

## **The Influence of Headform Geometry and Headform Mass on Alpine Ski Helmet Performance**

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Recent investigations have shown that impact mass can have an effect on the energy attenuation performance of helmet materials. The purpose of this study was to evaluate the effects of two parameters, head mass and head geometry on the safety performance of alpine ski helmets.

Testing was conducted in accordance to the Canadian Standards Association draft standard for alpine skiing and snowboarding helmets. The helmets were tested on size A (4.081 kg), and O (6.165 kg) ISO headforms, as well as a size A with extra mass (6.165 kg) using a monorail drop system at velocities of  $5.44 \text{ m/s} \pm 2\%$  using four impact locations: Front, side, rear, and crown.

An ANOVA revealed significant differences between peak linear accelerations across each test condition and between the small, (4.081 kg) and small extra mass (6.165 kg) test ( $p < 0.001$ ). As well, results were significantly different between the size A headform (6.165 kg) and the size extra-large helmet weighing 6.165 kg.

These results demonstrate the importance of both head form mass and geometry on the performance of alpine helmets. The authors suggest that these two characteristics be considered when revising helmet safety standards in order to decrease the risk of head injuries in skiing accidents. The authors also suggest that consumers be informed of the importance of using a helmet that is designed for their head size and shape.