BIOMECHANICS FOR OLYMPIC SPORTS

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INTRODUCTION

Since the mid-1980s, Sports Science has been represented in various organizational charts as part of the U. S. Olympic Committee. Although originally located at the Olympic Training Center in Colorado Springs (CSOTC) the Sport Science and Technology Division now has staff members at the two other training centers in Lake Placid, N.Y. (LPOTC) and Chula Vista, CA (ARCO OTC). Sports Science staff have experienced increased requests for services, and additional staff positions at the LPOTC and ARCO Training Center make it possible for specific services to be provided.

Resistance training programs are now available at all three locations by SS&T staff members who work cooperatively to provide consistency in the programs offered at the different OTCs. Physiological services are available by staff at LPOTC and are provided at the ARCO OTC by contract through a local university. Staff physiologists from any OTC may assist in providing services at the other locations.

Engineering and computer technology services are primarily available from the CSOTC. Staff in these areas provide invaluable assistance particularly to SS&T biomechanists as well as develop and implement technology for coach/athlete use in their own specific areas of expertise.

Biomechanical services are primarily provided by SS&T staff. In some instances, biomechanists associated with a local university may be asked to assist in providing services. These professionals may have unique instrumentation capabilities as well as sport specific interests and experience. Athletes at all three OTCs have access to biomechanical services as do athletes in certain training and/or competition venues at non-OTC sites.

Regardless of the location for providing services, coaches working with athlete groups must interact with staff biomechanists so that specific questions related to athletic performance can be formulated. Sport-specific testing protocols can then be developed that will allow the biomechanists to begin answering the question(s) relevant to improving sport performance.

Essential elements of providing quality biomechanical services include the following: (1) coach and sport federation (NGB) commitment and involvement, (2) information from testing sessions that is relevant,

meaningful and sport-specific, (3) testing results that are returned in a reasonable timeframe, (4) serial testing of athletes, (5) focus on a limited number of variables initially, and (6) continuous evaluation and redesign of testing protocols as needed.

To assist SS&T staff members in their efforts to develop and provide quality services to elite athletes in the United States, the Richard M. Scrushy/ HealthSouth Sports Medicine and Sport Science Center was opened on the Olympic Complex in Colorado Springs in September, 1996. Within this new facility, a 3,000 sq. ft. Athlete Performance Laboratory provides space for both Biomechanics and Physiology testing of elite athletes. The Sports Biomechanics laboratory area houses a 4-camera ceiling-mounted video system and a centralized steel platform for mounting up to two Kistler or AMTI force plates. The camera system (zoom, aperature, focus, pan-and-tilt) is operated from a control area with a viewing window that is adjacent to the laboratory. Within the main laboratory, seven additional camera locations can be used; an intercom system provides communication between the video system operator and those in the laboratory.

Across the hall from the laboratory is the Biomechanics Analysis Laboratory. This area houses three motion measurements systems, a coach-athlete review station, and a video editing system. Video tape storage cabinets are also located here.

In addition to the new facility, equipment for data collection in the laboratory and field setting is also available. Three 120-Hz video systems; one 200/400-Hz video system; two AMTI force plates; eight Kistler force plates; 2D, 3D and pan-and-tile video systems; DataLogger for EMG and pressure measurements; instrumented pedals, luge handles, and punching bag; and computerized timing system are available for staff use. A video overlay system provides multi-functional capability for use with specific sports.

PAST, PRESENT, AND FUTURE

Quality biomechanical services are made possible by staff using existing facilities (laboratory and/or training/competition areas) and equipment appropriately. Using the 1996 Olympic Games as the Past and the 2002 Olympic Games as the Future, examples of how staff bibmechanists have interacted and plans to continue or initiate involvement with various sports was presented.