

Newcastle University

School of Electrical, Electronic & Computer Engineering

PEDM Group Health & Safety Policy

Version 1.06

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3.1 Abbreviations

- U.G. Lab. – Refers to The Power Electronics, Drives and Machines Research Laboratory, Student Study Areas, Research Technicians Workroom and Research Cells.
- C.A.E.D. Lab. – Refers to The Centre for Advanced Electrical Drives.
- The Labs – Refers to both the U.G. and C.A.E.D. Laboratories.
- PEDM Group – Refers to The Power Electronics, Drives and Machines Group, plus the personnel of the C.A.E.D. Lab. This group comprises Academics, Research Associates, Students and a Technician, headed up by Professor Barrie Mecrow.
- C.O.S.H.H. – Refers to the Control Of Substances Hazardous to Health.

3.2 Statement of General Policy

The Power Electronics, Drives and Machines Research Group aims to:

1. To provide adequate control of the health and safety risks arising from our work activities.
2. To consult with members of the PEDM Group on matters affecting their health and safety.
3. To provide and maintain safe equipment.
4. To ensure safe handling and use of substances.
5. To provide information, instruction and supervision for members of the PEDM Group.
6. To ensure all members of the PEDM Group are competent to do their tasks, and to give adequate training where required.
7. To prevent accidents and cases of work-related ill health.
8. To maintain safe and healthy working conditions.

To help us achieve our stated aims all members of the PEDM Group are required to:-

- Follow the training you have received when using any work items the P.E.M.D. Group has provided for you.
- Take reasonable care of your own and other people's health and safety.
- Co-operate with the PEDM Group / School / University Authorities on health and safety.
- Tell someone, (your Lab Technician, Immediate Supervisor, School Safety Officer, Head of Group or Health and Safety Representative), if you think inadequate precautions are putting yours or anyone's health and safety at risk.
- Follow the regulations contained in this document.
- Perform risk assessments and have them approved before commencing any experimental work.
- Keep out from the work areas when under the influence of ALCOHOL and/or DRUGS, including any medicines which induce drowsiness.

3.3 Access to the Laboratories

This document applies to the following areas:-

- The Centre for Advanced Electrical Drives.
- The Power Electronics, Drives and Machines Research Laboratory (E12).
- Student Study Areas E7, E13 and E17.
- Research Technicians Workroom E16.
- Research Cells E21 and E22.

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Entrance to the Laboratories is restricted to members of the PEDM Group who's University Smart Card has been authorised to open the Laboratory Doors.

The completed and signed, (by both the applicant and their supervisor), "Safety Declaration" at the back of this document must be handed into "Reception" before your Smart Card can be activated.

Authorisation of your Smart Card to allow your admittance to the Labs does not entitle you to authorise the entrance of anyone else into the Labs, including family and friends.

No children are allowed in the Labs under any circumstances, unless part of an authorised visit.

4.1 Risk Assessments

Each new project and/or new piece of equipment requires a written risk assessment to be completed, signed, and approved by the relevant persons. The Risk Assessment to be updated every time you make a major change to your rig and at six monthly intervals.

Risk Assessments are undertaken using the software "Imin", which is supported centrally by the school.

When writing a risk assessment you will have to identify all hazards associated with your activities. This includes such things as noise, vibration, working alone, live working, dust, fluids, chemicals, generated heat, unattended experiments, trip hazards, moving parts, high voltage etc. (Note: this is not a complete list).

You will then have to assess the risk or likelihood of that hazard causing injury, then decide what control measures you will introduce to limit the risks.

Using the Risk assessment produced, an assessment of the rig must be performed by the builder and their supervisor, and approved by the lab manager before power is applied for the first time.

Some rigs maybe used over a period, to expand the parameters and / or perform different tasks than the original experiment, with each change of use of a rig a new risk assessment must be performed.

Some rigs maybe used over a period with different students, with each change of student a new risk assessment must be performed

4.2 Electrical Safety

4.2.1 General

Electricity kills. Even non-fatal shocks can cause severe and permanent injury. Therefore, ALL circuits using voltages above 50Vdc and/or 50V peak AC must be contained, such that the voltage cannot be touched. You must comply with the following:

- If the container is made of metal, then that container shall be earthed.
- All metalwork within the vicinity of your rig must be Earthed i.e. benches etc.
- All rigs must have interlocks, which disconnect the supplies if the covers are removed.
- Never leave your rig energised and unattended.

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- All rigs must have at least one clearly identified “Emergency Stop” button.
- You must never interfere with or switch on someone else’s rig.
- No member of the PEDM Group is permitted to work on rigs with guards removed unless you have received written authorisation, (Permit).
- No member of the PEDM Group is permitted to work alone with energised equipment within the C.A.E.D. Laboratories or Research Cells E21 and E22 unless you have received written authorisation, (Permit).
- No member of the PEDM Group is permitted to work alone with energised equipment within the Power Electronics, Drives and Machines Research Laboratory (E12), Student study areas (E13 & E17) or Research Technician Room (E16) unless there is another person within sight or sound of the rig you are working on, s/he must be competent to switch off the supplies.

4.2.2 **Wiring Codes (AC circuits)**

There are two colour codes for Electrical Wiring in place within the Labs. The old British Standard and the new European Standard, before connecting any equipment to the supply, it is vital that you ascertain which wiring method the equipment conforms too, failure to do so could produce a FIRE hazard. If there is uncertainty as to the method used, you should consult the Lab. Technician, the School Electrician or the School Safety Officer. Information on the two codes can be found at:-

<http://www.theiet.org/publishing/wiring-regulations/colour/>

There you will find all you need to know, also some downloads showing how the two systems marry together.

All new rigs must conform to the new European system.

4.2.3 **Electrical Equipment**

- Always read Instruction Manuals before using unfamiliar equipment.
- If you have any doubts about how to use equipment, then seek advice.
- Equipment only to be used in accordance with manufacturer’s instructions.
- Never block ventilation grills.
- All equipment to be stood firmly on benches; do not stack equipment.
- Never leave equipment energised and unattended.
- Never leave equipment in a dangerous condition for others to use.
- Never modify equipment.
- Never use any damaged or faulty equipment.
- Report immediately any damaged or faulty equipment to the Laboratory Technician.

4.2.4 **Rotating Machines**

- All rotating parts must be guarded.
- No rotating machine to be energised without guards fixed in place.
- All metalwork must be Earthed i.e. Bed plates, motor bodies, guards etc.
- No cabling shall be placed on or near moving parts
- All cabling must be securely fastened in place.
- Where ever possible interlocks must be fitted to motor enclosures.

4.2.5 **Soldering**

- When soldering, care should be taken when using any equipment within the soldering area: as most of the equipment can reach temperatures in excess of 400°C. some can reach temperatures of 550°C.
- When soldering, you must use the filtration system installed in the soldering area, to remove any toxic fumes.

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- When soldering at your workbench, inside cabinets or inside rigs, then portable filtration systems are available from the Laboratory Technician.
- Do not flick excess molten solder off the tips of soldering irons, use the sponges provided to wipe excess solder away.

4.2.6 Liquids and Electricity

- Liquids and electricity form a lethal combination.
- Never operate anything electrical with wet hands, (regardless of the voltage used).
- Do not keep water bottles and/or beverage containers anywhere near your rig or computer.
- If you spill any liquid near anything electrical, switch off the supply at once. Dry up the liquid, inform either the Lab. Technician, the School's Electrician the Schools Safety Officer or the School's I.T. Department.
- **DO NOT** switch the appliance back on until it has been thoroughly checked and pronounced safe.

5.1 General Working Practice

5.1.1 Lone Working and Out of Hours Procedures

Lone working is not allowed unless a Permit is issued, (See Permits below).

A new risk assessment must be completed before a permit can be issued.

When lone weekend and/or after normal school hours, working is required, a "Permit to Work" must be completed and signed by the applicant and their supervisor before any work characterised as hazardous is carried out, (see Risk Assessment Section).

In addition, a "buddy system" would need to be introduced.

A 'Buddy System' is where the person doing lone working keeps in contact with an agreeing colleague by telephone during the period of lone working. The absolute minimum contact would be when the person working alone arrives at work and when the person doing lone working is going home. Ideally, the contact should be more frequent. The exact period between contacts being determined by the risks involved, the higher the risks the more frequent the contacts. Should a contact be missed then the person expecting the call should first attempt to contact the person working alone, if contact cannot be established, then the person expecting the call should contact the University Security Office asking them to investigate.

Regardless of the type of work you are doing, if you are working anywhere within the School of Electrical, Electronic and Computer Engineering building, after 17.00 Hours and/or Weekends, then the out of hours book needs to be completed. This requirement needs to be complied with every time you work after 17.00 Hours and/or Weekends.

5.1.2 Permits

- A "Permit to Work" must be completed and signed by the applicant and their supervisor before any work characterised as hazardous is carried out, (see Risk Assessment Section).
- A time limit needs to be set for the permit and reviewed regularly.
- A permit is only relevant to the job it is issued for.
- Each subsequent job requires its own permit.
- Permits must be kept on file and a copy displayed.
- Permits to work must only be issued at the time that the work is to be carried out.

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- If more than one student works on a rig, which has its containment breached, then each person requires a permit.
- Only a student's supervisor may issue a "Permit to Work" to a student. When a supervisor is unable to issue a permit then alternative methods to get the work done must be devised and / or training given.

5.1.3 **Visiting Technical Staff**

When students require work to be done by external technical staff in a hazardous area or access is required by external technical staff into a hazardous area then a permit to work is required. The permit to work must be sought from the student whose area the technician is working, saying that it is safe for them to do so.

During the time that technical staff are, working in the hazardous area no equipment shall be energised until all work is completed and any containment breaches have been restored.

Only a student may issue a "Permit to Work" to external technical staff for the designated area for which that student is responsible.

When the work has been completed, the technician will sign the permit to confirm that the work is complete and return the permit back to its originator.

To facilitate audit trails the student will save and file all permits to work.

5.1.4 **The Permit to Work Form**

The Permit to Work Form has been designed so that a student may breach the containment of hazardous sections of their rig with the permission of their supervisor; to work alone in designated parts of the laboratories or for students to give external technical staff permission to work within the students designated work area safely.

Part 1 of the form is to be used to by a student's supervisor to give permission to the student to do a particular type of work.

Part 2 of the form is to be used by a student to give external technical staff permission to work within the students designated area.

5.1.5 **Unattended Experiments and Equipment**

There are specific hazards with unattended experiments. These need to be considered by Risk Assessment. If the risks are unacceptably high, (due to severity or probability), then the experiment may not be left unattended. However if it is reasonable to have an unattended experiment but there remains a foreseeable risk to other persons or infrastructure as a result of a incident then formal information needs to be made available and displayed on the door of the room concerned. This is normally done by the use of an Unattended Experiment form. It is advised that the form be also used in circumstances where there may be a concern that danger would be present but where no danger is foreseeable and in these circumstances, the form is recommended to be placed on or near the equipment concerned. (The above is copied directly from the university H&S Policy 2008).

The School Safety Officer must be informed.

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6.1 Fire

- Familiarise yourself with the locations of Fire Extinguishers, Fire Exits and Fire Alarm Actuators.

Upon hearing a fire alarm, leave the building immediately by the nearest route, (do not go back to your desk to retrieve anything).

- **DO NOT USE THE LIFTS**
- Once you have left the building, do not re-enter for any reason, go to your “Meeting Point” which is under Claremont Tower.
- Follow all instructions given by the Fire Marshalls, University Security Personnel or Fire Brigade Officers.
- The main corridor in the U.G. Lab. will be kept clear at all times. Besides being the main exit route for the U.G. Lab. under certain circumstances people coming down the main staircase could be diverted through the U.G. Lab. to the Fire Exit beside E7 study room.
- There is more than one type of Fire Extinguisher available in the Labs, you should familiarise yourself with different types and which one to use with different types of fires.
- Training is available for Fire Prevention and in the use of Fire Extinguishers, where applicable within the University.

6.2 Accidents and Near Misses

All accidents and near misses must be reported to the School Safety Officer.

If an accident occurs during normal school hours, then there are two First Aiders that you may call upon for help, there is signage in the U.G. Lab. indicating the First Aiders names and telephone numbers.

For all campus emergencies requiring the assistance of the Fire Brigade, Ambulance Service or Police dial the University Security 24 hour emergency telephone number 6666. The 999 number should only be used from off campus telephone systems where the 6666 number is not available.

Should an accident occur which traps a person in a rotating machine or causes electrocution, power needs to be disconnected as quickly as possible. You should familiarise yourself with the locations of all the Emergency Stop Buttons situated throughout the UG Lab. Once pressed all power in the U.G. Lab. is disconnected (except the Research Cells & Students Study Room E7).

If a person has been electrocuted, you should not approach them until you are certain all power has been disconnected; as you are at risk of electrocution yourself.

6.3 Miscellaneous

6.3.1 Chemicals

No chemicals, this includes oils, glue, resins etc. are to be used or stored within the U.G. or C.A.E.D. Labs unless, a C.O.S.H.H. assessment has been performed.

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Should it be necessary that chemicals be used within the Labs a Material Safety data sheet must first be acquired from the Manufacturer and a full C.O.S.H.H. risk assessment must take place before the chemicals are released.

6.3.2 **Manual Handling**

Manual handling is transporting or supporting loads by hand or using bodily force. Many people hurt their back, arms, hands or feet lifting everyday loads, not just when the load is too heavy.

Members of the PEDM Group should not attempt to move heavy loads. Should a heavy object need to be moved, the Lab. Technician should be informed, s/he will arrange for the object to be moved.

Around the U.G. Lab. and within the School, there are a number of different pieces of equipment for moving and lifting heavy loads. No person is permitted to use such equipment.

6.3.3 **Computers**

Using a computer or other kinds of display screen equipment, (visual display units), can give rise to back problems, repetitive strain injury, or other musculoskeletal disorders. These health problems may become serious if no action is taken.

It is your responsibility to report to your Supervisor or the School Safety Officer, if you feel your health is been affected by your posture whilst using your computer. They will arrange for a risk assessment of your work area and suitable alterations will be made as necessary

6.3.4 **Personal Care**

Remember, you are your greatest asset, also your greatest threat, so:-

- Keep your desk and work area clean and tidy.
- Make sure that you have removed any foreign materials and tools from and around your rig before energising it or any equipment associated with it.
- Make sure any equipment you are using is set up correctly before energising it.
- Think before you do anything, then double check it to make sure you have done it correctly.
- Never rush.
- If you find yourself losing your temper over something, leave it and do something else.
- If you are doing a fiddly or awkward job – ask someone to give you a hand.

6.3.5 **Pregnancy**

Employers have a legal duty to protect pregnant woman and their children from work-related risks. Therefore, any student becoming pregnant must inform her supervisor immediately so that a specific risk assessment maybe carried out.

6.3.6 **Disabilities**

Any person with a disability, (whether permanent or temporary), i.e. broken limbs, must make themselves known to the School Safety Officer immediately, so that a **Personal Emergency Evacuation Plan** may be produced.

7.1 **Visitors**

7.1.1 **Access**

Accompanied visitors are allowed within the Labs, i.e.

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- Representatives of the Company you work or are working for.
- Potential clients or investors.
- Representatives of companies you wish to buy products from etc.

Visitors must first report to The School Reception to be signed in, before entering the Labs.

Visitors should not be allowed to use video/photographic equipment as Sensitive Research takes place within the Labs.

7.2 **Visitors Health and Safety**

- Visitors Health and Safety is the responsibility of the person inviting a visitor into the Labs.
- Visitors should be closely supervised at all times.
- Visitors must be made aware of any hazards on the way to or within the area they are visiting.
- Visitors must be provided with any protective equipment required for the areas they are to visit, i.e. ear defenders, eye protection, hard hats etc.
- Visitors must not be allowed to interfere with any equipment within the Labs.
- Visitors are not allowed to operate or work upon any equipment within the Labs.
- Visitors must be escorted from the building by the nearest exit, should the Fire Alarm sound.
- Visitors must be escorted to at least, the laboratory door when a visit is concluded. Your responsibility for their Health and Safety does not end until the visitor is no longer within boundaries covered by the section "Scope of Document".

SAFETY DECLARATION

The document entitled 'School of Electrical, Electronic & Computer Engineering – PEDM Group Health and Safety Policy' has been issued to me. I have read this document carefully and fully understand the legal obligations and the regulations contained therein, I agree to be bound by, and to follow these obligations and regulations.

User Name (BLOCK CAPITALS)

Course and Stage

Smart Card Number

Signed

Date

For Supervisor Use only

Authorised working times (please tick one):

Monday to Friday - 9am until 5pm. (Undergrads)

24hrs 7days per week. (Staff – P.G.R.)

Supervisor's Name (Block capitals):

Supervisor's signature authorising student access into UG Lab

Date Signed