SPORTS ENGINEERING

Session Organizers: Patrick Drane, University of Massachusetts Lowell, and Yasuo Nakamura, Doshisha University

People have participated in and enjoyed sports throughout human history, but today's sports are more numerous, more accessible, higher performing and more regulated than any other time in history. Recently, many people play various sports for recreation and for the purpose of health promotion. In this case, the safety of sports equipment and body movement becomes very important. On the other hand, the professional sports are more exciting and more technical because of the advanced training techniques and higher performance equipment. The professional athletes use their body in extreme conditions. In this case, the performance of sports equipment and body movement become very important. Engineers working the field of sports engineering are responsible for the study, analysis, design and understanding required to ensure the progress of safety and performance in sport.

The talks in this session will focus on sports equipment and human body movement during professional sports. The talks and discussion will focus on recent technological advances and consider the question of how to successfully transfer technique from professional sports to ordinary sports.

The first speaker will be Kenta Moriyasu (ASICS Corporation, Institute of Sport Science)**.** He will introduce functional footwear designing examples considered the required functions. Also, he will describe challenges of the grip design that he has faced. The importance of footwear functions varies with players' skills, their foot alignments and features of the sports.

The second talk will be by Matt Vacek, Director of Composites, Jarden Team Sports (Rawlings, Worth, Miken, Gait, deBeer). Matt will describe the use of state-of-the-art composite design as it relates to baseball bats and other sports equipment. His discussion will focus on how critical fast turnaround on design, prototyping, testing and manufacturing is critical to being competitive and how composites with all of their design versatilities enable manufacturers to lead their respective markets and in other cases cause them to lose their market dominance.

Next, we will hear from Alison Sheets (Nike). Alison will talk on biomechanical modeling and experimental measurement methods used to improve athlete performance and predict injury risk. To provide specific examples, she will outline a gymnast model for simulating the swing on the uneven bars and a second model of an experiment studying football players' balance in an effort to predict ankle injury risk.

Finally, Kei Aoki (Digital Human Research Center, The National Institute of Advanced Industrial Science and Technology) will close the session with a talk on the biomechanical analysis of pitching motion of Japanese professional baseball pitchers. He will describe how to use his body for the pitching motion between veteran pitcher and rookie pitcher. Stability of lower extremities of elite athlete is important information for footwear development.

The subsequent discussion will focus on the future prospects and challenges of sports equipment development and human body movement analysis to meet engineering demands during various sports.