

## Assessment of the High-Speed Ice Friction of Bob Skeleton Runners

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**Abstract :** Bob skeleton is a highly competitive sport in which an athlete reaches speeds up to 40 m/s sliding, head first, down an ice track. It is believed that the friction between the runners and ice significantly contributes to the amount of the total energy loss during a bob skeleton descent. There is only limited available experimental data regarding the friction of bob skeleton runners or indeed steel on the ice at high sliding speeds ( > 20 m/s). Testing methods used to investigate the friction of steel on ice in winter sports have been outlined, and their accuracy and repeatability discussed. A system thinking approach was used to investigate the runner-ice interaction during sliding and create concept designs of three ice tribometers. The operational envelope of the bob skeleton system has been defined through mathematical modelling. Designs of a drum, linear and inertia pin-on-disk tribometers were developed specifically for bob skeleton runner testing with the requirement of reaching up to 40 m/s speed and facilitate fresh ice sliding. The design constraints have been outline and the proposed solutions compared based on the ease of operation, accuracy and the development cost.

**Keywords :** bob skeleton, ice friction, high-speed tribometers, sliding friction

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