

# Centre for Sports Engineering Research

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## Biomechanics laboratory

A biomechanics laboratory equipped with;

- Eagle Digital eight camera online motion capture and analysis system Motion Analysis Corporation complete with OrthoTrak and KinTrak data processing software
- Kistler floor-mounted force platforms, portable Kistler force platform, and Kistler Gaitway force measuring treadmill
- RSscan pressure plates and pressure measuring insoles
- Two Redlake Imaging Motion Scope high speed video cameras capable of filming at up to 2000 frames per second
- 1,500 Lux lighting and complete black-out facilities

## Motion capture

CSER have a range of motion capture solutions that include;

- Polhemus Liberty 240/8 electromagnetic motion tracking system
- Vision Research Phantom high-speed cameras , 2 x v4.3 (b&w), 1 x Miro (colour)
- 2 x Prosilica GC655 90fps machine vision cameras, 1x 200fps machine vision camera
- XSENS Xbus Kit, with 5 MTx motion tracking sensors

## Environmental chamber

The British Olympic Association (BOA) approved chamber simulates the climate of almost any country in the world. Temperatures can reach +40 degrees Celsius and -20 degrees Celsius, with humidity between one and 99 per cent. The chamber can be used to;

- Test clothing tolerance under different climatic conditions
- Test the influence of climatic conditions on the performance of sports equipment
- Study the effects of enduring extreme environments on sports people
- Look at the effects of temperature on work-related tasks in the occupational setting

## Computing

Specialist computational facilities include;

- High Performance Computing cluster, SGI Altix, 8 x compute nodes, 64 cores, 128GB RAM
- Dedicated CFD workstation (ANSYS Fluent solver, Ensight post-processing)
- Computer Aided Engineering workstations (Pro/E, ANSYS LS Dyna, Geomagic Studio, Rhino)
- Matlab and LabView software for developing custom data collection and analysis protocols for specialist projects

## Non-contact laser scanning

A reverse engineering and measurement facility comprising;

- Metris ModelMaker D100 3D non-contact laser scanner
- Geomagic Studio & Qualify, surfacing and inspection software

## Experimentation

CSER have a number of experimental laboratories, and a range of test equipment including;

- Impact rig with a maximum drop height of 2 m and a range of customisable hammers
- Playing surface rolling profile characterisation equipment
- Clegg impact hammer
- Bowlers customised for different sports ball applications
- High speed impact test chamber
- Fully portable lightweight air cannon
- Light gates

## Workshops

CSER have an in-house fully equipped manufacturing & prototype workshop, and an electronics workshop. This allows CSER to react to the clients needs and ensure full customer confidentiality. These facilities are capable of;

- Wide ranging service of in-house fabrication and high quality precision engineering
- Capabilities to work with a wide range of materials, including bulk metals, plastics, and aerospace grade alloys
- A service from creation of an initial prototype through to liaison with manufacturers for full production
- Development of small scale instrumentation systems