

# Key equipment list of the Systems, Power and Energy (SPE) Research Division

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# Centre For Medical And Industrial Ultrasonics (C-MIU) Key Equipment

<b>High-Speed Imaging</b>	Shimadzu HPV-1 and HPV-X2 high speed cameras  Photron Fastcam SA-Z  Litron Nano L 135-15 pulsed laser (532nm)  Cavitar Cavilux SMART pulsed illumination system
<b>Microscopy</b>	Leica Fluorescence Microscope  Olympus BX53 Upright Microscope w/ Fluorescence
<b>Tensile Testing</b>	Instron 5966 Tensile Testing Machine
<b>Transducer/Device Testing</b>	Verasonics Vantage 128 - Research Ultrasound Platform - High Frequency Configuration



	Transducer Testing Water Tank and Hydrophones
<b>Materials Preparation/Transducer Manufacturing</b>	Disco DAD3350 / DTU162 Saw  Logitech Lapping Machines 1AL54-1 w. jigs / ancillaries
<b>Vibration Analysis</b>	Polytec 1D and 3D LDVs including MSA-100 3D System Analyser with XY Stage, table, optical table, computer, software
<b>Medical Ultrasound</b>	Sonic Touch BK Machine, Probes, Software
<b>Additive Manufacturing/3D Printing</b>	Lulzbot  Ultimaker
<b>Robotic Platforms</b>	EDO Robotic Arms

# Materials, Design and Manufacturing Key Equipment

For the full list please visit the Lab Portal ([www.materials-glasgow.org/lab-portal](http://www.materials-glasgow.org/lab-portal)) (registered users)

## **Rankine Materials & Manufacturing Lab (Rm 225)**

### Mechanical Testing

<p><b>Zwick Roell Z250 (250 kN)</b> Uniaxial load frame, Screw driven, Load frame (1500mm x 1000 x 600mm) Head stroke 100mm Max. head rate 600mm/min Environmental Chamber (-100 to 350 degC) Load Cells available: 1kN and 250kN</p> <p>Contact: Ian Campbell / Phil Harrison</p>	 A large industrial uniaxial load frame with a red vertical column and a grey control cabinet on the right side.
<p><b>Zwick Roell Z2.0 (2 kN)</b> 2 kN, servo-hydraulic, Suitable for low load Fatigue Load frame (1000mm x 600mm x 300) Head Stroke 380mm High speed: Max. head rate 15000 mm/min</p> <p><a href="#">Environmental Chamber</a> (-200 to 450 degC)</p> <p>Load Cells available: 5N and 2kN</p> <p><a href="#">Introductory Video Tutorial</a></p> <p>Contact: Ian Campbell / Phil Harrison / Nimrekha / Ali</p>	 Two images: on the left, a smaller uniaxial load frame on a red table; on the right, a grey environmental chamber with a glass door and a warning symbol.

**Instron 3369 Universal Test Machine**

50KN max Load

Speed 0.05-500 mm/min

Vertical Testing Space 1193 mm

Contact: Ian Campbell / Phil Harrison



**Vickers Hardness Tester**

[Vickers Microhardness Tester](#) 401 MVA

**Note.** Needs power cable for PC

Contact: Ian Campbell / Phil Harrison



## Manufacturing and Processing

<p><b>Carbolite Oven</b></p> <p>Max temp 300°C</p> <p>Internal Dimensions 280x500x750mm (width x depth x height)</p>	 A photograph of a Carbolite oven, a rectangular industrial furnace with a grey door and a control panel on the right side.
<p><b>Vulkan Oven</b></p> <p>Max temp 240 °C</p> <p>Internal Dimensions 440x510x1000 (width x depth x height)</p>	 A photograph of a Vulkan oven, a tall industrial furnace with a grey door and a control panel on the right side.
<p><b>Heated consolidation press</b></p> <p>Oil heated custom manufactured consolidation press</p> <p>Contact: Ian Campbell / Phil Harrison</p>	 A photograph of a heated consolidation press, a green industrial machine with a control panel and a pressure gauge.

## Strain/Position/Thermal Measurement

### 2D and 3D VIC digital image correlation software & equipment (VIC-3D 9)

VIC-2D, VIC-3D and VIC-SNAP (2010) software required to capture simultaneous images from two camera sources. Current pair of (monochrome) cameras employed for DIC applications are CCD, LIMESS KRUZNACH XENOPLAN SCHNEIDER. Three VIC calibration boards plus tripod and camera positioning bar.

[Specs](#)

Contact: Ian Campbell / Phil Harrison

The VIC-3D Digital Image Correlation Measurement System



### HP 3D Structured Light Scanner Pro S3 (David SLS-2)

Scan size: 60-500 mm

Resolution/Precision: Up to .05% of scan size (up to .05 mm)

Scanning time: One single scan within 2 seconds

[Datasheet](#)

Contact: Ian Campbell / Phil Harrison





**Dantec Video Extensometer**

**Note-** Missing a connecting cable (1/2/21)

Contact: Ian Campbell / Phil Harrison



**Flir E8-XT Infrared Camera**

Camera size of 244 x 95 x 140 mm

-20°C to 550°C Temperature Range

FOV 45° x 34°

Image Frequency 9Hz

[Full Specs](#)

Contact: Ian Campbell/Phil Harrison



## Thomson Materials Lab

### Sample Preparation



Full range of equipment for specimen preparation for SEM/EBSD, including precision cutting (**Struers MiniTom**), hot & cold mounting (**Struers CitoPress**), as well as rotary and vibrational polishing (**Struers LaboForce-50**, **Buehler Vibromet 1**)




### Furnaces

Carbolite Gero Tube Furnace (with vacuum pump, 1500 °C)



<p>Carbolite Gero Tube Furnace (with argon environment, 1200 °C)</p>	
<p>Ramsell LAC PKE Hardening chamber furnace PKE 18/12 with SKM Hardening Table (Max Temp 1280oC) Vacuum pumps</p>	

## Mechanical Testing

<p>Deben 5kN Dual Leadscrew microtester (200N and 5000N load-cells)</p>	
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INSTRON 3367 Dual Column System Dual column universal (static screw driven) testing machine, load-cell 30kN



## Optical

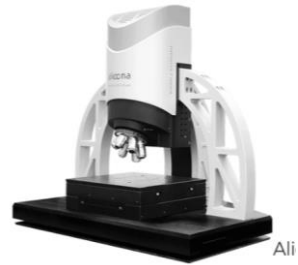
Motic AE2000MET Inverted Metallurgical Microscope



Thorlabs Cerna Optical Microscope with 8 Megapixel Digital Camera, motorised focusing and motorised XY Stages



Alicona Infinite Focus G4 3D Surface  
Profilometer



## Ultrasonics Lab

### Mechanical Testing

#### **Instron 5960**

Universal Testing Frame  
Up to 1500 mm/min  
Head Stroke 1140mm

Load Cells available: 100N and 10kN

[Spec Sheet](#)

Contact: Sandy  
CochranSandy.Cochran@glasgow.ac.uk



## School Workshop

Renishaw MCP 5/01 vacuum cast system



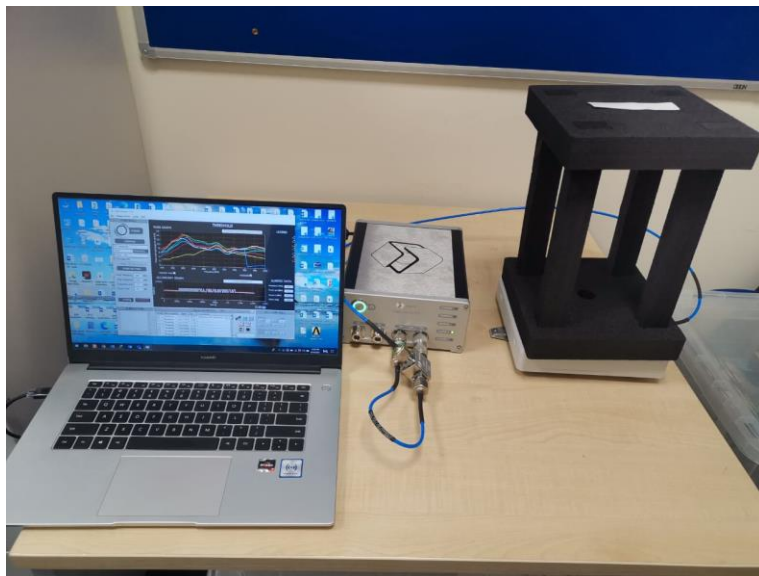
# Communications, Sensing and Imaging (CSI) Key Equipment

## Jackal J100 Robotic Research Platform x 4

On-Board Computer, Provides Gazebo Model, WiFi & Bluetooth, Wireless (BT) Game Controller, GPS, IMU, Li-Ion Battery, Battery Charger, Sensor Mounting Plates, 17 kg mass, 20 kg max payload, 508 x 430 x 250 mm overall dimensions, 2 m/s (7.2 km/h) max speed, IP65 rating, -20 C to 45 C operating temperatures range. User 5V at 5A (25W) + 12V at 10A (120W) regulated and fused power + VBat ~24-29V at 20A fused unregulated available, ROS preinstalled. Has extensive documentation, forums, and libraries via Clearpath and GitHub.

## Tagformance Pro Set,

Voyantic Tagformance® Pro is an all-in-one test and measurement device for RAIN RFID, HF RFID, and NFC. The system consists of the Tagformance Pro measurement device, one or more software packages, and accessories that complete the system. All hardware, software, and accessories are modular and easy to use, easy to maintain, and easy to understand the total cost of ownership. The system is designed to grow with the latest industry requirements.



Impinj RFID reader R700



Portable RFID reader





# IoT Lab Equipment's



## Tele operation robot and haptic controller



## Robotic Hand






## **Gaitrite connected mat (MAST lab)**











**Efficient data collection and outcome of gait analysis measures that can be viewed immediately or reviewed on your desktop.**

Gaitrite allows comparing and testing several walks with your pre-selected sets of parameters.


Standard reports include walkway footfalls, summary parameters, temporal and spatial parameters for left and right foot strikes.

Laboratory Name: CSI LAB		365 JWS	
Item Description	Item Image	Manufacturer	Quantity
RF/EMF and Mobile Network Analyzer (TSMA6)		<i>Rohde &amp; Schwarz</i>	1
USRP N2943R		<i>National Instruments</i>	1
USRP N310		<i>Ettus</i>	1

<p>USRP X300</p>		<p><i>Ettus</i></p>	<p>3</p>
<p>USRP B205mini</p>		<p><i>National Instruments</i></p>	<p>2</p>
<p>2.6 GHz Duplexer</p>		<p>Unbranded</p>	<p>1</p>
<p>USRP B210</p>		<p><i>National Instruments</i></p>	<p>2</p>




<p>G2 8k VR Headsets</p>		<p><i>PICO</i></p>	<p>15</p>
<p>Quest 2 VR Headset</p>		<p><i>Oculus</i></p>	<p>3</p>
<p>NI PXIe-100</p>		<p><i>National Instruments</i></p>	<p>1</p>
<p>Wireless N Router</p>		<p><i>TP-Link</i></p>	<p>1</p>




<p>Zedboard</p>	 <p>The image shows the top of a ZedBoard product box. It features the ZedBoard logo, which is a stylized red 'Z' shape. Below the logo, the text 'ZedBoard™' is printed, followed by the slogan 'Put Your Imagination to Work.' and the website 'www.zedboard.org'. At the bottom of the box, logos for 'DIGILENT', 'XILINX', and 'AMNET' are visible.</p>	<p>Xilinx</p>	<p>1</p>
<p>Spectrum Analyser</p>	 <p>The image shows a handheld spectrum analyser. It has a grey and white plastic casing. The front panel features a large, dark LCD screen at the top, a numeric keypad below it, and a central circular control knob. There are several other buttons and indicators around the keypad and knob.</p>		<p>1</p>
<p>Free Space Optics Links</p>	 <p>The image shows a blue, rectangular device mounted on a silver metal stand. The device has a central circular lens or aperture. There are several smaller circular openings on the left side of the device. The stand has two adjustable legs.</p>	<p>Koruza</p>	<p>2</p>
<p>Octoclock</p>	 <p>The image shows a close-up of a white electronic device. The word 'Octoclock' is printed on the front panel. There are some other markings and a small label on the device.</p>	<p>National Instruments</p>	<p>1</p>




<p>Label Maker</p>		<p>Dymo</p>	<p>1</p>
<p>Nvidia Jetson Nano</p>		<p>Nvidia</p>	<p>1</p>
<p>Samsung Galaxy S10 Phone</p>		<p>Samsung</p>	<p>1</p>
<p>Samsung Galaxy S9 Phone</p>		<p>Samsung</p>	<p>1</p>



<p>4G LTE Dongles</p>		<p>Huawei</p>	<p>4</p>
<p>Arduino Kit</p>		<p>ELEGOO</p>	<p>1</p>
<p>Open source 5G Testbed</p>		<p>OAI</p>	

Laboratory Name: CSI LAB		JWS 611	
Item Description	Item Image	Manufacturer	Quantity
<p>Glasgow 5G Testbed</p> <p>Band n77, 17 RRHs, pop-up network, MEC, LoRaWAN</p>		<i>Nokia</i>	
Hologlass		<i>Holoxica</i>	2
GPU Server		<i>Holoxica</i>	2

<p>IoT Scotland Indoor Gateway</p>		<p><i>Kerlink</i></p>	<p>6</p>
<p>Tab S7 + 5G</p>		<p><i>Samsung</i></p>	<p>1</p>
<p>S20 5G</p>		<p><i>Samsung</i></p>	<p>1</p>

<p>Matrice 600 Pro Drone</p>		<p><i>DJI</i></p>	<p>1</p>
<p>5G CPE</p>		<p><i>Huawei</i></p>	<p>1</p>
<p>5G Dongle</p>		<p><i>UofG</i></p>	<p>4</p>

# Space and Exploration Technology (SET) Key Equipment

## **Integrated space and exploration technology (i-set) laboratory**

The Integrated Space and Exploration Technology (I-SET) laboratory, opened on 8 May 2019, focuses on two areas of work: exploration technology and spaceflight hardware, while providing opportunities for students to learn and industry to engage.

The exploration area develops tools for planetary surfaces, including challenging areas of the Earth's surface such as the Antarctic regions. Fundamental research on granular materials, penetrators, and auger mechanics will be combined with technology development to produce robotic devices to support the exploration of new environments.

## **ESA plume-regolith interaction facility**

We host to the European Space Agency's plume-regolith interaction facility. With a total volume of over 70 m<sup>3</sup> and capable of reaching vacuum levels as low as 0.8 Pa, this facility explores the fundamental physics behind crater formation resulting from jet impingement.

The ESA facility is equipped with high-speed shadow and schlieren photography, pressure measurements and PSP, PIV, and data acquisition systems.

# Energy and Sustainability Key Equipment

<p><b>FLIR A325sc Infrared Camera (contact Prof Zhibin Yu - <a href="mailto:Zhibin.Yu@glasgow.ac.uk">Zhibin.Yu@glasgow.ac.uk</a> for access)</b></p> <p>320 × 240 LWIR resolution Fast data transfer up to 60 Hz</p> <p>Standard temperature ranges of -20°C to 120°C and 0°C to 350°C</p> <p><a href="#">Full Specs</a></p>	
<p><b>Photron FASTCAM MiniAX</b></p> <p>Compact high-speed cameras with high light sensitivity</p>	
<p><b>Portable gamma ray spectrometer</b></p> <p>Determining concentrations of radioactive elements in outcrop for geothermal reconnaissance</p>	
<p><b>Ultrameter II 6PFC hand-held water sampling instrument</b></p> <p>Determining water temperature, pH, electrical conductivity, total dissolved solids, and oxidation-reduction potential in the field</p>	