform showed that in all but one case, the risk of skull and brain injuries was very low. In the other case, the results were within acceptable limits when the test was repeated using a different adhesive material.

The forces recorded in the 40 Phase 2 tests were below the levels associated with brain or skull injuries, and most were less than those recorded in the control tests; this is probably due to the device absorbing some of the force in the crash that had previously been transmitted straight to the helmet.

Conclusions

The research program indicated that fitting devices to an approved motorcycle helmet is unlikely to pose an additional risk to the wearer in a crash. Independent peer reviews recommended additional tests be carried out to ensure the veracity of the results and conclusions, and these are currently being undertaken. The final findings will be provided to key stakeholders, including helmet manufacturers and applicable standards committees, for their consideration, and it is hoped they will inform amendments to the two design standards and the Road Rules.

References

- Suratno, B. and Leavy D, 2017, Attachments mounted onto an approved motorcycle helmet. Extended Abstract, Australasian Road Safety Conference, 2017.
- Australian/New Zealand Standard 1698:2006. Protective helmets for vehicle users, Standards Australia/Standards New Zealand.
- United Nations Economic Commission for Europe Regulation No 22.05 (UNECE22.05) Uniform provisions concerning the approval of protective helmets and their visors for drivers and passengers of motor cycles and mopeds.