Department of Orthopaedic & Trauma Surgery
TORT Centre • College of Medicine, Dentistry & Nursing, Medical Education Institute

SERVICES and EQUIPMENT
THE PURPOSE OF THIS LEAFLET IS TO HIGHLIGHT THE EQUIPMENT WE HAVE AND SERVICES WE CAN OFFER AT THE TAYSIDE
Orthopaedic Rehabilitation Technology (TORT) Centre. TORT is a modern, purpose-built unit, which incorporates the University Department of Orthopaedic & Trauma Surgery, the Institute of Motion Analysis & Research (IMAR) and the Tayside Rehabilitation & Engineering Services where there is a unique blend of surgeons, bioengineers, podiatrists and allied healthcare professionals, providing trauma surgery and specialised clinics on the premises.

EQUIPMENT & SERVICES

Motion Analysis. The Institute of Motion Analysis and Research (IMAR) has two fully integrated gait analysis laboratories providing a clinical service to the NHS, sports clubs and private referrals as well as supporting a wide range of research and commercial studies. Each laboratory is equipped with the most advanced optical 3D motion capture systems available, multiple force plate’s, wireless EMG capture and a specialised reporting tool to help visualise gait data. Whether it’s determining a child’s gait, analysing an athlete or dancer’s actions, recreating the movement of various materials or understanding the ergonomics of a new surgical instrument, IMAR can provide the solution with 26 high-tech, infrared modular Vicon cameras that can be synchronised with all our other equipment.

Barefoot Pressure Analysis. We have four pedography platforms that can be utilised to measure pressure measurements under the foot during both static and dynamic conditions including sports. Combined with synchronised video these instruments provide a quick and accurate analysis of foot function for both clinicians, athletes and researchers alike. The portability of the systems ensures a flexibility that allows projects and research in the field.

In-shoe Foot Pressure Measurement. We have two Pedar® systems manufactured by Novel that provide highly accurate, repeatable and reliable pressure measurement and distribution of loading between the foot and shoe. These mobile wireless systems provide freedom of movement whilst walking, running, exercising or even riding a horse or bicycle while the dynamic pressure data can be viewed in real time.

Electromyography (EMG). We have a large range of EMG instruments, from small portable recorders to the latest wireless technology that can measure activity in up to 16 muscles simultaneously, synchronised with the subject’s motion. Combined with a range of analysis tools and software, these EMG systems can provide muscle analysis for a wide range of clinical, sports and research projects.

Gait Measurement. Our foot pressure laboratory is equipped with a GAITRite® Gold walkway to measure temporal and spatial gait parameters of patients, athletes or subjects. The fully portable walkway is embedded with pressure sensors that record a number of sequential footfalls. Clinically relevant parameters such as stride length, step length, cadence, toe in/out angles are then calculated and displayed instantly in tabular or graphical formats.

Metabolic Measurement. We have two metabolic systems to provide cardio-pulmonary stress testing, nutritional analysis, and fitness and sports evaluation for patients and athletes. Our portable Oxycon Mobile® system permits evaluation in the field to determine metabolic response (VO2max) and work capacity while exercising in situations shown to be difficult to monitor. The laboratory-based Oxycon Metabolic cart can be linked to exercise equipment, providing ECG traces, heart rate and blood pressure, and a suite of software provides a completely integrated cardiopulmonary exercise test. Both systems record breath-by-breath data while being worn in a comfortable vest in the portable equipment, or attached readily by the testing equipment allowing testing of children, adults, patients and athletes. Dynamic flow-volume and energy expenditure can also be analysed with results displayed in easy-to-follow graphics. The metabolic cart can be synchronised in real-time to all our other biomechanical equipment.

Medical Equipment Design. Over the years a number of new orthopaedic fixators, inserts and alignment devices have been designed and developed within our labs in collaboration with leading industry. We can design these devices on state of the art CAD software and simulate function and usage before printing the component parts using our in-house 3D printer prior to manufacture.

AUDIT & RESEARCH SERVICES

• Study coordination for multiple Centres
• Case report form design
• Database design, administration and data transformation
• Web based data input and reporting applications programming
• Website hosting and maintenance
• Data entry and validation of paper forms
• Statistical analysis
• Presentations for conferences
• Assistance with publications
• Training and documentation for all systems
Materials Testing. The Department is equipped with a Zwick Roell Universal Testing Machine (UTM) for material and structural testing. The UTM is designed for tensile, compression and flexure tests as well as shear and torsion tests on a wide range of materials. Strength and elasticity data are graphically displayed and recorded to a high degree of accuracy. We also have a number of versatile cyclic testing machines, designed to repeatedly apply stress to materials for large numbers of cycles to represent normal everyday use allowing materials to be tested for long-term durability.

Pressure Distribution. Our Pliance® system from Novel uses state of the art technology combined with a large range of flexible sensors to monitor pressure measurements and distribution between almost any two surfaces. Pliance sensors allow pressure recordings from many diverse applications such as bicycle and equine saddles, equipment handles, gloves, seating, wheelchairs, beds and even prostheses to evaluate the most effectiveergonomical outcome.

Sports Simulation. With an increasing range of sports simulators at our disposal, IMAR can provide detailed analysis of sporting activities within a controlled laboratory environment. Linked with our state of the art motion analysis and metabolic instruments we can analyse athletic performance and investigate injury prevention for a wide range of sporting activities.

Vibration Analysis. IMAR has a range of instruments that can provide vibrations over a wide range of frequencies and amplitudes from Formula One to diabetes. Among such equipment is the vibrating powerplate, a concept using vibration for exercising muscles devised for Russian cosmonauts in the absence of gravity. These allow detailed investigation into what subjects and patients can actually feel, potentially leading to the development of new medical instrumentation.

Surgical Skills. As part of our prestigious MCh (Orth) master’s degree, surgical students are trained in joint replacements and have practical sessions using simulated bones to hone skills. We now run a Thiel soft-embalmed cadaveric workshop unique to the Dundee course. The Thiel method is unlike conventional cadavers in that the structures remain lifelike and flexible, which allows our students the rare opportunity to perform and practice surgical procedures on cadavers which retain the body’s natural musculature, colourisation and feel. Another benefit is that the cadavers give off no detectable odour.

Three-dimensional Foot Measurement. A highly precise ‘stripe’ projector allows us to capture 3D images of the foot in seconds. Combining this with plantar pressure images and insole-designer software allows the digital manufacture of custom-made orthopaedic insoles within a short space of time.

Wheelchair Optimisation. We have a Smartwheel® which sets the standard in the field of manual wheelchair use analysis. The Smartwheel monitors manual wheelchair use by analysing each push on the hand rim, providing an immediate visual feedback for clinical use and data storage for longer term research purposes. Recording push forces, frequency, length and smoothness along with wheelchair speed can help optimise performance and prevent pain and discomfort for the user.

Equipment Testing. Collecting scientific information on a range of equipment from surgical instruments to exercise equipment is a vital part of the Department’s commitment to clinical advances and translational research. Only with this factual information collected in a controlled and secure environment, can real progress be made.

Conference Organisation. The Department has already successfully hosted a number of prestigious conferences such as BOFAS, BORS, ESM, and CMAS. Our specialist Gait, Sports and Foot labs make excellent locations for practical workshops while the University offers larger teaching theatres for presentations. With an abundance of sightseeing excursions to choose from and evening entertainment we believe we can provide a conference facility that is friendly, memorable and educational.

The Sky is the Limit! The combination of our plethora of diverse, flexible equipment and our highly-skilled multidisciplinary team, ensures that we are confident in adapting effectively to any of your research, clinical or commercial requirements.

**COLLABORATIONS**
- American College of Sports Medicine
- British Association of Sport and Exercise Medicine
- Canskate Designs Ltd.
- Centre for Anatomy and Human Identification (Dundee University)
- Chronic Brain Injury Rehabilitation Team
- Clinical Movement Analysis Society of UK and Ireland
- Community Paediatric Team
- Department for Aging and Health (University of Dundee)
- Edinburgh University and Edinburgh Royal Infirmary
- European Society of Movement Analysis for Adults and Children
- NHS Tayside Accident and Emergency
- Orthotics and Prosthetics (Ninewells Hospital)
- Pain Services
- Queen Margaret University
- Rangers Football Club (Murray Park)
- Duncan of Jordanstone College of Art and Design
- Scottish Police Services Authority (Forensics)

**SPORTS EQUIPMENT**
- Astroturf flooring
- Cricket pitch (indoor)
- Cycling trainer/simulator
- Formula One (F1) simulator
- Golf simulator
- Heavy punch bag
- Indoor climbing wall
- Mini stepper machines
- Rowing machine
- Tennis/table tennis ball serving machine
- Treadmill
- Vehicle extraction facilities
- Vibration platform
- Weight-lifting equipment
CONTACT INFORMATION

Department of Orthopaedic & Trauma Surgery
TORT Centre
Ninewells Hospital & Medical School
University of Dundee
Dundee, DD1 9SY
Scotland, United Kingdom

Telephone +44 (0)1382 383500
Email ortho@dundee.ac.uk
www.orthopaedics.dundee.ac.uk
www.facebook.com/ortho.dundee

COURSES

Postgraduate Taught Courses
Master of Orthopaedic Surgery (MCh Orth) – RCS England Accredited
Diploma/Master in Orthopaedic Science - RCS England Accredited
Diploma/MSc in Motion Analysis
Diploma/Master in Orthopaedic and Rehabilitation Technology
Diploma/MSc in Sports and Biomechanical Medicine
Postgraduate Certificate in Clinical Audit and Research for Healthcare Professionals

Postgraduate Research Courses
MSc/MPhil/PhD in the area of Motion Analysis
MSc/MPhil/PhD in Musculoskeletal Biomechanics
MSc/MPhil/PhD in Biomedical Engineering
Doctor of Medicine (MD)

Undergraduate Courses
BMSc in Applied Orthopaedic Technology

Continuing Professional Development Certificate Courses
Clinical Statistics
Orthopaedic Medical Technology
Plaster Technology

PRODUCED BY
Department of Orthopaedic and Trauma Surgery, University of Dundee. The information contained in this booklet is correct at the time of publication. The University reserves the right to make changes. Copyright © 2014 University of Dundee. All rights reserved. The University of Dundee is a Scottish Registered Charity, No. SC015096