



Thompson Materials Laboratory

Thompson Building, Rm 107

Lab Responsible Academic: Dr Daniel Mulvihill

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CODE OF PRACTICE

The adoption and practice of good safety procedures is of paramount importance for both the health and safety of fellow workers, and for the integrity of the fabric of the Thompson Building Materials Laboratory.

1. Lab Safety Management Responsibilities

- 1) **Everyone** has a role in protecting the health and safety of both other lab users and themselves, and thus should be familiar with the **School's Safety Manual**.
- 2) **Academic Supervisors** take full responsibility for the health and safety of their own group's research activities, and consequently must ensure their staff and students are familiar with both the content of this **Code of Practice** and the **School's Safety Manual** and apply its requirements.
- 3) The **Lab Responsible Academic** is the academic member of staff responsible for overall lab activities.
- 4) No research activities shall be carried out in the Thompson Materials Lab without the prior permission of the **Lab Responsible Academic (or as delegated to the Lab Manager)**. The role of the Lab Responsible Academic is specified in **Appendix A**, in accordance with the **School's Safety Manual**.
- 5) No work shall be carried out until a **Risk Assessment** has been conducted by the research staff/students, **approved by their Supervisor** and the **Director of Safety**, and acknowledged by the **Lab Responsible Academic**.
- 6) An **electronic copy** of the approved Risk Assessment shall be sent to the Lab Responsible Academic to be kept as record (note that this can be done using the online risk assessment system). A hard copy of the approved risk assessment shall be displayed next to the relevant research rig and equipment for inspection. The procedures of the preparation of Risk Assessment are summarised in **Appendix B**.
- 7) **All lab users** should make themselves aware of the **general safety procedures** highlighted in the School's Safety Manual and of the location of safety equipment in the lab. The Safety Manual is available on the School's website.

These are:

In case of emergency, dial telephone number: **4444 (internal), 0141 330 4444 (external)**

Be aware of the location of emergency exits & assembly point (A. Front of James Watt South, B. North Front Flag Pole)

Be aware of the location of fire extinguishers & the type of fire they tackle (located inside the lab, by the door; one carbon dioxide extinguisher and one foam extinguisher)

Be aware of the location of the First Aid kit (located in the main Thomson Building area/Wind Tunnel)

Be aware of the location of the spill kit (located inside the lab, in box X10)

Hand washing Facilities: Located inside lab.

- 8) Work outside normal office hours (including weekend working) requires the permission of your supervisor. This can be given by an e-mail trail for audit purposes in the event of an accident and can be for multiple or extended periods of time. If permitted, the out-of-hours working book located in the foyer of the James Watt South building must be signed and the time recorded on arrival and the time of departure. Potentially dangerous operations **must never** be undertaken out-with normal hours **unless a second responsible person is present**. (Please read the safety regulations in the School's Safety Manual for more details.) Note: Permission for work outside normal office hours (8 am to 5 pm) will not be granted while Covid 19 restrictions are still in place (this will be reviewed periodically).
- 9) No research equipment should be used, unless the user has attended a lab induction, has received prior training for that particular piece of equipment and the use has been approved by the Lab Responsible Academic (or as delegated to the Lab Manager)
- 10) A **Lab Manager** is appointed to oversee day-to-day activities in the Thompson Materials Lab on behalf of the Lab Responsible Academic and Lab Management Team. The lab manager will work closely with the Lab Responsible Academic and the Academic Supervisors who use the lab. Safety monitoring is therefore carried out by the Lab Manager, the Lab Responsible Academic and the Academic Supervisors. The Lab Manager, Lab Responsible Academic and Academic Supervisors shall communicate regularly to ensure that lab users adhere to the Code of Practice and to the Guidance Notes and Risk Assessments for particular items of equipment.
- 11) The **Lab Management Team** consists of the Lab Responsible Academic, the Lab Manager and the Academic lab users who are also members of the Materials and Manufacturing Research Group. It is the responsibility of the Lab Management Team to approve any major changes to the lab, its operation or its Code of Practice.

2. Practice of General Activities

- 1) The experimental area must be **kept tidy and clean**. This is **NOT** the responsibility of the cleaners. Good housekeeping must be maintained by the lab users and be monitored by the lab management team. After each lab session, users should return the lab to its original state of cleanliness (except for experimental rigs that need to remain on benches)
- 2) **Food and drinks are not permitted in the lab.**
- 3) There is one exit from the lab (Main Door) and from the Thompson Building (Outside Main Door) – this route **MUST** be kept clear. If anything is impeding the exit, then you



should either move them, contact the person who placed them there, or inform the Lab Manager or Lab Responsible Academic.

- 4) Do not place equipment anywhere that will block access to other locations.
- 5) Dedicated storage cupboards and areas must be used. Bench tops should not be used as storage areas.
- 6) When leaving the lab (and if there are no other users in the lab), ensure that the lab main door is fully shut & secured and the Thompson building outside main door is also fully shut & secured.
- 7) Equipment must be placed in appropriate locations to safe-guard its integrity, minimise potential damage and to allow other researchers access to it. Never place equipment on a floor where others may walk around, always place it on a platform. Please follow the advice of the Lab Manager or Lab Responsible Academic regarding storage.
- 8) Once experimental work has been completed and the experimental setup is no longer required, the **experimental area must be cleared** in preparation for other experiments and researchers.
- 9) If it is necessary to remove equipment from the lab, permission must be given by your supervisor and the Lab Responsible Academic. If approved, the 'Tools & Equipment on Loan' form should be filled out upon removal of the equipment and its return. If necessary, seek assistance with moving heavy items.
- 10) If equipment breaks down or is not working, report the fault to your supervisor and the responsible person (see Section 5) immediately.
- 11) A fault with the fabric of the room or anything that will compromise safety, such as a lighting failure, should be reported through the Maintenance Request portal found on the Estates and Commercial Services webpage, <http://www.gla.ac.uk/services/estates/>. You should also inform both the Lab Manager and the Lab Responsible Academic.
- 12) There are many smaller handheld tools and items of equipment in the lab. All items have a designated storage location either in dedicated researcher storage or in general storage. Following use, please ensure that all items are returned to the correct location. Contact the Lab Manager if unsure about the correct storage location for a particular item.

3. General Lab Conditions

- 1) **Electrical connections** between different devices or equipment should be safe. If in doubt, speak with technicians in the Electrical Workshop (JWS Room 619) and inform the Lab Manager or Lab Responsible Academic.
- 2) To minimise **trip hazards**, extension cables should be plugged into the closest socket and avoid crossing pathways. If crossing a pathway is totally unavoidable then, only as a temporary measure, the cable must be secured to the floor and covered with a suitable (commercially supplied) floor cable cover/protector to prevent tripping hazards.
 - i. Once equipment is not in use, it must be turned off and any extension cables used should be tidied to a suitable location.

- ii. Leads and plugs should **ONLY** be used on the allocated item of equipment and should **NOT** be switched between equipment
 - iii. All equipment plugged into university outlets must be PAT tested (contact the electrical workshop for testing).
- 3) To minimise the risk of **falling objects**, no equipment or lab materials should be kept on top of cupboards and file cabinets.
- 4) Fire hazards:
- i. All **flammable materials** (gases, liquid and solids) should be stored and handled in accordance to the School's Safety Manual and relevant SEPS guidelines.
 - ii. All equipment or experimental rigs using flammable materials should be certified and have adequate measures for preventing fire hazards.
 - iii. All users of flammable gases should be trained.
- 5) Explosion hazards when using compressed gases:
- i. All gas cylinders should be secured to prevent falling.
 - ii. All pressure vessels should be certified by a professional manufacturer.
 - iii. All pressure vessels should have measures to prevent over-charging, such as relief valves.
 - iv. You should seek support from technicians when moving gas cylinders.
 - v. All users of compressed gases should be trained.
- 6) If you are unsure how to correctly use an item of equipment, seek assistance from an appropriate responsible person(s) (see Section 5).

4. Biological/tissue work/Chemicals

1. If you are doing experiments in microbiology related areas, then you will need to have appropriate training before starting this work.
2. All waste products must be placed in Biological Waste containers which are taken to Life Sciences periodically for safe destruction.
3. Chemicals (e.g. acetone) should be stored and disposed of according to the School of Engineering Safety Manual. Contact the School Safety officer if unsure.



5. Requirements & Responsible Persons for Specific Lab Equipment

This section gives details on equipment specific requirements and lists the responsible personal to contact. Before using any equipment, check the materials group website lab portal (<https://www.materials-glasgow.org/lab-portal.html>). If the piece of equipment is on the booking system, you will need to book time to use it. A user account is required – contact Lab Manager Chris Triantafyllou, c.triantafyllou.1@research.gla.ac.uk to create an account or fill out the form at <https://www.materials-glasgow.org/lab-access.html>. Items not on the system do not require specific equipment booking.

5.1 Mechanical Testing – Dr Peifeng Li and Dr Daniel Mulvihill

Instron 3360 (30kN) – Dr Peifeng Li

Deben microtester (5kN) – Dr Daniel Mulvihill

- Safety glasses should be used when using mechanical test machines.
- Care should be taken not to place hands etc. in the path of the machine while it is turned on. Remember the machine can move unexpectedly. Be aware of the location of the Emergency Stop Button.
- Students are asked to read the machine manuals carefully before use and undertake appropriate training before operating for the first time.

5.2 Cutting, Grinding and Polishing – Dr Daniel Mulvihill, Dr Peifeng Li, Dr Andrew McBride

Struers LaboForce-50 (Grinding/Polishing)

Struers CitoPress-1 (Hot pressure mounting machine)

Struers MiniTom (Cutting Wheel)

Buehler Vibromet 1

- The MiniTom cutting wheel is the most dangerous piece of equipment here.
- When using the MiniTom, ensure the protective screen provided is in place before cutting and wear protective glasses.
- Be sure that the machine is turned off while making any adjustments. Never place hands or arms close to the machine while it is turned on.
- Students are asked to read the machine manuals carefully before use and undertake appropriate training before operating for the first time.

5.3 Furnaces – Dr Peifeng Li and Dr Andrew McBride

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

Carbolite Gero Tube Furnace (with argon environment, 1200 °C)

Ramsell LAC PKE Hardening chamber furnace PKE 18/12 (Max temp 1280°C)

- When using the furnaces, ensure that the relevant personal protective equipment (PPE) is worn. This is detailed in the Risk Assessment documents associated with

the furnaces. The PPE is provided in the lab. Eye protection, face protection, foot protection and heat resistant gloves are required.

- Never handle hot materials – furnace tongs should be used. Hold them away from yourself and others.
- When the chamber furnace is in use, use the portable air extractor positioned near the furnaces to extract particles/fumes when the furnace door is opened.
- When using the furnaces, ensure that the microscopes are fully covered.
- Students are asked to read the furnace manuals carefully before use and undertake appropriate training before operating for the first time.

5.4 Microscopy – Dr Daniel Mulvihill

Motic AE2000MET Inverted Metalurgical Microscope

Thorlabs Cerna Optical Microscope

Alicona Infinite focus G4 Surface profilometer

- The microscopes require a high level of cleanliness. Only relatively clean specimens should be used.
- Take care never to touch or scrape the lenses/objectives.
- Never try to remove lenses – Contact the responsible academic
- Never try to remove structural screws etc. (this can case the lens to crash down) – contact the responsible academic.
- When finished using the microscopes, ALWAYS carefully replace the dust cover taking care not to accidentally adjust any finely set parts of the microscope.
- Students are asked to read the microscope manuals carefully before use and undertake appropriate training before operating for the first time.

5.6 3D Printers – Dr Peifeng Li

Zortrax M300 FDM

Choc Edge Choc Creator 2.0 plus

- Students are asked to read the 3D printer manuals carefully before use and undertake appropriate training before operating for the first time.

5.7 Other Equipment

- In relation to other items of commercial equipment, students should follow the manufacturers guidance on safe usage.
- In relation to student/researcher designed experimental equipment, it is the student/researchers responsibility to ensure that the equipment is safe for both themselves and other lab users (i.e. no sharp edges, no dangerous electrical installations – please ask the Electrical Workshop in the Rankine or James Watt Buildings to check these aspects).

6. Covid-19 Measures

The following additional measures are in place as of 18th June 2020 to ensure that the lab is a safe working environment during the Covid 19 Pandemic. The Lab Management Team will review these measures periodically in line with University and Government requirements.

- 1) Up-to-date guidance from the HSE, UK Government and Scottish Government to manage the risk related to Covid-19 pandemic must be applied in the Thompson Materials Lab. These include physical distancing, frequent hand washing and hygiene measures, cough etiquettes and face covering in enclosed public space. Considerations for codes of practice and risk assessment for the James Watt School of Engineering can be found here (<https://www.gla.ac.uk/schools/engineering/informationforstaff/safety/>)
- 2) Physical distancing within the Thompson Materials Lab means a **maximum capacity of 2 people** working at any given time. The two **users must remain 2 meters apart at all times** (even when walking around the lab). More than 2 people are not permitted to occupy the lab simultaneously. The lab will be divided into clearly marked sections (via floor markings) and only one researcher should occupy these at any one time.
- 3) It is good practice to wear **face coverings** in the lab if possible (this is optional).
- 4) Usage of the lab will be managed by the MMRG online booking system (<https://www.materials-glasgow.org/lab-portal.html>). A user account is required – contact Lab Manager Chris Triantafyllou, c.triantafyllou.1@research.gla.ac.uk to create an account or fill out the form at <https://www.materials-glasgow.org/lab-access.html>. Contact the Lab Responsible Academic (Dr Daniel Mulvihill Daniel.mulvihill@glasgow.ac.uk) or the School Safety Coordinator if you have other questions. Implications on the impact on the overall capacity of the Thompson building and adjacent James Watt South Building will be reviewed by the Technical Services Manager.
- 5) Morning and afternoon sessions will be available to book (from Monday to Friday during the hours 8 am to 5 pm)
- 6) Users from the morning session should leave on time and ensure that they do not meet the incoming users (unless one morning user is remaining for the afternoon session). A time gap is deliberately included between sessions to ensure that morning and afternoon users do not overlap.
- 7) Lab users must **wash their hands** regularly and **wipe workstation surfaces, materials, and equipment** at the start of their work and before leaving (this refers to items they will touch or have touched). Users should consider which parts of equipment they have touched and wipe these clean before leaving the lab. Users should allow time at the end of their lab session (e.g. 10 mins) to undertake the required cleaning.
- 8) Hands should be washed (within the lab): after blowing your nose, sneezing or coughing, and before and after sessions that involve touching lab equipment.
- 9) Emergency support (First Aiders and Fire Area Officer) might be constrained due to Covid-19 restriction on building capacity. Task risk assessments need to be reviewed to include the above measures and to review with personnel through the risk assessment, which work can be safely undertaken with reduced access to emergency

support. A Covid-19 risk assessment template can be found here (https://www.gla.ac.uk/media/Media_723618_smx.docx).

- 10) Users of the Thompson lab should use the nearest bathroom facilities in the adjacent James Watt South Building. Notice of these (and directions) will be highlighted on the lab door. Users should only use the designated toilet facilities.
- 11) Lab users should not loiter in building spaces outside the lab except in an area designated (for Thompson lab users) by the School of Engineering Building Services Manager.
- 12) The Covid 19 Lab Guardian for the Thompson Materials lab is the Lab Responsible Academic.
- 13) Induction: All users of the lab after 18th June 2020 must have attended a remote induction and training session on the Covid 19 procedures specific to the Thompson Materials Lab.
- 14) No lab work is permitted outside normal working hours (i.e. Monday to Friday, 8 am to 5 pm). This provision will be reviewed regularly, so contact the lab management for up-to-date information.



Appendix A: Duties of the Lab Responsible Academic, Lab Manager and Lab Management Team

A1. Lab Responsible Academic

According to the School's Safety Manual, the **Lab Responsible Academic is responsible for implementing safety policies in the Lab on a day-day basis**. The Lab Responsible Academic (acting on behalf of the Lab Management Team) is also responsible for the overall running of the lab. For the Thompson Materials Lab, the specific duties of its Lab Responsible Academic are: :

- 1) to maintain the Code of Practice (CoP);
- 2) to ensure the lab users keep their area in tidy and clean condition;
- 3) to ensure each activity (experimental rig/equipment) has a Risk Assessment before work commences;
- 4) to coordinate actions according to the School Director of Safety's report / instructions following inspections;
- 5) to liaise with the Lab Manager, and the Academic supervisors in order to ensure the safety and upkeep of both the lab and its equipment.

The appointment of the Lab Responsible Academic

- 1) The Head of SPE Research Division, in consultation with the Lab Management Team, appoints the Lab Responsible Academic for the Thompson Materials Lab (currently Dr Daniel Mulvihill).
- 2) The Lab Responsible Academic of the Thompson Materials Lab reports to the Head of Research Division (in this case The HoRD Systems, Power and Energy).

A2. Lab Manager

The Lab Manager (if appointed) is a researcher who assists the Lab Responsible Academic (and Lab Management Team) in overseeing the day-to-day running of the lab. The Lab Manager also assists the Lab Responsible Academic in ensuring that the Code of Practice and other more detailed safety procedures and Risk Assessment requirements are followed. The Lab Responsible Academic and Lab Management Team may delegate certain duties to the Lab Manager.

The appointment of the Lab Manager

- 1) The Lab manager is appointed by the Lab Management Team.

A3. Lab Management Team

The Lab Management Team comprises the academic staff users of the lab who are also members of the Materials and Manufacturing Research Group. Duties are:

- 1) To approve any major changes to the configuration, structure or operation of the lab or its Code of Practice. (this includes the addition or removal of equipment that will require permanent lab or bench space)
- 2) To appoint the Lab Manager and to assist the Head of Division in appointing the Lab Responsible Academic

Appendix B: Procedures of the preparation of the Risk Assessment

1. PDRAs and PG/UG students are responsible for formulating Risk Assessments on a day-to-day basis. For potentially hazardous activities, in addition to assessing the risks, the risk assessment form should include a standard operating procedure/method statement (and/or instrument manual) as an appended document.
2. Whilst the preference is for the persons undertaking the practical work to make their own risk assessments, it is permissible to use the on-line multi-user risk assessment forms for activities that will be undertaken by groups of people. However, in this case, each person involved in the practical work must sign the multi-user form online and a strict regime of user training should be in place that encompasses both the risks associated with the work as well as the practicalities of undertaking it.
3. Academic supervisors should assist the PDRAs and PG/UG students in preparing the risk assessment (this would typically be the case for less experienced PDRAs and PG/UG students). They should **ensure** foreseeable risks have been identified and adequate mitigation measures have been provided to reduce them as far as possible.
4. The academic supervisors should then approve the risk assessment form online (or ask for further information to be added); the Lab Responsible Academic should also acknowledge (on-line or otherwise) that the risk assessment has been completed, to indicate that as far as they can see, this activity does not conflict (in safety terms) with other activities in the lab. The Lab Responsible Academic can also ask for further clarifications/additions concerning the procedures involved to be made, if necessary.
5. After the risk assessment has been approved/acknowledged by the supervisor and Lab Responsible Academic/Lab Guardian, the School's Director of Safety approves, seeks further clarifications, or (exceptionally) rejects the risk assessment if there are clearly hazards that cannot be sufficiently mitigated.
6. An e-copy of the **approved** Risk Assessment should be sent to the Lab Responsible Academic by the PDRA or PG/UG student that originated the assessment (n.b. pdf's of the online form can be made by using the Print to PDF option available in most browsers)
7. A hard copy of the approved Risk Assessment and standard operating procedure should be kept or displayed next to the relevant experimental rig or equipment.
8. The Lab Responsible Academic approves the start of activity after receiving the **approved** Risk Assessment.
9. If there is any substantial change to the people or research activity as stated in the Risk Assessment, it **MUST** be revised accordingly, and pass procedures 1-7 as above.