

## **MATCHING THE IMPLEMENT TO THE PLAYER: HOCKEY STICK RESEARCH AND DEVELOPMENT**

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In the sport of Ice Hockey, many of the critical offensive and defensive skills, including shooting the puck, involve the precision use of the hockey stick. Choosing a stick, therefore, that is suitable to the natural characteristics and abilities of the player is critical to effective performance. There are probably five variables that influence the choice of a hockey stick by an individual player: cost, appearance, feel, performance, and durability. Cost may or may not be important depending on the level of play and the players financial assets. Appearance is dependent on graphics design and is usually based on response of focus group subjects to various colours and lettering on the shaft and blade of the stick. These variables are outside the purview of biomechanics research and development. However, feel, performance and durability depend directly on the mechanical design and materials make-up of the implement and on how well the implement matches the traits of the user. The purpose of this paper is to describe some of the basic characteristics and interrelationships of shooting in hockey and to indicate some of the mechanical features of the stick that might influence both the velocity and accuracy of the shot. Studies have been conducted to investigate the wrist shot and slap shot velocities of a group of highly skilled subjects. In addition, both static measures and high speed robot tests have been used to assess the performance characteristics of wood, three piece composite, and one piece composite hockey sticks. It is apparent that mechanical variables such as mass, center of mass, shaft flex, shaft torsional stiffness, and blade stiffness will all affect passing and shooting performance. However, the main effects will likely depend on the players strength and power attributes and, in the case of shooting, may depend on the type of shot normally employed. Data have been collected on two groups of highly skilled hockey players ( $N_1 = 7$ ,  $N_2 = 6$ ). The Independent Variables in the study were: Type of shot and player strength characteristics. The type of shots studied were standing wrist shot, skating wrist shot, standing slap shot, and skating slap shot. The player groups included one group classified as stronger players and the other classified as weaker players. The dependent variables measured were: shooting velocity both standing still and skating. In addition, several static characteristics of the hockey sticks employed were also determined. These included: mass, torsional stiffness, shaft flexibility, and center of mass. Based on the results of these studies, it is possible to hypothesize that player performance in hockey shooting is dependent, in part, on the correct matching of the mechanical characteristics of the stick and the physical attributes of the player.