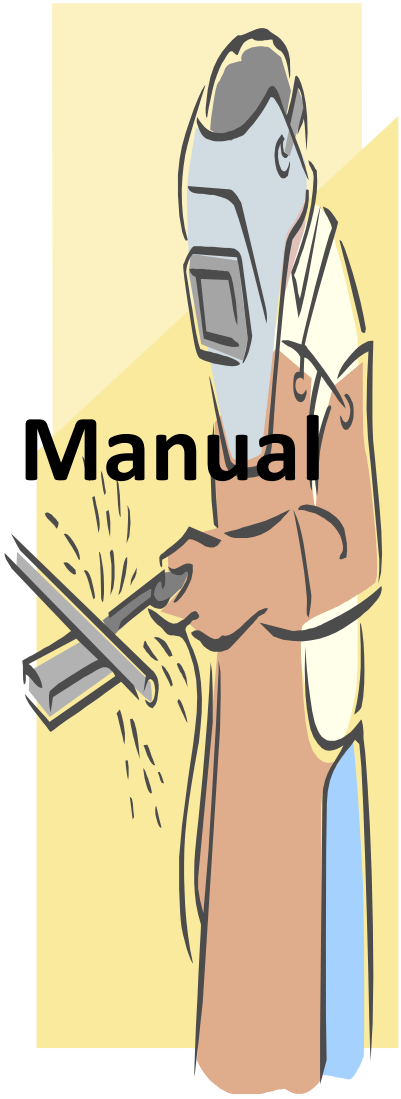
CIT Coláiste Ealaíne agus Deartha Crawford
Crawford College of Art & Design



Student Induction Manual

Metal Workshop

September 2015

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1 Introduction

The purpose of this student induction manual is to ensure that you, the student, are aware of the procedures in place for carrying out activities in the workshop. These activities may include demonstrations, group workshops, or individual project work. There is a big emphasis on health and safety, including a description of required personal protective clothing, how to evacuate in case of an emergency and information on what to do should an accident occur.

The roles of lecturing staff, technical staff, and you, the student, are outlined. A list of equipment and tools is provided, along with the function or purpose of each item. The major hazards and risks associated with working in the metal workshop are explained.

A description of the induction and competency testing processes is also provided.

If you have any queries relating to any item in this manual, please contact your **Head of Department, Trish Brennan (Trish.Brennan@cit.ie).**

Note

If you have not worked in the metal workshop for a period of 3 months after completing your induction course then it will be

***necessary to complete a refresher course. This can be requested by contacting the technician or the lecturer*.**

2 Workshop Practices

The metal workshop is one of the most hazardous workshops in the College. Therefore all students wishing to work there must partake in and pass an induction course. This is due to the fact that the activities that take place there can cause serious physical harm, if not conducted with due care and diligence.

The top priority for the Fine Art and Ceramics Department in relation to the Metal Workshop is for their students to gain the knowledge, skills and experience necessary to engage in planning, making and evaluating their own art work through the construction and welding processes available.
There are other support services that may also be required, such as the construction of metal stands, video cages and various individual projects. This may not require the student to be present during the making process. Any request of this nature must be supported by a lecturer, and should not take precedence over timetabled workshops, or the needs of individual students who wish to learn and work in the metal workshop.

All students wishing to work in the metal workshop must complete an induction session. Should students wish to pursue individual project work in the metal workshop there is also a competency test required, to ensure that equipment is used in a competent and safe manner. Students who do not pass the competency test may not work in the metal workshop.

There is generally a technical officer on hand to provide support to individual students who have passed the competency test and for workshop-related activities.

You may not work unsupervised or alone in the metal workshop.

GENERAL RULES

- Dress Code – Strict enforcement of PPCE (Personal Protective Clothing and Equipment) ie flame proof overalls, steel toe capped shoes or boots, safety glasses.
- No JEWELLERY
- No food or drink in the workshop
- No flammable liquids in the workshop (**including lighters**)
- No flammable material in the workshop
- No storage of personal items in the workshop
- No headphones/MP3 players/mobile phones

3 Role of the Lecturer

The role of the lecturer is as follows:

- to provide students with academic guidance on the making of art work
- to deliver and record appropriate induction sessions to all students using the workshop
- to deliver workshops and classes as appropriate
- to ensure that students have the necessary skills to make their own artwork in a safe manner
- to provide feedback on individual project work
- to carry out competency tests for students wishing to pursue individual work in the workshop; lecturers are NOT responsible for any accident that may occur while any students are working unsupervised.

In the case of individual project work, the lecturer will agree in advance with the student what can and cannot be attempted by the student on his or her own, and what pieces of equipment the student is competent to use.

For any individual piece of work to be completed by the student, the lecturer should work with the student in advance of commencement, overseeing size, weight, processes, equipment and materials.

It is the responsibility of the lecturer to ensure the following:

- **Students are working safely and using good housekeeping**
- **Students are not working alone and unsupervised**
- **Students working in an unsafe manner are removed from the workshop.**

4 Role of the Technical Officer

The role of the technical officer is as follows:

- Organising, preparing and setting up for workshops, student induction, demonstrations, and project and research work;
- To be present at each laboratory or workshop class to provide technical assistance or to provide demonstrations

- Provide technical assistance to lecturers and students on the safe operation and use of equipment and materials.
- Establishing and maintaining stock control of equipment and consumable materials.
- Arranging for safe disposal of used materials
- Participate in the carrying out of safety audits in all areas of operation in co-operation with other grades of staff.
- Ensure that laboratories, materials and equipment are kept clean, tidy and in good order.

The technical officer may also advise students on pre-project planning, and on processes and equipment. The technical officer is not responsible for accidents that may occur while students are working unsupervised.

5 Responsibility of the Student

Generally, as per CCAD Student Handbook:

Workshops and studios

Students have the responsibility to keep their workspaces clear of debris and hazardous materials and to follow College rules and regulations. Fire escapes and corridors are to be kept clear at all times. Waste is to be placed in bins and clear walkways must be maintained in all studios.

Students have responsibility for their own safety and for those of others.

- No food or alcohol is to be consumed in the workshops or studios.
- No smoking in the college. Smoking shelters are provided for this purpose.
- Always wear appropriate clothing, including sensible foot ware and eye protection.
- Always tie back long hair, remove personal jewellery and guard against loose clothing when using moving machine tools.
- Always use the guards provided on equipment
- Familiarise yourself with the correct operating procedures for workshops and machinery.
- **Observe safety instructions and unless you are absolutely confident to undertake an operation safely, DO NOT PROCEED.**
- You are requested to make known to your year tutor or a relevant staff member any information, such as a medical condition which may affect your safety in the workshops or your treatment in the case of an accident. This information is confidential and is for health & safety reasons only.
- Always keep fire escapes and corridors clear.
- Students have the responsibility to ensure that all equipment borrowed from the College is returned promptly and in good working order.

Further specific responsibilities of students working in the Metal Workshop include:

- Co-operating with lecturing and technical staff in relation to any instructions that may be issued in relation to the use of equipment;
- **Complying with requirements for wearing personal protective clothing and equipment (PPCE);**
- Ensuring that jewellery is removed, and long hair and loose clothing are secured before entering the workshop;
- **Ensuring that work is being carried out in a safe manner that will cause no harm to self or others;**
- Tidying the workspace on completion of a project, or on departure from the workshop;
- Refraining from using headphones/mobile phones.

Failure to comply with any of the above will see the student being removed from the workshop.

It is the responsibility of the student to purchase/obtain the required items of PPCE identified in Section 9. There will be some spare items available in the workshop for temporary use.

6 Induction

Student induction will take place at least twice per semester, and will be organised by the academic staff. This will include:

1. Introduction by academic staff to metal workshop and technical support;
2. Overview by academic staff of health and safety requirements, including induction manual;
3. Demonstration by technical officer/lecturer of equipment and associated hazards and risks;
4. Overview by technical officer/lecturer of correct procedures for manual handling of metal.

Students may be divided into smaller groups for Part (3) above.
Notices will be posted as to dates and times of the next induction session.

There will also be regular workshops in the metal workshops, organised and delivered by lecturing staff with a view to increasing the competency of students in particular processes or on certain items of equipment.

Notices will also be posted as to dates and times of workshop sessions.

7 Workshops and Competency

There are several areas of competency required: the two main areas are Electric Welding and Electric Cutting & Grinding. The competencies for each are outlined below. **Students will only be deemed competent after completing the proficiency as outlined and as certified by the academic staff.** There is likely to be some overlap with the induction process, especially in relation to health and safety aspects.

Electric Welding:

Student Activity	Process	Duration (approx)	Competency Test Method
Welding practice e.g. Spot/Tack welding, Line/Plate welding, axis/angle, filling, slag removal & Box test.	ARC General purposes (mild/carbon steel)	2 to 3 hours	Via Lecturer
Welding practice e.g. Spot/Tack welding, Line/Plate welding, axis/angle, filling & Box test.	MIG General purposes (mild/carbon steel)	2 to 3 hours	Via Lecturer
Welding practice: e.g. tacking, line/plate welding, joining, filling, axis/angle etc.	TIG Advanced purposes (Bronze, stainless steel & aluminium)	10 to 15 hrs	Via Lecturer

Power Tools and Hand Skills:

Student Activity	Process	Duration (approx)	Competency Test Method
Basic Rolling and Folding	Use of roll and swing beam folder.	30 min	Via Lecturer

Basic Drilling of mild steel	Safe use of pedestal Drill	30 min	Via Lecturer
Grinding practice: various surface treatments, grinding welds SUPERVISED	4.5'' Grinder General purposes (mild/carbon steel)	2 to 3 hours	SUPERVISED Via Lecturer (Until satisfactory level of competency attained)
Basic Cutting of plate and bar.	Rotary SAW General purposes (mild/carbon steel)	Half an hour	Via Lecturer
Basic use of vice grips vices, centre punches hammers, hacksaws, plyers etc.	General purpose hand tools	Half an hour	Via Lecturer

Note: If students require training to use equipment outside the items used as part of the induction they can make a request to obtain training through the lecturer.

8 List and Function of Equipment and Processes

Equipment	Function
Guillotine	The function of the Guillotine is to cut sheet metal (not exceeding 3mm thickness) to precise accuracy **The technical officer is the only person permitted to use the guillotine in the metal workshop.**
Power Saw	To cut flat bar, round bar, square bar, angle iron and pipes of various sizes to specific lengths, and at various angles, to an accuracy of 1degree.
Pedestal Drill	Used for drilling metal on projects which require a certain level of accuracy, and to obtain hole sizes of a larger diameter than would be obtainable by using a hand operated drill.
Rolling Machine	To roll sheet steel, flat bar and round bar (of various thicknesses) into curves, semicircles and circles of any given diameter.
Hand Guillotine	To cut 6mm mild steel bar.
Swing Beam Folder	To fold light gauge sheet steel (max 1.6mm thick) into square or rectangular shapes, thereby eliminating the need for welding.
Marking-out tools	For clear definition markings prior to cutting.
Extension Cables	To be used when a piece is under construction in an area to far away from the workbench e.g. outside.

Process	Description
MMA (Manual Metal Arc)	Where two pieces of metal are to be joined (welded) using the electrode or rod.
MAGS (Metal Arc Gas	Semi – Automatic Welder using coiled wire as electrode and inert gas as

Shielded)/MIG (Metal Inert Gas)	flux.
TIG	Usually used for non- ferrous metals such as stainless steel, bronze and aluminium.
Gas Welding	Pre-electric welding process whereby metals are fused together by naked flame and filler wire. Most commonly used for brazing.
Oxy-fuel cutting (steel)	Older system of cutting mild/low carbon steel. Has been replaced by plasma cutting, therefore rarely used now.
Plasma Cutting	Versatile process whereby plasma which is electricity/compressed air driven, this can be used on a variety of metals.

9 Personal Protective Clothing and Equipment

PPCE required for the Metal Workshop:

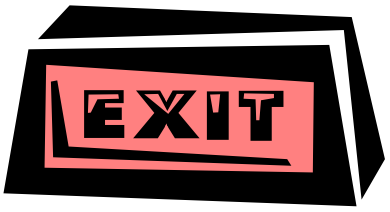
- Only steel toe-capped shoes or boots;
- Appropriate non-flammable boiler suit or full overall;
- Eye protection equipment i.e. safety glasses;
- Ear protection
- **It is the responsibility of the student to purchase/obtain the required items of PPCE identified above. There will be some spare items available in the workshop for temporary use.**

In some situations additional PPCE will be required, such as:

- Hemet/visor
- Heavy-duty Apron
- Gloves/Gauntlets
- Welding Shield

These items will be provided.

10 Evacuation in Case of Emergency



In case of an emergency such a fire, there are two possible evacuation routes:

Evacuation Option ONE

- Exit through the large metal doors to the metal workshop;
- Cross the yard, through the archway, out the college Southern gate;
- Assemble in St. AL's carpark.

This is the normal evacuation route if the fire alarm should sound. Should the fire or emergency incident occur in the yard itself, or under the archway, or in the ceramics area, do not follow the route above. Instead take Evacuation Option TWO:

Evacuation Option TWO

- Exit through the side door into the 4th year studio;
- Pass through the studio and along the sculpture corridor;
- Turn left at the top of the corridor, and exit the building through the large north-facing doors;
- Exit from the grounds via the Northern gate;
- Assemble in St. Al's carpark.

OPTION ONE

OPTION TWO

11 Identification of Risk

The main hazards in the metal workshop are as follows:

- Fire
- Electric Shock (110v – 220v)
- Welding
    - Slag
    - Fumes

    - Light
    - Heat
    - Spatter
- Burns
- Hot Metal
- Slips/Trips in Workshop
- Items falling onto a lower limb

All of the following items of equipment can crush and remove body parts (fingers and hands):

- 115mm Disc Grinder
- Saw
- Guillotine
- Drill
- Rolls
- Swing Beam Folder

Cork Institute of Technology

Activity : **Metalwork**

	Risk Assessment Work Sheet		**Area/Departmen**
Activity	***Hazard***	***Risk value***	***Improvements/ C***
Welding - welding plant (machine)	**Sparks, severe burns, electric shock. Arc welding – Arc eye**	**Low**	**Protective equipr**
Grinding - 4½" - angle grinders	**Sparks and metal offcuts, burns and skin piercings**	**Low**	**PPCE and equipm**
Drilling - hand-held and pedestal drills	**"Swarf" entanglement, hand and eye damage, cuts and loss of sight**	**Low**	**PPCE at all times,**
Rolling and Bending - Rolling Machine	**Finger Crush, Fracture, loss of finger**	**Low**	**Extreme caution,**
Folding - Box & Pan Folding Machine	**Finger Crush, Fracture, loss of finger**	**Low**	**Training & Superv**
Cutting Sheet Metal - Hand Guillotine	**Fingers caught in blade, finger(s) loss**	**Low**	**Guard in place at To reduce risk to this machine**
Gas cutting and welding Oxy/Acetylene Gas	**Highly explosive and flammable gases, explosion, death**	**Low**	**Cautious supervis**
Cutting lengths of metal bar, cut-off saw	**Injury/loss of fingers, eyes penetrated by flying debris**	**Low**	**Supervision, Train PPCE**
General Manual Handling	**Moving and lifting loads MS Injuries**	**Low**	**Supervision, Train**

Risk Assessment Work Sheet **Crawford Collage of Art and Design**

Metalwork Workshop

Area / Item No.	**Hazard/Risk**	**Risk Value**		**Existing Controls**	**Improve**
		Value	**Rating L/M/H**		
CR1.331	Manual Metal Arc Welding, Potential Harzards, Electric Shock, Arc Welding Eye, Burns, Radiation and Fumes	2 x 2= 4	L	Training, Practice, Supervision and PPCE	SOP C
CR1.332	Metal Arc Gas Shielded & Metal Inert Gas Potential Harzards, Electric Shock, Arc Welding Eye, Burns, Radiation and Fumes	2 x 2= 4	L	Training, Practice, Supervision and PPCE	SOP C

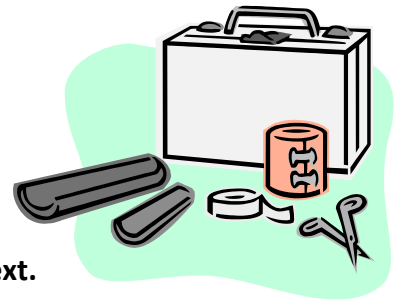
CR1.333	9"/ 230mm Electric Grinder, Metal Splinters, Burns, Swarf, Inhalation, Ingestion and Amputation	2x2=4	L	Not to be used by Students of CCAD	SOP
CR1.334	4 1/2"/115mm Electric Grinder, Metal Splinters, Burns, Swarf, Inhalation, Ingestion and Amputation	2x2=4	L	Training, Practice, Supervision and PPCE	SOP
CR1.335	Band Saw, Entanglement, Eye Injury, Dermatitis, Cuts and Bruises	1x2=2	L	Competent personnel to use saw. Blade to be changed regularly. Regular maintenance to be carried out. Standard operating procedure to be followed	SO
CR1.336	Pedestal Drill, Eye Injury, Entanglement, Cults, Hand Injury and Bruises	2x1=2	L	Competent personnel to use drill. Regular maintenance to be carried out. Standard operating procedure to be followed.	SO
CR1.337	Gas Welding and Heating Plant, Burns, Fumes, Eye Injury, Explosion and Fire.	2x2=4	L	Competent personnel to use gas welding plant. Regular maintenance to be carried out. Standard operating procedure to be followed.	S
CR1.338	Noise Permanent Hearing Loss	4x1=4	L	Carry out noise assessment to obtain decibel levels. PPE must be provided if required.	Carry
CR1.339	Hand Tools Eye Injuries,Cuts, Hand Injuries and Bruises	1x2=2	L	All students to be given a toolbox talk on safe use of various tools.	Student
CR1.3310	Air quality, Respiratory Health Problems	2x2=4	L	Ventilation system to be used at all times. Air quality monitoring to be carried out.	SO
CR1.3311	Fabrication of Metal Projects. Manual Handling, Burns, Cuts, Noise and Eye Injuries	2x2=4	L	PPCE, Safe work practices, Supervision of students, Ventilation to be used, Fire extinguishers and first aid equipment to be available.	Student
CR1.3312	Ridgid Hydraulic Bending Machine. Manual Handling, Crush Injuries, Bruises and Dermatitis	2x1=2	L	Safe instruction on use of hydraulic bending machine. Highlight dangers of injury from improper manual handling. Oil leaks to be reported and repaired.	SO
CR1.3314	Floors, Slips Trips and Falls	2x1=2	L	Regular housekeeping to be maintained.	SO
CR1.3315	Electrical systems Burns and Electric shocks	2x2=4	L	Regular maintainence and pat testing of electrical system and equipment by trained competent personnel. All faults reported and repaired immediately.	Regu
CR1.3316	Vice Crush Injuries, Cuts, Bruises and Trapping Injuries	1x2=2	L	All material to be removed from vice at the end of workshop practice.	All ma

CR1.33 17	Bronze Welding Burns, Fumes, Eye Injuries, Explosion and Fire	2x2=4	L	Competent personnel to use bronze welding equipment. Regular maintenance of equipment.	SC
CR1.33 18	Cuprotec Solder Jointing Burns, Fumes, Eye Injury, Explosion and Fire	2x2=4	L	Competent personnel to use curpro jointing equipment. Regular maintenance of equipment.	SC
CR1.33 19	Fluxes Fumes, Inhalation, Eye Injuries, Skin Irritation and Dermatitis	1x2=2	L	PPCE to be worn when using fluxes. Ventilation to be used.	MSDS
CR1.33 20	Sink Hot and Cold Water Scalding and Flooding	1x1=1	L	Regular maintenance.	Regu
CR1.33 21	Fire Fumes and Burns	5x1=5	L	Heat detectors to be fitted in workshop. Emergency evacuation to be followed at all times. All staff to be trained in the use of fire extinguishers. Regular fire drills to be carried out all exits to be kept clear at all times.	Fire e mai
CR1.33 22	Air quality Respiratory Health Problems	2x2=4	L	Ventilation systems to be used at all times. Air quality monitoring to be carried out.	SC
CR1.33 23	Floor Standing Bending Machine Muscular and Skeletal Injuries. Crush injuries and Bruises	1x2=2	L	Safe instruction on the use of bending machine. Operator to have manual handling training complete. Highlight dangers of injury.	SC
CR1.33 24	Lighting Eyestrain and Headaches	1x1=1	L	Survey lighting system and decide if action is required.	Reco ap
CR1.33 25	Working at Height. Falls, Fall Related Injuries and Fear of Heights.	2x2=4	L	All persons working at height over 2 m must have appropriate equipment, training and PPE.	SC
CR1.33 26	Visual Display Units. Eyestrain and headaches	1x2=2	L	VDU to be used for a maximum of one hour continuous use. Screen and keyboard be cleaned regularly. Seating and desk to be ergonomically correct.	SC
CR1.33 27	Ergonomics Muscle Strain and Back Injury	2x2=4	L	Complete manual handling training. Assess all manual handling tasks. Seating and desk to be ergonomically correct.	Mar ergonom
CR1.33 28	Chemical spills	1x3	L	Have MSDS sheets for Chemicals used on record.	SO
CR1.33 29	Manual Handling Back Injury, Foot Injury, Sprains, Muscular and Skeletal Injuries	2x2=4	L	Assess all manual handling tasks. Staff to be trained in manual handling techniques.	Mar ergon

CR1.3330	Filing Cabinets Crush injuries and Manual Handling Injuries	2x2=4	L	Always fill bottom drawer first, heaviest drawer to be at the bottom. Always close the drawers after use. Care to be taken moving filing cabinets.	SC
CR1.3331	Incorrect Clothing and Footware Burns, Entanglement, Cuts and Crush injuries	1x2=2	L	Correct PPCE to be worn at all times. No loose clothing to be worn. Long hair to be tied up when working.	SC
CR1.3332	Electric Drill Burns and Electric Shocks, Entanglement, Cuts, Bruises and Eye Injury	2x2=4	L	Training, Practice, Supervision and PPCE. Report all faults immediately.Practice good house keeping.	SC
CR1.3333	Belt Sander Loss of Limb, Eye Injury, Noise, Vibration and Inhalation of Dust.	2x2=4	L	Correct safety guards to be used at all times. Regular maintains the carried out. Safe instruction on the usage of the Belt Sander.	SO
CR1.3334	Anvil Burns, Cuts, Back Injury and Eye Injuries	1x2=2	L	Anvil not to be moved. PPE to be worn. Proper training to be given to all students.	SC
CR1.3335	Metal Rack Crush Injury, Eye Injury and Back Injury	2x2=4	L	Manual handling training to be given to all those loading and unloading metal rack.	SC
CR1.3336	Disposable Gas Lighters Explosion, Burns and Eye Injuries	2x2=4	L	Disposable lighters are not to be allowed in workshop. Cup type Flint lighters to be used at all times.	Dispos allo
CR1.3337	Battery Drill Eye Injury, Cuts and Bruises.	1x1=1	L	PPE to be worn at all times	SC
CR1.3338	LPG Bottles Gas Escape and Explosion	1x2=2	L	Gas bottles be stored separately. All faults to be reported immediately. Only correct equipment and attachments to be used.	SC
CR1.3339	Euromac Digibend 360 Entanglement, Eye Injuries, Cuts, Bruises and Hand Injury	2x2=4	L	All operators to be trained in the safe use of machine.	SC
CR1.3340	Metal Roller Entanglement, Eye injury, Cuts, Bruises, Crush and Hand injuries	2x2=4	L	All operators to be trained in the safe use of metal roller.	SC
CR1.3341	Tool Store Slips, Trips and Falls	1x1=1	L	All equipment and material to be stored safely. Students to be supervised at all times in tool store.	Studer wh
CR1.3342	Welding Screens	1x1=1	L	Welding screens to be used at all times when welding.	Scree
CR1.3343	Welding Sheilds	1x1=1	L	Welding shields to be used at all times when welding.	SC
CR1.3344	Inert Gas Asphyxiation	2x2=4	L	Valves be closed at the end of use. Cylinders to be stored in a well ventilated area. Cylinders to be chained in position to prevent falling over.	MSDS

CR1.33 45	Chemical Use Burns, Eye Injuries, Inhalation and Absorption	2x2=4	L	Chemicals to be disposed of according to MSDS sheets. Chemicals to be stored in correct containers. Chemicals to be stored in appropriate storage facility.	SO MSDS
CR1.33 46	Hygiene Infections	2x1=2	L	Always wash hands before leaving workshop. Overalls to be worn in workshop only. Workshop to have drying and washing facilities.	SO
CR1,33 47	Metal Folding Machine Entanglement, Eye Injuries, Cuts, Bruises and Hand Injuries	1x1=1	L	All operators to be trained in safe use of folding machine.	SO
CR1.33 48	Hyper Term Power Maxs Plasma Cutter Fire, Explosion, Burns, Electric Shock, Fumes, Noise and Magnetic Fields	2x2=4	L	All operators to be trained in the safe use of plasma cutter.	SO
CR1.33 49	Forklift Entanglements, Crush Injuries, Electric Shock and Dermatitis	2x2=4	L	Forklift to be used by trained personnel only. All forklift movements to be escorted by Marshall's. Forklift to be regularly maintained.	SO
CR1.33 50	Air compressor Contaminated air, Dermatitis, Dust, Air Leaks and Explosions	2x2=4	L	Compressor to be regularly maintained. Users are to be instructed on its correct use.	SO
CR1.33 51	Pneumatic Power Hand Tools Contaminated air, Dermatitis, Dust, Air Leaks and Explosions	2x2=4	L	Pneumatic power hand tools to be regularly maintained. Users be instructed on correct usage. Pneumatic hoses and pipework to be checked regularly.	SO
CR1.33 52	Handshears/Guillotine Crush injuries, Entanglements and Amputations	1x4	L	Guillotine to be installed correctly, operators to use operators instructions, guillotine to be regularly maintained and material to be cut must not to exceed manufacturers recommendations	SO
CR1.33 53	Ermaksan Electric/Mechanical Guillotine	1 x 4	L	Operators to use operators instructions, guillotine to be regularly maintained and material to because must not exceed manufacturers recommendations.	SO

12 What to Do if an Accident Happens



First Aid

There are a number of personnel trained in first aid, should the need arise. These are:

Denis Lynch, Technical Officer (First Year Workshop, CR 3.12, ext. 240)
Triona Crowley, Administrative Officer (Accounts Office, CR 1.3, ext. 223)

Should an accident occur, contact the caretakers immediately. They will call for an ambulance or taxi to hospital if necessary, and alert the trained first-aid personnel. Generally the student is either brought to the person trained in First-Aid or he/she is called upon to go to the scene of the accident.

Fire

If a fire breaks out, contact the caretakers also, they will sound the alarm if necessary.
A significant number of personnel are trained to use fire extinguishers, including all members of technical and caretaking staff.