



WORKSHOP & TECHNOLOGIES MACHINERY SAFETY MANUAL V2 2018



CONTENTS

FOREWARD	3
INTRODUCTION	4
PURCHASING MACHINERY AND EQUIPMENT	5
HAZARD IDENTIFICATION, ASSESSMENT & CONTROL	8
THE GENERAL WORK ENVIRONMENT	10
MACHINERY AND EQUIPMENT SAFETY	16
• SAFETY GUARDING	16
• ELECTRICAL SWITCHING FOR FIXED PLANT	19
• TAG AND LOCKOUT	20
• GAS CYLINDER SAFETY	21
• SPRAY BOOTHS	28
HYDRAULIC/PNEUMATIC POWERED PLANT	30
WELDING FUMES LEV	31
ELECTRIC WELDING MACHINES (CATEGORY A ENVIRONMENT, 2.2 AS 1674.2 – 2007)	32
PERSONAL PROTECTIVE EQUIPMENT	33
DISPOSAL OF PLANT AND EQUIPMENT	37
STUDENT SAFETY	39
REFERENCES	40
• APPENDIX 1 – PLANT HAZARD IDENTIFICATION. RISK ASSESSMENT AND CONTROL INFORMATION FORM	43
• APPENDIX 2 – ASSOCIATED HAZARDS WITH PROJECT MATERIALS	44
• APPENDIX 3 – GENERAL WORKSHOP RULES	45
• APPENDIX 4 – DESIGN AND TECHNOLOGIES WORK INSPECTION CHECKLIST	46
• APPENDIX 5 – PLANT DISPOSAL RISK ASSESSMENT	50
• APPENDIX 6 – STUDENT INDUCTION WORKBOOK	51
• APPENDIX 7 – SOP – TEMPLATE	58
• APPENDIX 8 – SAFE OPERATING PROCEDURE - EXAMPLE	59
• APPENDIX 9 – TEMPLATE FOR PLANT/EQUIPMENT	60
• APPENDIX 10 – TESTING AND TAGGING	61

FOREWARD

CSHWSA is committed to the provision of safe places to work and learn in relation to Technologies Studies and workshops within Catholic Education schools. The Manual also has application to other worksites where similar equipment is used.

During the process of revising these Design and Technologies Guidelines the Work Health and Safety Unit of the Department for Education and Child Development (DECD) provided valuable information that has been included in the manual.

Because Design and Technologies activities present a high risk of injury to students and workers, this manual has been produced to provide guidance to Principals, School Councils or Boards, and Teachers in the application of their Duty of Care as Officers, supervisors and workers under the Work Health and Safety Act 2012, Regulations and Codes of Practice.

Given the need to comply with legislation and the Catholic Church's commitment to safety, it is a mandatory requirement that educational sites will comply with the direction and content contained herein.

Most importantly, this manual is a living document and in line with the consultative approach to work safety it is open for review, addition or modification.

INTRODUCTION

These Guidelines have been developed in line with the Work Health Safety (WHS) Act 2012 and the Work Health Safety Regulations 2012. The Act and Regulations set out the legal requirements for everyone which include practical steps for workers in preventing injury and illness at work.

“Design & Technologies Workspace” refers to the facilities where teachers and students in schools engage in designing, manipulating and processing materials for construction, fabrication, or development of projects or artifacts. In this area exists a wide range of equipment, machines, tools, work benches, storage space, compressed air and various types of power outlets including single phase and three phase electricity.

Plant includes any machinery, equipment, appliance, container, implement and tool, and includes any component or anything fitted or connected to any of those things. Plant includes items as diverse as lifts, cranes, computers, machinery, conveyors, forklifts, vehicles, power tools and amusement structures.

Plant is a major cause of workplace death and injury in Australian workplaces. There are significant risks associated with using plant and severe injuries can result from the unsafe use of plant including:

- Limbs amputated by unguarded moving parts of machines
- Being crushed by mobile plant
- Sustaining fractures from falls while accessing, operating or maintaining plant
- Electric shock from plant that is not adequately protected or isolated, and
- Burns or scalds due to contact with hot surfaces, or exposure to flames or hot fluids.

Other risks include hearing loss due to noisy plant and musculoskeletal disorders caused by manually handling or operating plant that is poorly designed.

These steps ensure that safe systems of work are developed and implemented. The steps to follow are:

- *Consult with workers and their elected representatives.*
- *Identify hazards that have the potential to cause injury or illness.*
- *Assess the risks i.e how likely it is that the hazards will cause injury or illness, and how seriously this might be.*
- *Control the risks by eliminating them or if you can't, by minimizing them.*
- *Provide information, instruction, training and supervision to ensure workers are aware of any risks and what must be done to control them.*
- *Report hazardous situations, injuries and illness so action can be taken to prevent them from happening again.*
- *Implement systems to regularly review and evaluate health& safety.*

Regardless of which machine is being used or task undertaken, those carrying out the operation must have the skills, knowledge, training and experience to allow them to perform the operation safely. Machines must be used in accordance with the manufacturers' instructions and operators must use machines that are properly maintained.

These Guidelines do not provide the answers to all safety problems. Detailed information relating to specific standards required for all aspects of the work area can be found in the relevant State Legislation and related Australian Standards.

PURCHASING MACHINERY AND EQUIPMENT

The following list provides topics for consideration and consultation when purchasing machinery and equipment. It is important to note that Work Health Safety Regulations, Chapter 5 - Plant and Structures, designers, manufacturers, importers and suppliers of plant and substances have specific regulations.

PEOPLE	<ul style="list-style-type: none"> • Who will come into contact with the machinery and the equipment • What are people required to do? • How will work be carried out and completed? • Based on the knowledge of existing machinery and equipment, what improvements should the purchaser specify when buying new machinery and equipment?
CONSULTATION (WHS Act 2012 Section 46, 47 & 48)	<ul style="list-style-type: none"> • The WHS Act requires that you consult, so far as reasonably practicable, with workers who carry out work for you who are (or are likely to be) directly affected by a work health & safety matter. • If the workers are represented by a health and safety representative, the consultation must involve that representative. • Workers usually know the hazards and risks associated with the plant they use. By drawing on the experience, knowledge and ideas of your workers the more likely to identify all hazards and develop effective risk controls. • Workers to be consulted as early as possible when planning to introduce new plant or change the way the plant is used. • The WHS Act also requires that you consult, co-operate and co-ordinate activities with all other persons who have a work health or safety duty in relation to the same matter, so far as is reasonably practicable.
DOCUMENTATION AND TRAINING	<ul style="list-style-type: none"> • What supporting documentation will accompany the new machinery and equipment? • Does the machinery have a risk register? • Has the machinery and equipment been manufactured to Australian Standards? • What support do suppliers of machinery and equipment offer (service, training, maintenance)? • What operating and maintenance information is supplied with the new machinery and equipment? • Is the supplied information sufficient to provide a basis of a workplace training package? • If the machinery and equipment is refurbished or second-hand, how do the risks controls compare with new machinery and equipment?

	<ul style="list-style-type: none"> Have you upgraded the existing controls to reflect current state of knowledge?
LOCATION	<ul style="list-style-type: none"> Where the machinery and equipment to be located is and how much space does it require? Have you conducted a risk assessment? Is there enough room to access your machinery and equipment for servicing, maintenance, repair or cleaning? Do people walk past or work in close proximity to the proposed machinery and equipment location? Is there enough light? Is there sufficient ventilation?
OPERATION AND MAINTENANCE	<ul style="list-style-type: none"> Have you conducted a risk assessment? Will the machinery and equipment introduce more noise to the workplace? Will your machinery and equipment perform a task other than what it was designed for? What type of emissions does the machinery and equipment produce when operated or cleaned (such as noise, fumes, light and heat)? What are the expected hours of machinery and equipment operation? How will material arrive and how is the product going to be removed after the process is completed? Are there environmental factors such as hazardous atmospheres of flammable vapors or dust or water that may affect the machinery and equipment, the operators or the maintenance workers? Does the machinery and equipment have confined spaces? Does the machinery and equipment have valves or isolation points located at height?
VARIOUS	<ul style="list-style-type: none"> Have you conducted a risk assessment? Will the machinery and equipment fit through the door? Is the floor of your workplace strong enough to support the machinery and equipment? Do you understand that if you purchase machinery and equipment outside SA, then you also take on the duties of the importer? Do you understand the duties of an importer? Do you understand that if you alter or adapt machinery and equipment to perform an alternate function, then you also take on the duties of the designer for those alterations? Do you understand the duties of the designer? If the machinery and equipment is mobile, where will it operate and who may be in the area? In what terrain will the mobile machinery and equipment operate?
DESIGNERS	<ul style="list-style-type: none"> Plant is without risks to health & safety to workers Provide specific information to the manufacturer

	<ul style="list-style-type: none"> • Carry out calculations, analysis, testing or examination that may be necessary to ensure the plant is safe
MANUFACTURERS	<ul style="list-style-type: none"> • Plant is manufactured without risks to workers throughout the lifecycle of the plant • Must advise the designer of any hazards identified • If design registration required, the manufacturer must give the design registration number to the person with management or control of the plant. Number must be readily accessible.
IMPORTERS AND SUPPLIERS	<ul style="list-style-type: none"> • Must, insofar as is relevant to any such plant, structure, materials or substance, ensure compliance with any regulation that, pursuant to regulation 233 of the WHS Regulations 2012, applies to suppliers.
INSTALLERS (Regulation 204)	<p>A person with management or control of plant at a workplace must ensure that;</p> <ul style="list-style-type: none"> • Plant is not commissioned unless the person has established that the plant is, so far as reasonably practicable, without risks to health & safety of any person • The person installing or commissioning the plant is a competent person, and is provided with all the necessary information to minimise risks to health & safety • The processes for the installation, construction and commissioning of plant include inspections that ensure, so far as reasonably practicable, the risks are monitored.

HAZARD IDENTIFICATION, ASSESSMENT & CONTROL

The Work Health Safety Act and Work Health Safety Regulations 2012 applies to all worksites in South Australia. The main emphasis in regard to risk is that prescribed in WHS Regulation 2012, Chapter 3 – General risk and workplace management and Chapter 5 – Plant and structures, Part 1 – General duties for plant and structures.

Common risks (consequences) found in our Design & Technologies Workshops and maintenance workshops include:

Entanglement	Laceration - cuts
Entrapment	Lung disorders
Crush injuries	Fire
Explosion	Burns
Broken bones	Foreign Body in eyes
Hearing loss	Splinters
Contusions - bruising	Dislocations

4.1 HAZARD IDENTIFICATION – All machinery and equipment along with work process MUST be assessed to identify hazards.

MECHANICAL HAZARDS – that cannot be eliminated must be controlled to prevent harm. Machines have moving parts. The action of moving parts may have sufficient force in motion to cause injury to people.

When assessing machinery and equipment for possible mechanical hazards consider:

- Machinery and equipment with moving parts that can be accessed by people
- Machines and equipment that apply high force or rotational speed may ejects parts, components, products or waste items that can hit people causing bruising, eye damage or body penetration

NON -MECHANICAL HAZARDS – that cannot be eliminated must be controlled to prevent harmful exposure. Non mechanical hazards associated with machinery and equipment can include:

Dust	Mist (vapours of fumes)
Explosive or flammable atmospheres	Noise
Heat (radiated or conducted)	Ionising radiation (x-rays)
High intensity light (laser, ultra violet)	Molten metal
Heavy metals (lead, cadmium, mercury)	Chemicals
Steam	Pressurised fluids or gases
Ignition sources (flame or spark)	Electrical

4.2 RISK ASSESSEMENT

When hazards have been identified, assess the risk created by each hazard. The risk is the likelihood that the hazard will cause injury, illness or disease in a way that it is used or occurs in the workplace, and the severity of the injury, illness or disease which may result. Risk assessment is a process of evaluating the probability and consequence from exposure to an identified hazard or hazards.

Any hazards identified must then be **assessed**, for example

- Nature of hazard
- How it may affect health and safety
- How employees are exposed
- Amount, frequency, length of exposure
- Way the work is organized
- Layout and condition of work environment
- Training and knowledge
- Type and condition of current control measures available

Refer to the Hazard Identification / Risk Assessment Control Form (Appendix 1) a risk identification form is included in this section for the Technologies studies and maintenance work shop plant. Alternately Form 14f in the Catholic Church Safety Manual may be used if more appropriate for specific situations.

4.3 RISK CONTROL

When hazards have been identified and the risk assessed, appropriate control measures should be implemented. The aim is to eliminate or minimize the risk. As far as possible a hazard should be controlled at its source rather than trying to make the workers 'work safely' in a dangerous environment or having the worker wear protective clothing and equipment. To do this, action needs to be taken to control risks in the order listed below. This is called the hierarchy of controls.

4.4 HIERARCHY OF CONTROL MEASURES (Reg 36)

The Work Health Safety Regulation 36 Hierarchy of control measures state:

- (1) This regulation applies if it is not reasonably practicable for a duty holder to eliminate risks to health and safety.
- (2) A duty holder, in minimizing risks to health and safety, must implement risk control measures in accordance with this regulation.
- (3) The duty holder must minimise risks, so far as reasonably practicable, by doing 1 or more of the following:
 - (a) Substituting (wholly or partly) the hazard giving rise to the risk with something that gives rise to a lesser risk;
 - (b) Isolating the hazard from any person exposed to it;
 - (c) Implementing engineering controls
- (4) If a risk then remains, the duty holder must minimise the remaining risk, so far as reasonably practicable, by implementing administrative controls.
- (5) If a risk then remains, the duty holder must minimise the remaining risk, so far as reasonably practicable, by ensuring the provision and use of suitable personal protective equipment.

Note: A combination of the controls set out in this regulation may be used to minimise risks so far as is reasonably practicable if a single control is not sufficient for the purpose.

4.5 MAINTENANCE OF CONTROL MEASURES (Reg 37)

A duty holder who implements a control measure to eliminate or minimise risks to health and safety must ensure that the control measure is, and is maintained so that it remains, effective, including by ensuring that the control measure is and remains-

- (a) Fit for purpose; and
- (b) Suitable for the nature and duration of the work; and
- (c) Installed, set up and used correctly

4.6 REVIEW OF CONTROL MEASURES (Reg 38)

(1) A duty holder must review and, as necessary, revise control measures implemented under these regulations so as to maintain, so far as is reasonably practicable, a work environment that is without risks to health or safety.

(2) Without limiting sub regulation (1) the duty holder must review and, as necessary, revise a control measure in the following circumstances:

(a) the control measure does not control the risk it was implemented to control so far as is reasonably practicable; (b) before a change at the workplace that is likely to give rise to a new or different risk to health or safety that the measure may not effectively control; (c) a new relevant hazard or risk is identified; (d) the results of consultation by the duty holder under the Act or these regulations indicate that a review is necessary; (e) a health and safety representative requests a review under sub regulation (4).

(3) Without limiting sub regulation (2) (b), a change at the workplace includes – (a) a change to the workplace itself or any aspect of the work environment; or (b) a change to a system of work, a process or a procedure.

(4) A health and safety representative for workers at a workplace may request a review of a control measure if the representative reasonably believes that – (a) a circumstance referred to in sub regulation (2) (a), (b), (c) or (d) affects or may affect the health and safety of a member of the work group represented by the health and safety representatives; and (b) the duty holder has not adequately reviewed the control measure in response to the circumstances.

INFORMATION, TRAINING, AND INSTRUCTION (Reg 39)

- (1) This regulation applies for the purpose of section 19 of the Act to a person conducting a business or undertaking.
- (2) The person must ensure that information, training and instruction provided to a worker is suitable and adequate having regard to –
 - (a) The nature of the work carried out by the worker; and
 - (b) The nature of the risks associated with the work at the time the information, training or instruction is provided; and
 - (c) The control measures implemented.
- (3) The person must ensure, so far as reasonably practicable, that the information, training and instruction provided to a worker in a way that is readily understandable by any person to whom it is provided.

THE GENERAL WORK ENVIRONMENT

A person conducting a business or undertaking at a workplace must ensure, so far as is reasonably practicable, the following;

- (a) The layout of the workplace allows, and the workplace is maintained so as to allow, for persons to enter and exit and to move about without risk to health & safety, both under normal working conditions and in an emergency;
- (b) Work areas have space for work to be carried out without risk to health & safety
- (c) Floors and other surfaces are designed, installed and maintained to allow work to be carried out without risk to health & safety;
- (d) Lighting enables-
 - (i) Each worker to carry out work without risk to health & safety; and

- (ii) Persons to move within the workspace without risk to health & safety; and
- (iii) Safe evacuation in an emergency;
- (e) Ventilation enables workers to carry out work without risk to health & safety;
- (f) Workers carrying out work in extremes of heat or cold are able to carry out work without risk to health & safety;
- (g) Work in relation to or near essential services does not give rise to a risk to the health & safety of persons at the workplace.

The layout and space allocation within a workshop has a great influence on the safe and efficient use of machinery. Factors that should be considered include:

- The amount and space required for the equipment
- Congestion and operator movement
- Space for maintenance and cleaning
- The size of materials that may be processed (length & width of material)
- Space required for auxiliary equipment e.g. stands and supports
- The movement between work stations including material and people
- Location of particular machinery and associated risks e.g. thicknessers, welding area
- Surface conditions
- Noise levels of machinery and adjacent machinery and processes re communication and concentration
- Services and dust/fume extraction
- The number of students
- Number of activities being engaged in by student group simultaneously in the workshop and the actual size of the student projects (this can be based upon completion of a risk assessment)

Refer to Appendix 2 for Associated Hazards with Project Materials.

MACHINERY	
Operator Positions	<ul style="list-style-type: none"> • Integral parts of the machine footprint – a minimum of 900mm depth for the operator from machine face clearance to another work station, walkway or barrier. • A minimum of 500mm sideways from normal operating position(s) required access point. • Storage facilities are additional to this.
Machine Area	<p>Is the total area required to position and use a machine safely? This includes</p> <ul style="list-style-type: none"> • the footprint of the machine; • the operator position requirements, • the footprint of any attachments (e.g. material supports, dust extraction, storage facilities, work surfaces and the material sizes that may be used on the machine) and an additional 400mm buffer each side or the extremities of this area to the next machine, work station walkway or wall. <p>Machines should ideally be placed near walls. If machines are placed back to back they should be separated by a safety screen 900mm to 1500mm above the floor. The screen should be impact resistant and transparent for supervision.</p>
Access/Egress	

<i>Australian Standards AS 1318 Colours for the Occupational Environment and Australian Standards AS 2700 Colour Standards for paints and related materials.</i>	<ul style="list-style-type: none"> • A minimum 600mm width free flowing aisle providing for movement of people in an emergency situation and for the movement of tools and materials. • If the side boundaries are not clearly defined they should be clearly marked with 50mm wide lines. Sunflower yellow is the basic or background colour used to denote “caution” in accordance to Australian Standards
Work Benches	<ul style="list-style-type: none"> • A minimum of 600mm operator space from the bench where operator positions (vices) are staggered. Where possible 900 should be provided. Where a work area is adjacent to a walkway then 900mm is the minimum operator position requirement.

FLOORING	
Slips, Trips, Falls	<ul style="list-style-type: none"> • Workplace flooring must be non-slip surface and are maintained with a non-slip resistant polish • Walkways should be clearly marked – sunflower yellow • Oil, grease, sawdust to be cleaned immediately • Any loose tile, carpets lifting, joins fraying to be reported and fixed promptly.

COLOUR SCHEME	
AS 1318 – 1985 – “SAA Industrial Safety Colour Code”	<p>The following standard colours should be used to mark physical hazards, equipment and advisory signs:</p> <ul style="list-style-type: none"> • RED- danger (e.g. stop buttons) • YELLOW – Caution or attention (e.g. machine guards, hazards within an area) • GREEN- Safety (e.g. start buttons, first aid equipment, exit signs) • BLUE – Information (e.g. office, toilets, store)

SIGNS	
AS 1319 – 1994 – “Safety signs for the Occupational Environment”	<p>Signs should:</p> <ul style="list-style-type: none"> • Prominently be displayed • Be legible and clearly visible • Be mounted as close as practical to the observers line of sight • Regulatory and hazard signs should be located in relation to a particular hazard as to allow a person sufficient time after first viewing the sign to heed the warning • signs must be maintained in good condition

STORAGE

Materials should:

- be readily accessible
- stored on racks or shelves with lips to stop materials falling off the racks or shelves
- not extend beyond the racks or shelves
- Heavy objects to be stored at a low level
- Infrequently used materials and light weight to be stored at a high level
- Trolley available to move materials as required

LIGHTING

Consider the following safety issues relating to the provision of adequate and appropriate lighting around machinery:

- Direction and intensity of lighting
- Contrast between background and local lighting
- Color of the light source
- Reflection, glare and shadows
- Stroboscopic effect of fluorescent lighting on moving machinery. It can make moving parts of the machinery look as if they have stopped.
- The elimination of distractions from surroundings by means of suitably positioned screens.
- Maintenance of lighting systems and equipment
- Flickering or intermittent lights must be repaired or replaced immediately.
- Fluorescent tubes have limited effective light and should be replaced at the recommended frequency suggested by the manufacturer
- Uniform light around the workspace which is free from reflection, glare and shadows.
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Activity	Lighting Level - Lux
Extra fine work	1600
Fine bench and machine work	800
Office, general	600
Medium bench work, typing, filing	400
Classroom, general	300
Rough bench work	200

NOISE CONTROL

Noise control should be considered when purchasing new plant, during the maintenance processes and activities in which the tools and equipment are used.

Processes can be modified by:

- Placing shock absorbing materials under work – rubber matting
- Working on a surface that does not vibrate or amplify noise
- Using different tools or processes
- Changing the way the tool is used – speeds and feeds

Noise levels must not exceed 85dbA over an 8 hour period.	<ul style="list-style-type: none"> Regular maintenance <p>Methods that can reduce equipment noise include:</p> <ul style="list-style-type: none"> Applying rubber material to the tool rest of a pedestal grinder to reduce vibration Stiffening of applying a sound-deadening material to the inside of the side panels, doors etc. Enclosing equipment in a box lined with acoustically absorbent material Use of rubber mounting pads under machines to reduce transmission through wood floors Replacing noisy saw blades with newer quieter ones Replacing old, noisy equipment with new equipment Increasing the distance from the equipment to ear Isolating machinery in an insulated area such as a machine room Choosing suitable equipment for the task e.g. bench grinder may be less noisy than an angle grinder, hand saw for a bench saw Use of soft wood rather than hard wood Reducing cut depth
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DUST AND FUME CONTROL	
	<p>Dust Extraction-</p> <ul style="list-style-type: none"> Equipment should be placed as close to dust extractor Stand alone extractors may be used for single machines Mop or vacuum instead of sweeping Wood dust to be cleaned up regularly around machine to avoid fire hazards Dust respirators and safety goggles where substantial amounts of dust present Filters to be changed on a regular basis – refer to manufacturer's instructions <p>Fume Extraction (this must be considered for the following)</p> <ul style="list-style-type: none"> - photographic chemicals, solvents, cements, resins, wood finishes Operation of engines, battery charging, electroplating, metal hardening, metal casting, etching of circuit boards, electric and gas welding, spray painting, soft soldering and electrical soldering.

SPRAY PAINTING BOOTHS	
Spray painting must be carried out in a booth unless—	<p>Construction of spray booths-</p> <p>a) Room or Cabinet Booth—being an enclosure so arranged, constructed and equipped as to confine and control air motion in a manner that effectively protects the spray operator and any other persons in the vicinity;</p>

<p>(a) the painting consists of minor spotting or touching up operations; or</p> <p>(b) the painting is carried out on any plant or item that is fixed or too large to move into a booth.</p>	<p>b) Tunnel Booth—being an arrangement of enclosing walls, floor and ceiling, with 2 opposite ends open, to permit the continuous movement through the booth of articles being sprayed (and in this case the booth must be designed and equipped to effectively protect any person in or near it);</p> <p>c) Canopy Booth—being an arrangement of walls and ceiling to form a canopy or hood that is designed and equipped so that when it is in position over an article being spray painted the operator, and any other person in the vicinity, are effectively protected;</p> <p>Risks-</p> <p>Hazardous substances pose the major risk in spray painting. Other hazards include:</p> <ul style="list-style-type: none"> • Operating plant, such as spray painting guns, ventilation systems, hoses, compressors and booths • Fire & explosion • Electricity • Noise • Manual tasks • Confined spaces • Heat • The work environment (including lighting and cleanliness).
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VENTILATION & THERMAL COMFORT

<p>AS 1668.1/.2/.3 – 2001/2002 – “<i>The use of mechanical ventilation and air conditioning in buildings</i>”</p>	<p>Mechanical ventilation should be risk assessed to identify any hazards.</p> <p>This can include but not limited to-</p> <ul style="list-style-type: none"> • Temperature conducive to working comfortably at all times • Ensure no draughts present • Equipment is operated prior to commencement of activity, throughout activity and time after activity
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HAZARDOUS MANUAL TASKS OF TOOLS AND EQUIPMENT

<p>Avoid unnecessary transport of tools and equipment around the room. Adequate manual handling aids should be provided.</p>	<ul style="list-style-type: none"> • Ensure sharp objects and tools are carried with points down • Equipment and tools not be left near the edge of tables or benches • Do not try to attempt falling tools. Step clear if possible
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EYEWASH FACILITIES

Facilities for quick and safe washing of eyes with fresh running water must be readily available to areas where splashes of hazardous materials, foreign bodies or fumes may enter the eyes.

- Eyewash bottles should only be used if filled with fresh running water immediately prior to use because stored water can grow harmful bacteria.
- Ideal Standard – is a special eyewash basin facility or sterile sodium chloride disposable irrigation packs, with a current date.

FIRE EXTINGUISHERS & BLANKETS

Fire extinguishers must be available and employees trained in their use

EXTINGUISHERS

- Correct type must be available
- Checked according to regulations – every 6 months
- Placed near exit doors and outside chemical storeroom.

BLANKETS

- Woolen or fiberglass, near exit door.

SAND BUCKET – Dry sand in bucket near exit door.

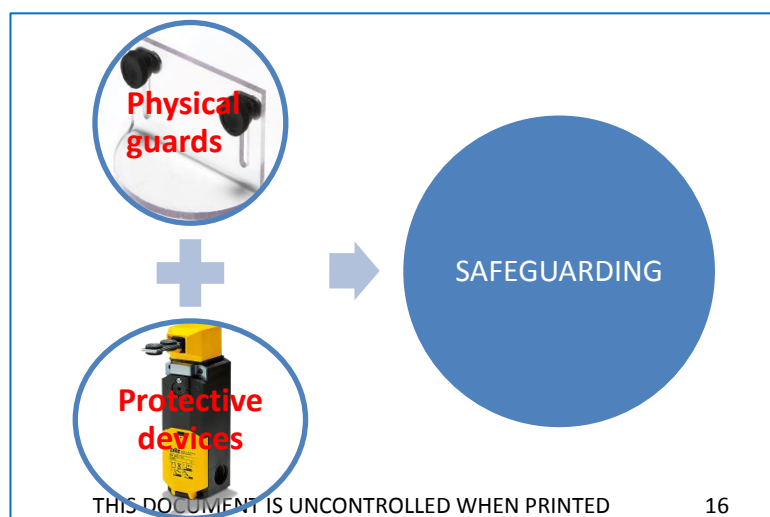
Refer to Appendix 3 for General Workshop Rules that can be displayed throughout Design & Technologies areas.

Refer to Appendix 4 for Design & Technologies Workplace Inspection Checklist

MACHINERY AND EQUIPMENT SAFETY

Refer Chapter 5 – Plant and Structures

SAFETY GUARDING



All dangerous parts of a machine must be guarded to prevent access to the danger area. This includes for example;

Parts that move or transmit power	<ul style="list-style-type: none"> • Belts and pulleys • Flywheels and gear wheels • Shafts and spindles • Slides and cams • Chain and sprocket gears
Parts that do the work	<ul style="list-style-type: none"> • Tools and dies • Guillotine blades • Milling cutters • Circular saws • Drills and chucks
Machine hazards	<ul style="list-style-type: none"> • Ejected materials (work piece or machine part) • Hot/cold parts

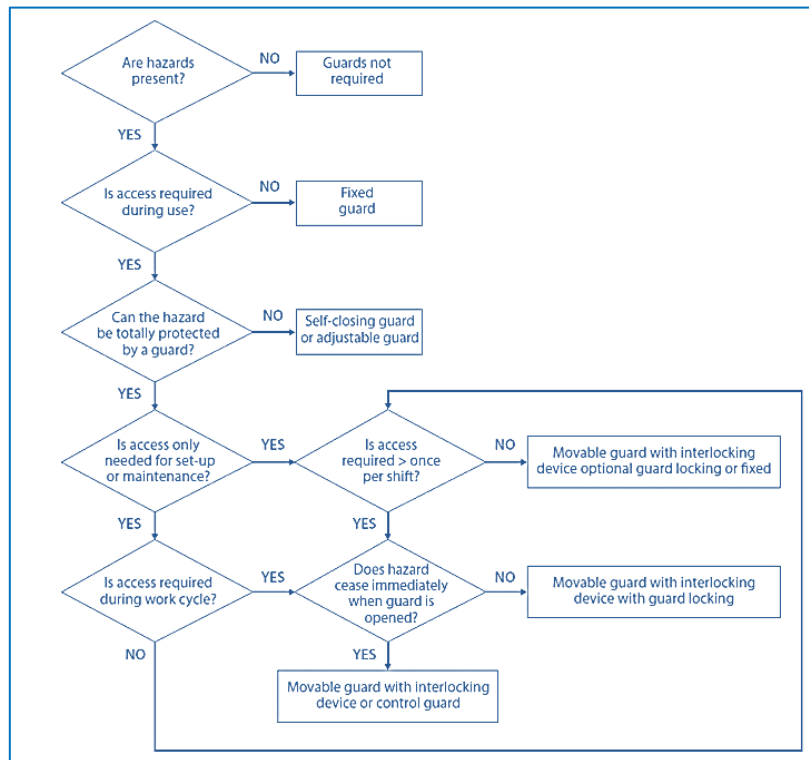
GUARD TYPES

There is various guard types used to control risks. All are suited to a particular purpose or machine. Consider the type of guard best suited to your needs.


Physical guards	
Fixed Guards	<ul style="list-style-type: none"> • A fixed guard is a permanent barrier without moving parts, which prevents contact between moving machinery and the operator. • A fixed guard will only offer protection when correctly fixed into position. However, the fixed guard must not create a new hazard. • To deter easy removal, a fixed guard must require the aid of an appropriate tool to open, remove, replace, perform maintenance or repair work. • Fixed guard slides can also be adjusted (with the aid of an appropriate tool) to allow work to be fed through the guard and into the work area.
Interlocked Guards	<ul style="list-style-type: none"> • An interlocked guard has moveable parts and is interconnected with the power (or control) system of a machine. • Interconnections can be electrical, mechanical, hydraulic or pneumatic. An interlocked guard prevents a machine from operating while the guard is open or removed. • Interlocked guards are essential when guards have to be removed or opened to allow for adjustments or maintenance. Opening the guard will disengage or lock the machine and stop all dangerous movement. • Where micro switches are used, they must to comply as an interlock be applied in the positive mode (see below) where a failure of the return mechanism (mostly springs) the switch will not allow the machine to be powered up or the switch to be “made” whilst the guard is open.
Automatic Guards	<ul style="list-style-type: none"> • Automatic Guards automatically move into position as the machine or cycle is started. • They are also known as push away guards and are only suitable on slow moving machines
Adjustable Guards	<ul style="list-style-type: none"> • Adjustable Guards can be adjusted to accommodate different sizes, shapes and materials. They also provide a barrier that can be adjusted, to assist with a variety of production operations





Self-Adjusting Guards	<ul style="list-style-type: none"> Self-Adjusting Guards are movable guards that allow an opening large enough for materials to enter the point of operation. They are suitable for docking saws, rip saws and cross cut saws. Note: A self-adjusting guard fitted over the circular saw blade will automatically rise over the material being cut. If the guard is not affixed, the cutting blade is exposed whenever the machine is running.
Distance Guards	<ul style="list-style-type: none"> Distance Guards prevent operator access to dangerous areas of the machine by the use of a barrier or fence. Access points through the guard such as gates and doors must be secured with a lock or interlock system.
Partial Guarding	<ul style="list-style-type: none"> Partial Guarding is used in cases where it may not be possible to completely guard a machine (e.g., a circular saw or planer). Other methods of risk control such as administration controls and personal protective equipment should also be applied when using partial guarding. The installation of these guarding devices should comply with Australian Standard 4024 – Safeguarding of machinery – general principles.
Protective devices	
Micro Switches	<p>These push button type switches offer a measure of safety by causing the machine to stop should a guard be opened whilst the machine is in use. There is, however, no direct link between the guard door and the safety contacts so that the system relies entirely on spring pressure to open contact.</p> <p>Micro switches can fail for the following reasons:</p> <ul style="list-style-type: none"> Spring failure or contact welding or sticking may cause the system to fail Pushing the plunger while the guard is open easily defeats this type of system. CSH&W SA do not recommend the use of micro switches alone where a risk assessment has identified a significant risk in the event of a switch failure. An assessment of the risk posed by the failure of the micro switch should be used to establish the requirement for any replacement program. <p>Where Micro Switches are used as part of a guard, they must be installed in the “Positive” mode</p>
Presence Sensing Devices	<ul style="list-style-type: none"> Presence Sensing Devices (PSD) detects entry into the ‘dangerous work space’ of a machine and stops all moving parts. Restart of the machine is possible only after a person; body part or obstacle has been removed. Examples of PSD include photoelectric light curtains, laser scanners and pressure mats.
Administration	<p>Where ‘Engineering’ cannot fully control a health and safety risk, administration controls should be used. ‘Administration’ controls introduce work practices that reduce risk and limit employee exposure. They include:</p> <ul style="list-style-type: none"> training employees in correct and safe operation

	<ul style="list-style-type: none"> • developing Safe Operating Procedures (SOPs) • reducing the number of employees exposed to the hazard • reducing the period of employee exposure • developing and implementing lock-out procedures • displaying appropriate warning signs
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ELECTRICAL SWITCHING FOR FIXED PLANT

<p>Isolation: With the exception of those circuits required for safety systems, all machinery should be fitted with a means of isolation from all energy sources. Such isolators should be clearly identified and be capable of being locked if reconnection could place persons at risk.</p>	<p>Appropriate isolation methods include:</p> <ul style="list-style-type: none"> • a lock-out (or tag-out) system, (where one or more padlocks are fitted to the isolation switch) • danger tags with the exposed persons' names on them 
<p>Controls: Operational controls and emergency stop devices must be suitably identified and readily accessible to each person using the machine. New installations should include a direct on line (no volt relay) start/stop switch at either the supply point or the machine to prevent re-start after power interruption.</p>	<ul style="list-style-type: none"> • Emergency stop devices must have handles, bars or push buttons which are coloured red and are immediately accessible in the event of an emergency. • A large machine may require a number of control switches. Multiple controls must be of the 'stop and lock-out' type.

 	<ul style="list-style-type: none"> Additional emergency stop controls are required in situations where machines have multiple operator work stations for example combination belt/disk liners or machines that operate in series such as on production lines and conveyors  
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TAG AND LOCKOUT

<p>OUT OF SERVICE TAG</p> <p>Out of service tags <i>DO NOT</i> provide personal protection to the individual. Out of service tags should be in place <i>BEFORE</i> personal danger tags are attached, and it should be the <i>LAST</i> tag removed before the plant, equipment and machinery is restarted</p> <p style="text-align: center;">REAR VIEW</p> 	<ul style="list-style-type: none"> Must be attached to plant, equipment or machinery which is taken out of service due to a fault, damage or malfunction and reason given The tag is to be securely fixed to the operating control power isolator with the appropriate details completed on the tag (explain reason for out of service). When the initial reason for placing the out of service tags no longer exists, an out of service tag may be removed by: <ul style="list-style-type: none"> (a) The person who attached the tag (b) A supervisor responsible for the operation of the equipment (c) The workshop supervisor (d) The maintenance person who carried out the repairs
<p>DANGER TAG</p> 	<p>Before starting work, where a person could be endangered by the operation of equipment, the equipment must be properly:</p> <ul style="list-style-type: none"> isolated and a danger tag securely attached to the isolator in a prominent position with appropriate details completed on the tag. Each person working on the equipment must place a personal danger tag on the isolator. Danger Tags must not be removed except by the person who attached the tag.

	<ul style="list-style-type: none"> In the event of illness a tag may be removed by the supervisor, once safety of all personnel is ensured
<p>LOCKOUT TAG</p> 	<p>Where people could be endangered by the operation of plant or the release of stored energy, the plant must:</p> <ul style="list-style-type: none"> be properly isolated and stored energy must be released have danger tag and personal lock applied to the isolating control each person should apply an individual padlock to the isolating control <p>A danger tag identifying the person who placed the lock and the reason for placing the lock must accompany the placement of a lock</p> <p>The OUT OF SERVICE tag must be the last tag removed.</p> <p>A record of the maintenance/repair must be made on the service record/schedule.</p>
Isolation hardware for 240v plugs	
Lockout station – 4 lock	

GAS CYLINDER SAFETY

HAZARDS ASSOCIATED WITH GAS CYLINDERS

Pressure	<p>Gases kept in sealed cylinders under pressure present the following pressure related hazards:</p> <ul style="list-style-type: none"> gas leak to atmosphere pneumatic shock which can lead to the combustion of a flammable gas possibility of explosive rupture of the cylinder
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Flammability	<ul style="list-style-type: none"> • Flammable gases need to be mixed with air or an oxidizing gas to be ignited. • Combustion usually produces a flame and the flammable gas burns as it enters the atmosphere without any delay of ignition. • If flammable gases are mixed with air without igniting and are confined, subsequent ignition, in nearly all cases, will cause an explosion.
Reactivity	<p>Reactivity hazards such as:</p> <ul style="list-style-type: none"> • Some gases, especially acetylene, may decompose generating heat leading to an explosion • The decomposition of reactive gases can be catalysed by some substances such as copper and brass • Contamination with water can cause corrosion of gas cylinders • Reactive gases can attack some elastomeric components of storage and handling equipment.
Asphyxia Hazard	<ul style="list-style-type: none"> • Any gas other than air or oxygen will displace oxygen when entering the atmosphere. • Any depression of the oxygen content of the breathing atmosphere from its normal 21% to below 18% is a threat to life, by asphyxia.
Oxygen-Enriched Atmospheres	<ul style="list-style-type: none"> • The flammability of substances is enhanced in oxygen-enriched atmospheres. • Substances that are non-flammable in air become flammable in such atmospheres. • The major hazard to persons entering an oxygen-enriched atmosphere is the increased flammability of their clothing.
Cold Hazard	<p>Gases that are kept at a low temperature or that will cool when depressurized, such as LP gas, present the following hazards:</p> <ul style="list-style-type: none"> • Cold burns can result from contact with gas or uninsulated fittings • Skin can 'stick' to cold equipment.



Compressed gas cylinders containing [oxygen](#) and [MAPP gas](#)

Classification of Gases	<p>Gases under pressure are classified according to the Australian Dangerous Goods (ADG) code as Class 2 dangerous goods</p> <ul style="list-style-type: none"> • Class 2 is further subdivided into flammable gases (Class 2.1), non-flammable non-toxic gases (Class 2.2), and toxic gases (Class 2.3) • Gases in cylinders may also be subject to further restrictions. For example, oxygen is classified as Class 2.2 with a Class 5.1 (oxidizing properties) Subsidiary Risk.
Storage and segregation of cylinders	<p>Gas cylinders should be appropriately segregated and stored in a common storage area</p> <ul style="list-style-type: none"> • Oxygen must be stored at least 3 meters from fuel gas cylinders • Ensure a Material Safety Data Sheet (MSDS) is available for each gas stored • There must be no oil, grease or other fuel sources on or near cylinders • Cylinders must be restrained from falling at all times

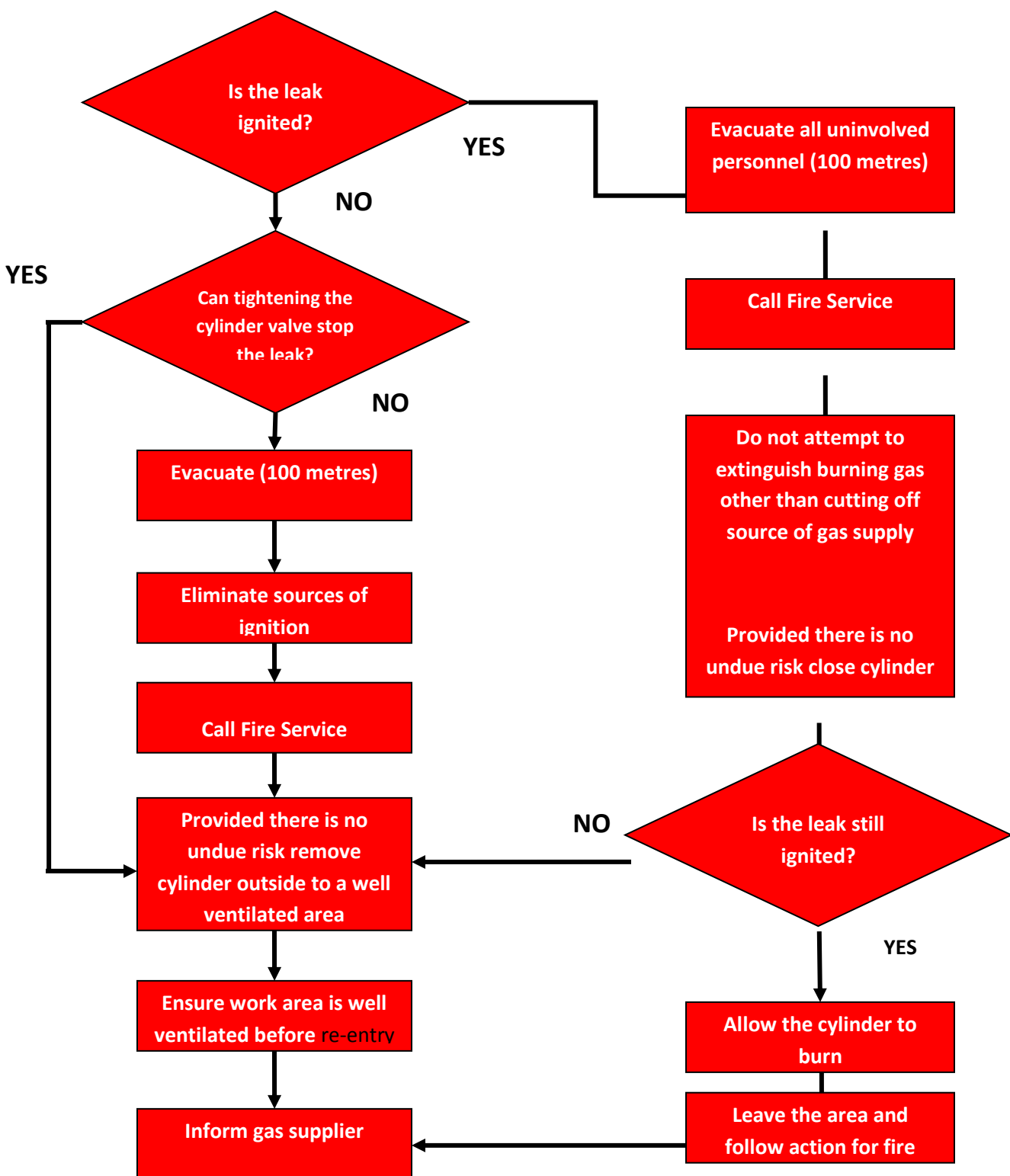
	<ul style="list-style-type: none"> Freestanding cylinders must be securely chained to a wall; mobile cylinders must be secured to an approved trolley Full and empty cylinders should be stored separately on a firm, level floor All cylinders must be stored vertically and empty cylinders must have cylinder valves closed Keep cylinders away from sources of heat, (e.g. furnaces, heaters and blowpipe flames) Do not store cylinders in confined spaces and ensure the storage area is well ventilated If there is an operational requirement to store and locate compressed gas cylinders outside, they must be stored in approved gas storage cages Rotate stock of full cylinders and use cylinders on a 'first in first out basis' Empty cylinders should be marked 'M.T.' with chalk. 										
Fire protection for minor stores	<p>(a) To be classified as 'minor storage' the aggregate quantities of all gases must not exceed 2000 L</p> <ul style="list-style-type: none"> Storage of flammable gases must not exceed 500 L Storage of oxygen must not exceed 1000 L <p>(b) Minor stores having an aggregate capacity of less than 1000 L water capacity may be protected with a single, permanently connected water hose, provided that it is capable of depositing water on any part of the store.</p> <ul style="list-style-type: none"> Water capacity is the total internal volumetric capacity of a cylinder expressed in litres of water <p>(c) Minor stores having an aggregate capacity of 1000 L to 2000 L water capacity must have one hose reel or one 2A60B (E) fire extinguisher</p>										
<p>8.4 Nominal water capacities of cylinders are shown below in Table 1.</p> <table> <tr> <th>Cylinder designation</th><th>Nominal water capacity, L</th></tr> <tr> <td>C</td><td>2.8</td></tr> <tr> <td>D</td><td>10</td></tr> <tr> <td>E</td><td>23</td></tr> <tr> <td>G</td><td>50</td></tr> </table> <p><i>Table 1</i> Nominal water capacities of cylinders</p>		Cylinder designation	Nominal water capacity, L	C	2.8	D	10	E	23	G	50
Cylinder designation	Nominal water capacity, L										
C	2.8										
D	10										
E	23										
G	50										
Handling Cylinders	<ul style="list-style-type: none"> Read Safety Data Sheet (SDS) before use Cylinders considered to be empty should be handled with the same precautions as cylinders filled with gas because so-called 'empty' cylinders still contain residual gas and pressure Cylinders are a Manual handling risk so they must be assessed Cylinders must be handled with care using the appropriate size and type of trolley and only by personnel who are competent to do so 										

	<ul style="list-style-type: none"> • Care should be taken to avoid striking or dropping cylinders, or knocking them together • Never roll cylinders along the ground • Every care must be taken to avoid accidental damage to cylinder valves • Valves must be operated without haste, never fully opened, and never wrenched shut, but turned just securely enough to stop the gas • Before removing or loosening any outlet connections, caps or plugs a check should be made that the valves are closed • Immediately a cylinder becomes empty, its valve should be closed • When changing cylinders ensure all other sources of ignition, such as pilot lights, are extinguished • When reconnecting, ensure that all connections and washers are clean and in good condition, and do not over-tighten them • A gas leak test should be carried out each time a cylinder is changed • Checking for leaks must be done with a proprietary leak test solution and never with a naked flame or soap • If a leak is suspected (acetylene has a garlic odour and LPG has a fish-like smell) the cylinder valve must be turned off.
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EMERGENCY MANAGEMENT

Where cylinders are used on site as on site emergency plan should be developed and include:	<ul style="list-style-type: none"> • Action to be taken in the event of fire, explosion, leak • Contact emergency numbers • Evacuation procedures
If cylinders catch on fire	<ul style="list-style-type: none"> • Evacuate to safe area • Do not attempt to fight fire • Contact Emergency Services (000)
If cylinders leak (and cannot be stopped by closing the valve or tightening the gland nut)	<ul style="list-style-type: none"> • Evacuate the area • Eliminate source of ignition • Contact Emergency Services (000) • Inform supplier immediately
Overheated Acetylene Cylinders	<ul style="list-style-type: none"> • Close fuel gas and oxygen lines • Do not move the cylinder • Evacuate the area • Notify Emergency Services • Eliminate source of ignition
Cylinder Storage	<ul style="list-style-type: none"> • Oxygen must be stored 3 metres or more from gas cylinders • Keep away from heat source • Cylinders must be restrained from falling at all times • If stored outside – must be in an approved gas storage cage • Empty cylinders should be marked 'M.T' with chalk
Handling Cylinders	<ul style="list-style-type: none"> • Avoid striking, dropping or knocking cylinders

	<ul style="list-style-type: none"> • Suitable trolley available (sack truck) ensure cylinder is fastened to truck • Arrange for delivery as close to area of use as possible
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SPRAY BOOTHS

Hazards associated with spray painting are:

- Hazardous substances
- Operating plant, such as spray painting guns, ventilation systems, hoses, compressors and booths
- Fire and explosion
- Electricity
- Noise
- Manual tasks
- Confined spaces
- Heat
- The workplace environment (including lighting and cleanliness).

Hazardous Substances

Risks from hazardous substances must be controlled by preventing exposure or by reducing the exposure as low as possible.

Examples of control methods are:

Elimination:

- Stop using particular hazardous substances
- Use an alternative to spray painting.

Substitution:

- Replace a hazardous substances with a less hazardous one
- Use water-based paint instead of organic solvent-based paint

Isolation:

- Automate the process
- Use spray booths as they effectively isolate other workers from the hazard
- Designate an area as a spray zone

Engineering:

- Use ventilation as the major engineering control to reduce exposure to vapours and aerosols.

Administrative controls:

- Store solvents in covered container with taps to avoid the need for pouring
- Mix and pour in a room clearly designated and used exclusively for it with good mechanical or natural ventilation and no ignition sources
- Emergency procedures implemented (including spill procedures)
- Safe Work Procedures developed
- Workers to be inducted and trained where required.

Personal Protective equipment:

- Use PPE in conjunction with other control measures
- Provide workers with suitable PPE that is clean, functional and fitted properly
- Instruct workers on using PPE.

Below outlines controls for specific issues relating to spray painting.

Injection Injury - can be a particular risk when using high pressure airless spray painting equipment. A substance can be injected into the bloodstream that can cause a lack of air supply to the area or chemical or thermal burns. In some cases this can result in the amputation of fingers or hands.

To avoid injury:

- Never clean airless spray guns by covering the nozzle with a cloth or material held in the hand.
- Always put the safety catch on to prevent the spray gun trigger being accidentally pulled during stoppages in work or when the spray tip is being changed.
- Make sure operators never point the spray gun at themselves or any other person and fingers and hands are kept away from the spray jet
- Do not remove the tip guard.

High pressure hoses and lines - should be located and designed to ensure:

- They are protected from rupture
- Flammable material is not discharged into an area where there is a source of ignition in the event of a leak or rupture
- Hoses are the minimum length required
- Hoses and lines are regularly inspected and maintained.

Fire and Explosion

Many paints contain flammable substances and spray painting mists spread and rapidly fill airspace, creating the risk of fire and explosion in they come into contact with any source of ignition, such as open flames, static electricity or sparks.

Some examples of controls are outlined below:

Isolation:

- Establish a spray zone. Put up warning signs restricting entry e.g. "Spray zone: Unauthorised people keep out. No smoking, welding, grinding, naked flames or other sources of ignition".

Engineering:

- Optimize ventilation

Administrative Controls:

- Mix and pour in a room clearly designated and used exclusively for it with good mechanical or natural ventilation and no ignition sources
- Ensure containers are earthed before pouring into another container
- Where containers have air lines, always replace the plugs as soon as the air lines are disconnected

- Store and handle flammable or combustible liquids in accordance with *AS 1940 – The Storage and handling of flammable and combustible liquids*.

Electrical

Electricity used in spray painting poses unique health risks including:

- Electrocution from direct or indirect contact with electricity
- Burns – flashes and arcing due to short-circuiting may lead to severe tissue burns or the ignition of flammable gases.

Static electricity charges can be generated in any spray painting process if two differently charged materials come into contact.

All equipment and metal surfaces within three metres of the charged head of the spray gun should be earthed.

Noise

Some personal protective equipment may be required to be worn for specific activities. This will be identified through a risk assessment process.

HYDRAULIC/PNEUMATIC POWERED PLANT

Risk assessment should follow AS/NZS 4024.1 Series to determine the performance level. functions).

AS 2788-2002 Pneumatic fluid power - General requirements for systems.

AS 2671: 2002 - Hydraulic fluid power – General requirements for systems.

Basic requirements – hydraulic and pneumatic systems:

- All parts of the system shall be protected against pressures exceeding the maximum working pressure of a system or the rated pressure of any specific component; one or more pressure relief valves is the preferred means. Alternative means such as pressure regulators may be used.
- Surge pressure and intensified pressure shall not cause hazards.
- Loss of pressure or critical drops in pressure shall not expose persons to a hazard.
- Leakage (internal or external) shall not cause a hazard.
- Components must be located where they are accessible and can be safely adjusted and serviced.
- Means shall be provided to prevent unacceptable pressure build-up where high external loads are reflected on actuators.

- The system shall be designed to facilitate positive isolation from energy sources and also facilitate dissipation of the fluid pressure in the system in order to prevent unexpected start-up.
- Where failure of a hose or piping could cause whiplash it shall be restrained or shielded by suitable means.
- Layout should be designed to discourage its use as a step or ladder.

Pneumatic systems:

- Supply components to be used:
 - Manual isolator.
 - Filter.
 - Regulator.
 - Dump valve.
 - Pressure switch.

Hydraulic systems:

- Hydraulic filters must be used and maintained strictly.
- The following occurrences shall not create a hazard:
 - Switching the supply ON or OFF.
 - Supply reduction.
 - Supply cut-off or re-establishment.
- Hazardous fumes and dusts

WELDING FUMES LEV

- Exposure standard for welding fume = 5mg/m^3
- Local exhaust ventilation (LEV) must be operating for all welding, cutting, brazing and soldering operations, in addition to normal workshop ventilation.
- The LEV capture chute must be positioned to capture as much of the smoke plume as possible.
- A minimum capture velocity of 0.5m/s , measured at the fume source is required.
- Where the LEV is discharged outside of the workshop, it should be isolated from any air intakes.

Wood dusts LEV –

- Exposure standards:
 - Softwood dust exposure standard = 5mg/m³.
 - Hardwood & hazardous timber exposure standard = 1mg/m³.
 - MDF exposure standard = 1mg/m³.
 - Formaldehyde exposure standard = 1ppm 8hrTWA.
 - STEL should not exceed 2 ppm.
- Machine controls:
 - Dust control effectiveness must be a major factor in comparing machine models.
 - New equipment must have an integrated dust extraction system.
 - Each source of dust on a machine should be controlled by the LEV system.
 - Design of the LEV hoods, ducts and baffles etc. should be based on a conveying velocity of extracted air in the ducts of 20m/s for dry chips or 28m/s for wet chips (moisture content > 10%).

Testing of levels are performed by Occupational Hygienists.

ELECTRIC WELDING MACHINES (CATEGORY A ENVIRONMENT, 2.2 AS 1674.2 – 2007)

Control measures

- Welding gloves shall be worn on both hands while welding or changing electrodes.
- Full length leather gloves, specified for electric welding, must be sound and not have any holes or tears whatsoever.
- Electrode holders must be crack free.
- Electricity supply cords should be as short as possible and connection via an approved flexible cord with plug and socket or by a licenced electrician to AS/NZS 3000.

Output terminals

- Shall be enclosed, covered or otherwise protected, to prevent inadvertent contact.
- Brass washers should be used either side of the welding lead lug.

Maximum open circuit voltage (Category A environment)

- 113v peak and 80v rms.



Welding leads





- Should be kept as short as possible.
- Insulation must be in good condition – no exposed internal wire or deep cuts/burns.
- Welding leads must be fitted with purpose designed brass terminal lugs. The cable/lug connection should not have exposed internal wire or cause any reduction in wire cross-section.

PERSONAL PROTECTIVE EQUIPMENT

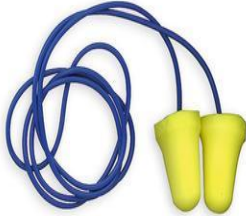
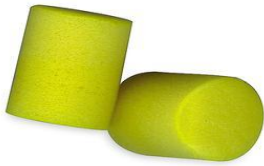
Personal Protective Equipment (PPE) refers to the equipment worn to reduce exposure to hazards and includes such items such as eye glasses, face shields, respirators, gloves, shoes, ear muffs, ear plugs, welding spats, aprons and are the least effective control measures because the hazard and risks are still present.

PPE should be used as part of an integrated approach to health & safety management. It should complement other control methods, not replace them.

<p>To provide adequate protection PPE must always be:</p>	<ul style="list-style-type: none"> • Appropriate for the particular hazards • Operators training in specific PPE • Maintained and in good condition – cleaned fully functional • Fit properly and be comfortable • Stored in accordance with the manufactures recommendations e.g. respirators
<p>CLOTHING</p> 	<ul style="list-style-type: none"> • Loose clothing is not permitted in any practical area. This includes jackets, coats, ties, bracelets, necklaces, rings, watches and ear-rings. Use of disposable aprons where required. • Safety's vest can be worn by employees. This will assist easy identification for all.
<p>FOOTWEAR</p> 	<p>Suitable footwear must be worn at all times.</p> <ul style="list-style-type: none"> • Footwear must be in good condition with tops fully enclosed • Examples of footwear NOT appropriate are: thongs, high heels, sandals

<p>GLOVES – disposable recommended</p> 	<p>Gloves must be checked regularly to ensure they provide adequate protection.</p> <ul style="list-style-type: none"> Glove must be appropriate for the task and can include rough surfaces, hot objects, sharp edges, vibration and chemicals. Discard if holes evident or they become ineffective.
<p>HAIR</p> 	<p>Where hair is at a length that it may become a hazard-</p> <ul style="list-style-type: none"> If long, to be tied up or hairnet to be worn to prevent any entanglement.
<p>SAFETYGLASSES GOGGLES FACE SHIELDS</p> 	<p>Safety glasses, goggles, face shields -</p> <ul style="list-style-type: none"> Must be worn by observers and operators when using any machine or power tool, chemicals, welding or when any hazardous operation has a potential risk. To be kept clean To be stored appropriately
<p>RESPIRATORS AND FILTERS</p> 	<p>Where there is a risk of exposure to an atmospheric contaminant, a respiratory protective device must be worn. These should conform to AS 1715 "Selection, use and maintenance of respiratory protective devices" and AS 1716 "Respiratory protective devices".</p> <ul style="list-style-type: none"> To be kept clean Have a good seal Valves are soft and functioning Filters are changed per manufacturers recommendations When not in use to be stored in a plastic bag to ensure longevity of filters

HEARING PROTECTION



Noise induced hearing loss can be prevented by wearing correct hearing protection, reducing the noise level at its source or a combination of both. Hearing protection conforming to AS 1269 1/2/3/4 "Acoustics: Hearing Conservation" and AS 1270 "Acoustics: Hearing protection" must be used.

Noise can result in permanent deafness if suitable precautions are not taken. For example, hand grinders produce very high noise levels that can seriously damage a person's hearing.

REMEMBER: The danger is irreversible - a hearing aid will not replace lost hearing.

Earmuffs:

- Ensure cushion seals are soft, and sealing to side of head
- Plastic caps are not damaged
- To be kept clean

Earplugs:

- Earplugs to be disposed of after each use
- If reusable to be washed frequently

Hearing protectors will only give proper protection if they fit, are worn properly, and are used whenever the wearer is exposed to high noise levels. The more comfortable they are, the more likely it is that they will be used properly. Taking them off even for a short time when noise levels are high can quickly allow hearing damage to occur.

REMEMBER: Hearing protectors that don't fit don't protect!

DISPOSAL OF PLANT AND EQUIPMENT

Disposal of plant may place the disposer in the role of a supplier under the OHS&W Regulations. This legislation provides for the protection of people at work from risks of plant and is expected to be achieved through the implementation of the regulations, which require that:

- Hazards have been identified
- Risks are assessed
- Risks are controlled

Under the OHS&W Regulations Part 3, Subdivision 8, Regulation 128, Duties of owners – Dismantling, storage and disposal of plant states-

- (a) If plant is dismantled, an employer must ensure-
 - (i) that the dismantling is carried out by a competent person; and
 - (ii) insofar as it is readily available - that any relevant information provided by the designer or manufacturer which is relevant to the dismantling is made available to the competent person
- (b) If plant is to be stored (including plant which has been dismantled) – that storage is carried out by a competent person;
- (c) If the plant contains any materials that may give rise to a risk to health or safety and the plant is to be disposed – that the disposal is carried out by a competent person.

OHS&W Regulations, Subdivision 8, Regulation 129 - Specific duty for control of risk

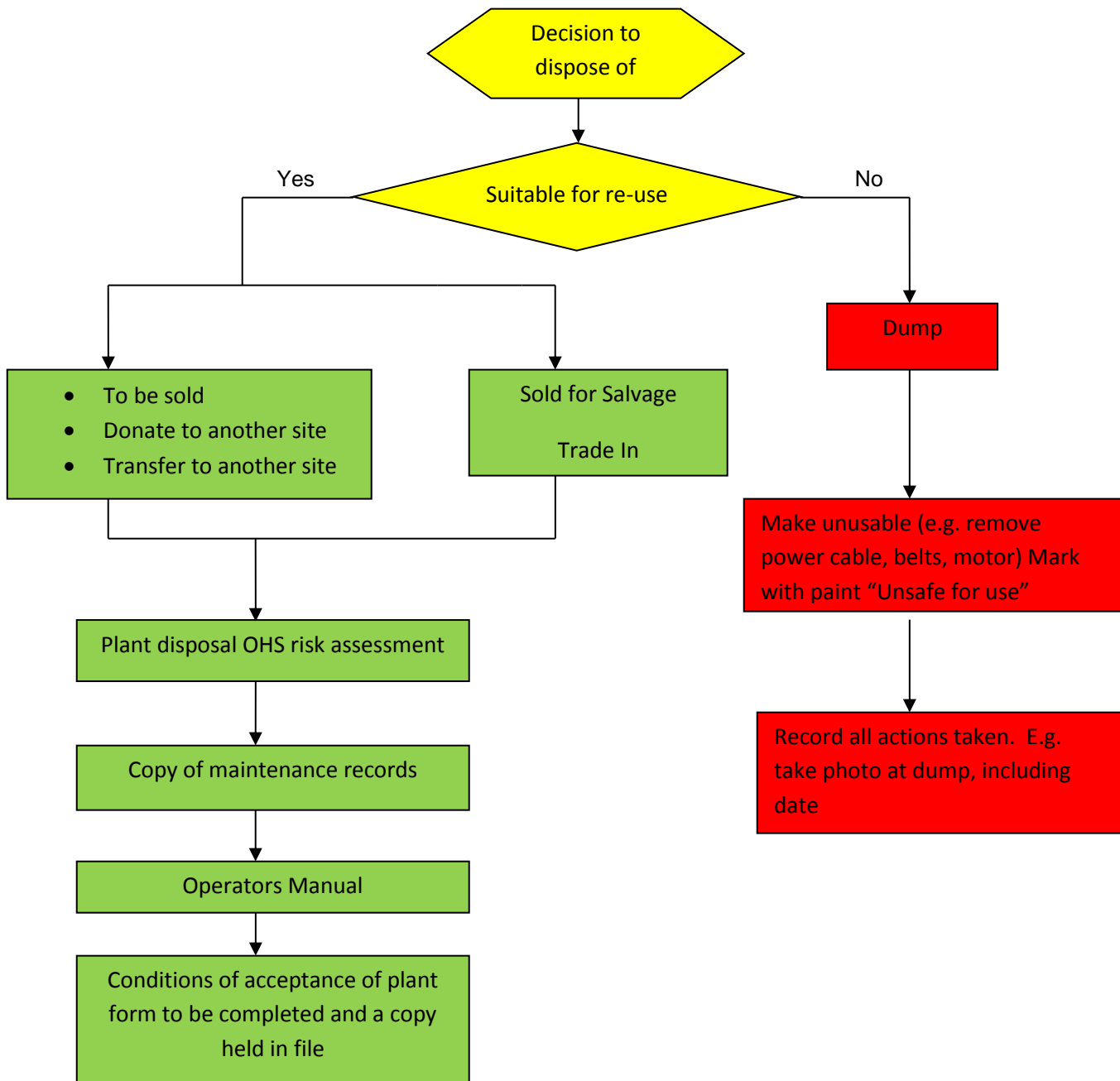
The owner of any plant referred to in regulation 122 must also comply with the requirements of regulations 111(a) and (b), 113, 116 and 120, insofar as the requirements of those regulations are relevant to maintaining the plant in a condition that eliminates or, where that is not reasonably practicable, minimizes any risk to health and safety (including carrying out or arranging necessary inspections or testing (and paying any appropriate fee), through the provision of information, through keeping records, or otherwise), and as if references in those regulations to an employer extended to the owner

OHS&W Regulations 2010, Subdivision 8, Regulation 130 – Record Keeping

The owner of the plant to which the requirements of this Subdivision apply by virtue of Regulation 122 must –

- (a) Make records of any relevant test, maintenance, inspection, commissioning or alteration of the plant, or of any risk assessment carried out in accordance with Regulation 123; and
- (b) Keep those records (and any records made for the purposes of Regulation 3.2.44 of the revoked regulations) for at least 5 years or, if an approved code of practice specifies a different period, for that period; and
- (c) Except where the plant is being sold for scrap or as spare parts for other plant-ensure that those records (and any records made for the purpose of regulation 44 of the revoked regulations) are transferred to any person who purchases or otherwise acquires the plant (other than on hire or lease) from the owner.

The following flowchart should be used to complete the disposal process -



Refer to Appendix 5 for Plant Disposal OHS&W Risk Assessment Form

STUDENT SAFETY

Assessing Student Competency in the Use of Machinery

Making sure students are capable of performing a task that incorporates machinery and equipment will assist in the effective management of risk. This means giving student operators of plant and equipment in a workshop sufficient instruction in its safe operation and adequate supervision.

However, in some circumstances, students can't be closely supervised. The teacher may need to verify that a student has understood how to apply the operating and safety instructions for a specific task. This may be done through a number of means, such as:

- oral and written tests which are focused on technological safety and literacy;
- assignments;
- operator certifications;
- practical testing and observation.

Such verification for a student would determine whether the student is 'competent' or 'not yet competent' in performing a particular task. A sample checklist for recording the results for each student attached at the end of this section. Provision is made for verifying competency for the same student a number of times during the school year, such as at the start of each semester, or after a student has not used a piece of equipment for a period of time. The frequency with which the competency of students is assessed needs to be identified in the risk management process.

Students who are assessed as being 'not yet competent' for a certain task must not be allowed to undertake the task.

Student Safety Contracts

A contract is an agreement between two parties. Some schools have introduced safety contracts between teacher, student and the parents/guardians. Such a contract states a number of requirements agreed between student and teacher and is to be signed by the student and that student's parent or guardian, signifying that they have each read and understood the 'contract conditions'.

Student contract follows

A contract such as this has no legal bearing and is nothing more than a mechanism by which teachers can exercise their duty of care by ensuring appropriate information is given to students. By letting parents or guardians see the document, they are being given the opportunity to acknowledge the fact that safety rules in Design and Technologies exist and are considered to be very important.

Refer to Appendix 6 for Student Induction Workbook.

REFERENCES

This workshop manual has been prepared using resources available from various State education authorities, state legislature and various public available documents. Specific acknowledgement is made of the following:

- South Australia – Department of Education and Children’s Services – *Guideline for the Safe Use of Machinery*,
- Government of South Australia – SafeWork SA - *Machinery and Equipment Safety – An Introduction*
- Government of South Australia – SafeWork SA - *Machine Guarding*.
- Western Australia – Department of Education and Training – *Design and Technologies, Hazard Identification and Risk Management Guidelines*
- New South Wales – Department of Education and Training - *Equipment Safety in Schools*
- Victoria – Department of Education and Training – *Student Safety Guidelines Technologies*
- Queensland Government – Department of Employment, Training and Industrial Relations, Workplace Health & Safety – *Spray Painting Guide for Employers and Operators*

STANDARDS AUSTRALIA

- Standards Association of Australia, *Australian Standard 1485 – 1983 Safety and health in Workrooms of Educational Establishments*.
- Standards Association of Australia, *Australian Standard 4024. 1 – 1996 Safeguarding of Machinery Part 1: General Principles*
- Standards Association of Australia, *Australian Standard 1473 – 1991 Guarding and Safe Use of Woodworking Machinery*.
- Standards Association of Australia, *Australian Standard 1470 – 1986 Health & Safety at Work – Principles and Practices*.
- Standards Association of Australia, *Australian Standard 1390 – 1994 Safety Signs for the Occupational Environment*
- Standards Association of Australia, *Australian Standard 1680.1 – 1990 Interior Lighting Part 1: General Principles and Recommendations*
- Standards Association of Australia, *AS/NZS 1336:1997 Recommended practices for occupational eye protection*.
- Standards Association of Australia, *Australian Standard 1337 – 1984 Eye Protectors for Industrial Applications*.
- Standards Association of Australia, *AS/NZS 1338: 1992 Filters for eye protection*.

- Standards Association of Australia, AS/NZS 1715: 1994 *Selection, use and maintenance of respiratory protective devices.*
- Standard Association of Australia, AS 1269.3 1998 *Occupational noise management Part 3 Hearing Protection Program*
- Standard Association of Australia, AS 1647.1997 *Safety in Welding and allied processes Part 1 Fire Precautions*
- Standard Association of Australia, AS 1647. 1997 *Safety in welding and allied processes Part 2 Electrical*
- Standards Association of Australia, AS/NZS 1716: 1994 *Respiratory protective devices*
- Standards Association of Australia, AS/NZS 2161: 2000 *Occupational protective gloves*
- Standards Association of Australia, AS 2225: 1994 *Insulating gloves for electrical purposes.*
- Standards Association of Australia, AS/NZS 2210.1: 1994 *Occupational protective footwear – Guide to selection, care and use.*
- Standards Association of Australia, AS/NZS 1800: 1998 *Occupational Protective Helmets- Selection, care and use.*
- Standards Association of Australia, AS/NZS 1801: 1997 *Occupational Protective Helmets*
- Standards Association of Australia, AS 3765: 1990 *Clothing for protection against hazardous chemicals.*
- Standards Association of Australia, AS/NZS 4399: 1996 *Sun protective clothing – Evaluation and classification*
- Standards Association of Australia, AS/NZS 1891:1995 *Industrial fall-arrest systems and devices*
- Standards Association of Australia, *Australian Standard 1788.1 – 1987 – Abrasive Wheels part 1 – Design, Construction, and Safeguarding.*
- Standards Association of Australia, *Australian Standard 1788.2 – 1987 – Abrasive Wheels Part 2 – Selection, Care and Use.*
- Standards Association of Australia, AS 1473.1 2000 *Wood Processing machinery – Safety Part1: Primary timber milling machinery*
- Standards Association of Australia, AS 1473.2 2001 *Wood processing machinery – Safety Part 2: Finishing machinery – Common requirements.*
- Standards Association of Australia, AS 1473.3 2001 *Wood processing machinery – Safety Part 3: Finishing machinery - Circular sawing machines.*
- Standards Association of Australia, AS 1473.4 2001 *Wood processing machinery – Safety Part 4: Finishing machinery - Bandsawing machines.*

- Standards Association of Australia, AS 1473.5 2001 *Wood processing machinery – Safety Part 5: Finishing machinery – Moulding machines and routers with rotating tool.*
- Standards Association of Australia, AS 1473.6 2005 *Wood processing machinery – Safety Part 6: Finishing machinery – Surface Planing and thicknessing machines.*
- Standards Association of Australia, AS 1473.7 2005 *Wood processing machinery – Safety Part 7: Finishing machinery – Tenoning, profiling and edge-banding machines.*
- Standards Association of Australia, AS 1473.8 2007 *Wood processing machinery – Safety Part 8: Finishing machinery – Milling tools and circular saw blades.*

SOUTH AUSTRALIAN GOVERNMENT

- Work, Health & Safety Act 2012
- Work, Health & Safety Regulations 2012
- Dangerous Substances Act 1979
- Waste Management Act 1987
- Local Board of Health Regulations

APPENDIX 1 – PLANT HAZARD IDENTIFICATION, RISK ASSESSMENT AND CONTROL INFORMATION FORM

<p><u>HAZARD DESCRIPTION</u></p> <p>Be specific in description of hazard and equipment part e.g. crushing finger in a circular saw</p> <p><u>CHECKLIST- MECHANICAL HAZARDS</u></p> <ul style="list-style-type: none"> Entanglement – of clothing, jewellery, body parts, hand held objects, rotating parts, projections or gaps in moving machine, between rotating and fixed parts, and materials in motion. Crushing from- moving parts of machine, and fixed structures, materials falling, material moving on plant, machine and materials being processed. Drawing in – to in-running nips in gear of pulley duties, rollers, and gear wheels on tangential surfaces, conveyor rollers, head and tail drums, rope on cables on reels, pulleys. Cutting – on sharp edges of cutting or milling tools, sharp materials being processed, sharp edges of plant if person slips, falls or strikes edge quickly Stabbing and Puncture by – rapidly moving parts of plant or materials, ejection of parts of machine or material processed Shearing – between moving parts of plant or between machinery part and a work piece Striking or impairment by – disintegrating pieces of plant or work pieces, fast moving parts of machine or materials processed Friction/Abrasion – from abrasive tools, fast moving surfaces Injection – of fluids, gases under high pressure Potential energy releases – stored in springs, tension shafts, counterweights, objects stored at heights, objects held under hydraulic/gas pressured by electromagnetic devices. <p><u>CHECKLIST – NON MECHANICAL</u></p> <ul style="list-style-type: none"> Slips, trips, falls, entrapment, falling objects – from defective access/egress ways, stairs, platforms Overuse or strain injury – arising from poor systems of work, absence of lifting aids Electric shock/burn – arising from contact with electricity, including unprotected live circuits, unlocked electrical cabinets, damaged or defective conductors, overloaded circuits, water or combustible medium contacting live conductors 	<ul style="list-style-type: none"> Poisoning/burns, illness, injury – from contact/inhalation of chemicals that are toxic, carcinogenic, irritant, flammable, corrosive, incompatible, explosive Suffocation – from lack of oxygen in confined space, heavier than air or toxic gases, materials stored overhead, or loosely in stockpiles Radiation burns/ slight loss of vision – from ionizing and non-ionizing radiation, including lasers, welding, weighing and measuring devices Deafness, disorientation, illness – arising from excessive noise and vibration Injury to organs – arising from excessive pressure and vacuum (generally long-term exposure) Illness – arising from biological risks e.g. viral, bacteria Burns, heat related illness, hypothermia – resulting from exposure to extremes of temperature <p><u>ERGONOMIC CHECKS</u></p> <p>Review plant design, particularly controls, operator layout, the work environment and work systems to identify potential hazards and check adequacy of safe guards. Common deficiencies include:</p> <p><u>Safe Systems of Work</u></p> <ul style="list-style-type: none"> Inadequate communications system Absence of systems for foreseeable abnormal situations and fluctuation of operations conditions Insufficient work procedures and instruction provided by designer and/or supplier Inadequate job and task design Inadequate or insufficient plant layout Excessive rate of work such as pacing Inadequate shift arrangements Insufficient competency of people using the plant Inappropriate clothing or jewellery Objects falling from plant due to inappropriate systems of work <p><u>Deficiencies in reach/space required</u></p> <ul style="list-style-type: none"> Hazard above 2.5 or out of reach behind barrier Openings in guards comply with Australian/New Zealand Standards Controls within easy reach, no over exertion or awkward posture to use Space sufficient to allow free movement in operation and maintenance, no constrained posture 	<p><u>Design consideration relating to human capabilities</u></p> <ul style="list-style-type: none"> Warning signals/alarms easy to detect (visual, aural, smell) Reaction time required to current situation reasonable, particularly in noise environment Safety distances for presence sensing safeguards checked against Standards for movement speeds Controls, parts of plant requiring operation, lifting with strength range of operators Is there a high reliance on any of the senses for operation, safety, that may be a hazard if person distracted, unwell, has deficiency in the characteristic e.g. hearing, sight, smell Fatigue reduced by constant positioning of arms above shutters, standing in fixed positioned, constant static load on muscles <p><u>Design characteristics that reduce potential for error</u></p> <ul style="list-style-type: none"> All controls, measuring instruments, gauges, conform with population norms for use Information overload, particularly in emergencies reduced by interlocking vital controls Use of more than one sense where information vital in some situations e.g. visual and audible Repetitive movements that may get out of phase, creating a hazard should be redesigned e.g. safety interlocked Similar controls on differing lines on same plant should be standardized in shape, colour, size Minimize letter sizes on displays, controls should be calculated as $h = 0.005D$ where h = height of letter and D = viewing distance (same units) <p><u>WORK ENVIRONMENT CONSIDERATIONS</u></p> <ul style="list-style-type: none"> Lighting adequate for operating machines, checking product, supplementing local lighting if necessary – refer AS 1680.1 Glare and reflection off instruments minimized Noise levels do not mask hazards or warning alarms, or hinder communication Excessively hot/cold parts of plant guarded, protection provided if necessary Overhead operating plant mobile equipment movement to hazard requiring special barriers, audible and visual alarms, special systems of work Where product creates slippery/wet floors, provision for drainage, routine cleaning, adequate surface friction on walking surfaces Absence of personal protective equipment or use of inappropriate personal protective equipment 	<ul style="list-style-type: none"> Unsuitable terrain for plant causing instability and resulting in roll-over, fall through or impact Environmental conditions causing the plant to fall Inappropriate location in the workplace and the impact on workplace layout and design Insufficient access/egress during normal, maintenance and emergency conditions Insufficient control relative to the presence of other people in the vicinity of the plant <p><u>CONTROL CHECKS</u></p> <ul style="list-style-type: none"> Isolator- in place, labeled if remote from plant, lockable Emergency stops – clearly visible, easy access, red mushroom head switch, latch in, no auto restart on reset, fail to safety, Lanyard switches – clearly visible, easy access, operates if wire is pulled, slackened or breakage, fail to safety, no auto restart or reset Clutch and breaking system – fail to safety Setting and Adjustments controls – hold to run controls at reduced speed/torque, returns to stop when released; two hand controls for one person operation, both buttons operated within 0.5 seconds and both buttons separated to prevent operation by one hand; inching/logging only allows pre-set limited movement consistently on each activation button Warning signals – audible and visually clear to people not within sight of start control, not a substitution for safeguards, fail to safety PLC may monitor safety functions but not capable of being overridden <p><u>GUARD CHECKS</u></p> <ul style="list-style-type: none"> Fixed guards – removable only with a tool or key, solid, sturdy, permit routine adjustment/lubrication without removal where possible, shall not create hazard with sharp edges or traps points, shall not inhibit compliance with food hygiene requirements, openings, and distance guards, shall comply with reach distance (AS4024.1) Interlocking guard – effective interface to stop moving parts when guard is open or remains locked, closed until risk to injury from the hazard has passed. Level of interlock is appropriate for level of risk. (AS4024.1 – Principle of “positive break” contacts and fails to safety.) Presence of sensing guard – accredited type of safety device used and plant is capable of stopping part way through a cycle. Stopping distance adequate for stopping time moving parts and interface comply with AS 4024.2.
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APPENDIX 2 – ASSOCIATED HAZARDS WITH PROJECT MATERIALS

WOOD TECHNOLOGIES		HAZARDS
Copper chrome arsenate (CCA) – treated timber. e.g. Permapine	Use: Reason:	<ul style="list-style-type: none"> Outdoor furniture and joinery Dust particles can stimulate lung secretions, which induce the dust to release arsenic resulting in lung cell tissue destruction.
Oleander	Use: Reason:	<ul style="list-style-type: none"> Green timber turning on wood lathes Latex is poisonous
Western Red Cedar	Use: Reason:	<ul style="list-style-type: none"> General joinery Suspected that dust particles cause cancer

METAL TECHNOLOGIES	HAZARDS
Ventilation	Poor ventilation, enough air changes
Chemicals	Inhalation, toxic, sensitivity
Tools & Equipment	Correct guarding, correct placing
Materials	Type, waste, sharp edges, disposal
Lighting	Poor lighting, strobe effect, reflection from machinery
Welding Rods	Dust, fumes, sufficient extraction

PLASTIC FABRICATION	HAZARDS
Ventilation	Poor ventilation, enough air changes
Chemicals	Inhalation, toxic, sensitivity, fumes
Tools & Equipment	Hot machines
Materials	Type, waste, fumes, disposal
Lighting	Poor lighting, strobe effect, reflection from machinery

These general rules can be enlarged and displayed in a prominent area -

APPENDIX 3 – GENERAL WORKSHOP RULES

Personnel working with any machine tools are required to follow the Safety Instruction stated below in order to prevent any accident that may occur.

- Appropriate personal protective equipment (such as dust coat, safety shoes, and face shield) **MUST** be worn while operating the machine.
- Long hair, neck tie, or hanging mobile phone **MUST** be tightened up.
- Hand gloves should **NEVER** be used.
- Work piece and cutting tool **MUST** be properly clamped.
- Chuck key **MUST** be removed from the chuck when not in use.
- Make sure there is **NO** loosened part left on the machine table.
- Make sure you know how to operate the machine before switching it on.
- Machine guards **MUST** be put in position while operating.
- Keep hands away from any rotating objects.
- Cutters being used should be correctly ground and in good condition.
- Use correct cutting speed, feed rate, and depth of cut from time to time.
- Spilled oil or cutting fluid on the floor **MUST** be wiped off immediately.
- **NEVER** use hand file or emery cloth for finishing lathe work pieces.
- Do not leave any running machine unattended.

In case of doubt, contact the Technician or Training Officer immediately.

APPENDIX 4 – DESIGN AND TECHNOLOGIES WORK INSPECTION CHECKLIST

This Work Inspection checklist has been developed to assist Schools in addressing their hazard identification and reporting. The checklist is not intended as a definitive list for the identification of all hazards and provides guidance only. Staff are encouraged to make modifications to suit their specific environment. **Note:** there will be hazards/deficiencies not mentioned on the checklists that will need to be identified and managed.

School or Location (block/campus/room):	
Person/s completing Checklist:	Date:

INSPECTION AREAS	SPECIFIC HAZARDS/ELEMENTS TO INSPECT	YES	NO	N/A	WHAT CONTROLS / ACTIONS ARE BEING TAKEN TO FIX THE RISK?	SCHEDULED DATE	COMPLETED DATE
FLOORS	Floor surfaces do not present a slip, trip or fall hazard (e.g. cracks, cables etc)						
	Floors are free from grease and oil						
	Floors are clean and clear of rubbish						
	Pedestrian walkways and keep clear zones are clearly marked						
FIRE SAFETY	Emergency exits and pathways are unobstructed and marked with illuminated exit signs						
	Appropriate types of fire extinguishers are available (e.g. electrical, flammable liquids etc)						
	All fire equipment is easily accessible, appropriately stored and signed						
	A current emergency plan is displayed and clearly legible						
	A fire blanket is available						
	Smoke detectors are installed and are in working order						
	Emergency lighting has been tested in the past 6 months						

INSPECTION AREAS	SPECIFIC HAZARDS/ELEMENTS TO INSPECT	YES	NO	N/A	WHAT CONTROLS / ACTIONS ARE BEING TAKEN TO FIX THE RISK?	SCHEDULED DATE	COMPLETED DATE
ELECTRICAL	Electrical switchboards are signposted, clear of obstructions and locked						
	Electrical switchboards fitted with RCD protection have been tested within the last 6 months						
	All electrical equipment has been tested and tagged within the prescribed timelines						
	Extension cords/plugs and sockets are in good condition						
LIGHTING	Lighting level is appropriate for activities performed and regular maintenance schedule is established for all areas						
	Lighting is appropriate in storage areas						
CHEMICAL	Appropriate ventilation is available in chemical storage area						
	A Dangerous Goods and Hazardous Substance Register is available						
	MSSD are available for all chemicals stored on site and are less than 5 years old						
	The minimum amount of chemicals are stored on site						
	Spill kits are available and appropriate for chemicals used in the workplace						
	All decanted chemicals are appropriately labeled						
	Safe Work Procedures for both tasks associated with Dangerous Goods and Hazardous Substances are available for reference						
	Dangerous Goods are Hazardous Substances are stored and segregated						
	The Dangerous Goods storage area is greater than 10 metres from any ignition source						
	Hazchem signage is located at all entrances to the site and DGHS signage in chemical storage areas						
	Gas cylinders are secure and have flash back protection						
	Stormwater drains are able to be isolated in the case of a bulk chemical spill						

INSPECTION AREAS	SPECIFIC HAZARDS/ELEMENTS TO INSPECT	YES	NO	N/A	WHAT CONTROLS / ACTIONS ARE BEING TAKEN TO FIX THE RISK?	SCHEDULED DATE	COMPLETED DATE
WELDING EQUIPMENT	Oxygen and acetylene bottles are chained and stored appropriately						
	Gas cylinders are secure and have flash back protection						
	Cylinders have been pressure tested and stamped within the past 5 years						
	Welding bays and curtains are clean and undamaged						
	Flashback arrestors are installed on both the bottle and blowtorch						
	Welders are tagged and regularly tested in accordance with the Australian Standards						
	Hoses and connectors are in good condition						
LIFTING CHAIN AND SLINGS	Chains are appropriately stored when not in use						
	Safe Work Limit (SWL) tags are in place, legible and regular professional inspections scheduled						
	Chains have been labelled indicating current formal inspection						
STORAGE AREAS	Storage racks are load rated and labeled						
	Storage racks are not loaded in excess of load rating						
	Storage areas are clean, neat and tidy						
PLANT AND EQUIPMENT	Plant and equipment is serviced and maintained regularly and records of such are available						
	All plant items have documented risk assessments and designated controls are fully implemented with Safe Work Procedures developed						
	Machine guarding is in place to prevent injury						
	Emergency stops are installed and in good working order						
	Safety interlocks are installed and in working order						
	SWP's are displayed adjacent to plant and equipment items						
	Appropriate signage is in place (e.g. PPE requirements)						
	Heat producing plant and equipment is positioned away from combustible material						
	Extraction fans and mechanical ventilation are in working condition						

INSPECTION AREAS	SPECIFIC HAZARDS/ELEMENTS TO INSPECT	YES	NO	N/A	WHAT CONTROLS / ACTIONS ARE BEING TAKEN TO FIX THE RISK?	SCHEDULED DATE	COMPLETED DATE
PLANT AND EQUIPMENT	Appropriate noise/vibration controls are in place as required for plant and equipment						
	All damaged or faulty equipment is isolated to prevent operation						
MANUAL HANDLING	All hazardous manual handling tasks have been risk assessed and controls put in place (e.g. trolley, stands, and correct storage procedures followed)						
	Workstations, benches, stools, chairs etc are in good condition						
	Trolleys, hoists, lifting slings etc are in good condition						
PPE	Appropriate PPE is available						
	PPE is free from signs of damage or wear						
GENERAL	First Aid Kit is fully stocked and are contents suitable for activities being performed						
	Eye wash stations are checked/serviced regularly						
	Stairs are fitted with secure handrails						
OTHER							

APPENDIX 5 – PLANT DISPOSAL RISK ASSESSMENT

Note: <i>Some questions may not be applicable in certain areas</i>	Yes	No	N/A	Comment
Guarding <ul style="list-style-type: none"> Is guarding adequate for the type of plant and the work it is used for? 				
Crushing <ul style="list-style-type: none"> has the risk of crushing from falling parts falling off or uncontrolled or unexpected movement of the plant been addressed? 				
Electrical <ul style="list-style-type: none"> can anyone be injured from electric shock due to damaged electrical leads/cables or damaged switches? 				
Explosion <ul style="list-style-type: none"> Can anyone be injured by explosion of gases, vapours, liquids, dusts or other substances triggered by the operation of the plant or materials handled by the plant? 				
High Temperature <ul style="list-style-type: none"> Can anyone come into contact with objects at high temperatures or be injured by fire when using this plant? 				
Slipping, tripping and falling <ul style="list-style-type: none"> Can anyone using the plant slip, trip or fall due to uneven or slippery work surfaces or lack of guardrails or other suitable edge protection? 				
Striking, cutting, stabbing and puncturing <ul style="list-style-type: none"> Can anyone be struck, cut, stabbed or punctured by this plant? 				
Environmental hazards <ul style="list-style-type: none"> Are hazardous (or other) wastes likely to be released by this plant? 				
Other hazards				
Actions required prior to disposal				
Signed as completed:				
Actions required by new owner				
Signed as completed				

Person undertaking risk assessment:

Date:

Copy with plant for transfer to disposal/new owner:

Signature.....

APPENDIX 6 – STUDENT INDUCTION WORKBOOK

Design and Technologies

Name of Student:

Subject:

Teacher:

Date:

Instructions

1. You must complete the worksheets in this workbook before any practical classes can be attended.
2. Once completed, this workbook is to be presented to your practical class teacher.
3. You must at all times comply with provisions of the *Occupational Health, Safety and Welfare Act 1986*.
4. You must read and understand all sections contained in this workbook.
If you do not understand or are unclear about what is required, then you should ask the teacher.

Student Objectives

After completing this workbook, you should be able to:

1. list the minimum dress standard for entering practical classes in the Design and Technologies workshop/s.
2. list the other items of personal protective equipment that are used in the workshop/s.
3. state your obligations in relation to the *Occupational Health, Safety and Welfare Act 1986*.
4. state the school workshop safety rules.
5. state the procedures for using both:
 - machinery, and
 - portable power tools.

Now, read the following information and complete the worksheets in this workbook.

Student's General Safety Rules

Sometimes a safety rule is repeated because it may be applicable in more than one area.

General Safety Precautions

1. Always wear SAFETY GLASSES in the room
2. Do not set up or operate any machinery unless a teacher is in the room.
3. Do not operate any machine unless authorized to do so by a teacher or under a teacher's supervision.
4. Use the proper tool for the job.
5. Check tools before use to assure they are safe to use.
6. Do not leave tools or work on the table of a machine even if the machine is not running. Tools or work may fall off and cause a toe or foot injury.
7. Put tools away when not in use.
8. Place all scrap pieces in the correct containers.
9. Never handle chips with your hands or fingers. Chips are extremely sharp and can easily cause cuts.
10. Use a brush to remove chips -- not hands, fingers, or rags.
11. Never wear gloves or use rags to clean the work piece or any part of a machine that is running. Rotating tools or parts can grab gloves and rags and pull you into the machine.
12. Never use compressed air to clean any machine.
13. Never use compressed air to clean your clothes or yourself.
14. If using compressed air to clean a part, point the air hose down and away from yourself and other persons.
15. Do not run in the room; there should be no "fooling around" at any time. Don't be a "wise guy."
16. Get first aid immediately for any injury.
17. Get help for handling large, long, or heavy pieces of material or machine attachments.
18. Follow safe lifting practices; lift with your leg muscles, not your back. If you do not know how to lift safely, ask a teacher to show you.
19. Be sure you have sufficient light to see clearly. Check with the teacher if you do not have enough.
20. Aisles should be clear at all times to avoid tripping or other accidents.
21. Store materials in such a way that they cannot become tripping hazards.
22. Keep the floor free of oil, grease, or any other type of liquid. Clean up spilled liquids immediately; they are slipping hazards.
23. Loose clothing or long sleeves should not be worn. Machines can easily grab loose clothing in rotating parts.
24. All set-screws should be of the flush or recessed type. If they are not, move with caution when near them. Projecting set-screws are very dangerous because they may catch on sleeves or clothing.
25. Do not walk behind a person operating a machine; you may bump him/her by accident or startle them and cause an accident.

Workshop Dress and Personal Protective Equipment (PPE)

Listed below are the requirements of this school as to what you must wear when attending Practical Design and Technologies classes.

- *Shirt Sleeves - either*
 - a. Short sleeves, or
 - b. Long sleeves, which are fully rolled up
- *Apron or coat* - An apron or coat must be worn for all practical classes.
- *Footwear* - Fully enclosed footwear must be worn.
- *Hair Protection* - Long hair must be restrained under a cap or hair net.
- *Loose Clothing and Jewellery* - All loose-fitting clothing, rings, watches, - bracelets, earrings (except for studs), necklaces, leather/cloth wrist bands, etc. must be removed or secured.
- *Eye Protection* Face shields or safety glasses must be worn when you use machines and power tools; or when you are undertaking any other task or in a situation where an eye injury could reasonably occur, e.g. when chiseling or adjacent to someone else who is chiseling.
- *Hearing protection* - Hearing protection must be worn when you use. Machines or power tools.
- *Other PPE* - you will be required to wear other PPE when you undertake specific activities, e.g. arc welding.

Summary Minimum dress requirements to enter the Design and Technologies workshop for a practical class:

- SHORT SLEEVES (or rolled up sleeves)
- APRON OR COAT
- FULLY ENCLOSED FOOTWEAR
- CAP OR HAIRNET IF REQUIRED
- JEWELLERY AND LOOSE CLOTHING REMOVED
- OR SECURED

Note:

You will be working in an environment that contains hazards.

The teachers have done their part in controlling those hazards by instituting safety measures.

You are expected to behave in a responsible manner by co-operating with your teacher.

Student Worksheet

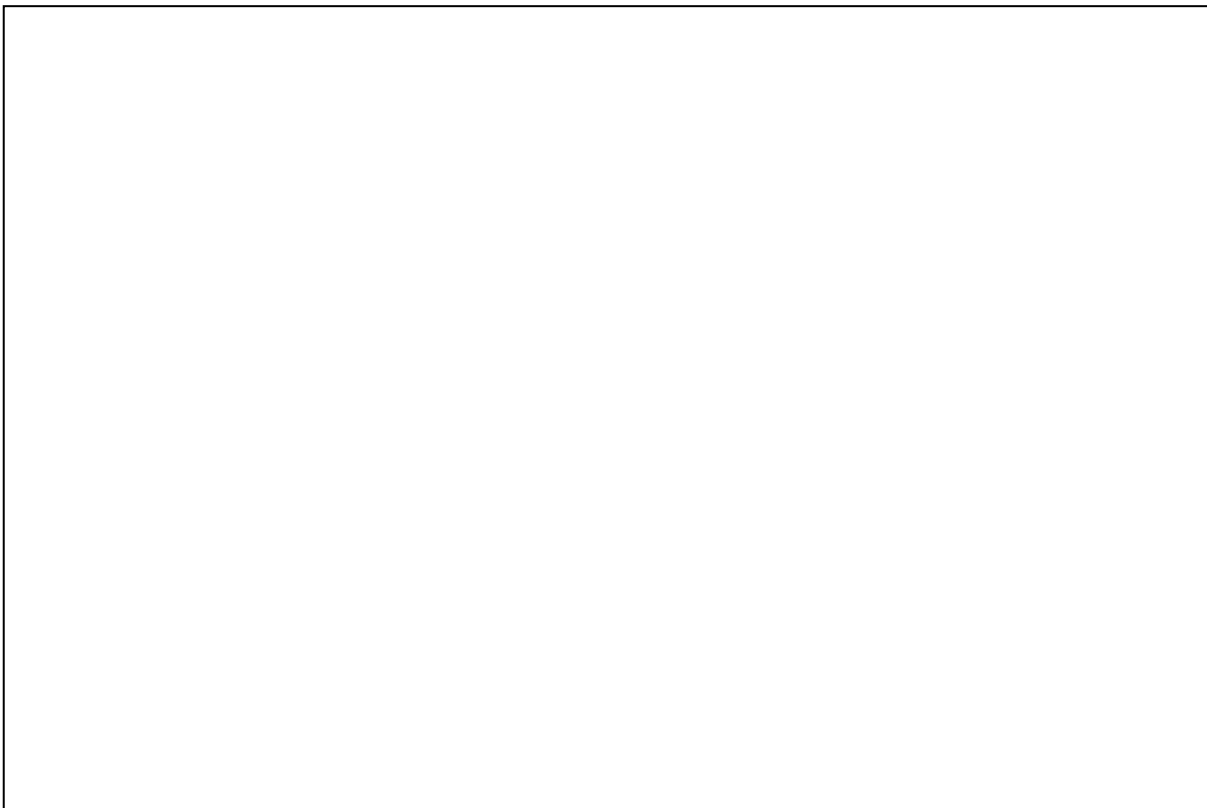
Workshop Dress

- 2) Describe a situation in the Design and Technologies workshop where an incorrect shirt sleeve may cause an accident.
.....
.....
.....
- 3) Describe a situation in the Design and Technologies workshop where the wearing of shorts may be dangerous.
.....
.....
.....
- 4) Describe a situation in the Design and Technologies workshop where incorrect footwear could cause an injury.
.....
.....
.....
- 5) Describe a situation in the Design and Technologies workshop where unsuitable hair protection could result in an injury.
.....
.....
.....
- 6) List all the machinery that has the potential to cause the operator an EYE injury.
.....
.....
.....
- 7) Apart from machinery, where else must you wear eye protection?
.....
.....
.....
- 8) Describe a situation in the Design and Technologies workshop where the wearing of a ring, watch, etc. may be dangerous.
.....
.....
.....

Workshop Layout

In the space provided below, draw a proportional freehand sketch of the workshop/s, clearly indicating the following:

1. The location and type of all firefighting equipment.- extinguishers & blankets
2. The nearest telephone.
3. The Emergency Stop switch location/s.
4. The location of the First Aid Kit/s
5. The location of the following items of personal protective equipment (PPE):
 - I. face shields/safety glasses
 - II. hearing protection.
6. Indicate and label on your sketch the storage location of any other PPE in the workshop/s.
7. Wash basins
8. All exits.



APPENDIX 7 – SOP – TEMPLATE

(ADD MACHINE NAME)

DO NOT USE THIS MACHINE UNLESS YOU HAVE APPROVAL

SAFETY HAZARDS

- 1)
- 2)
- 3)
- 4)
- 5)

PRE- USE OF MACHINERY - SAFETY CHECKS

- 1)
- 2)
- 3)

WHEN USING MACHINERY – SAFETY CHECKS

- 1)
- 2)
- 3)
- 4)
- 5)

HOUSE KEEPING

- 1)
- 2)

SAFETY EQUIPMENT TO WORN

- 1)
- 2)

A safe operating procedure is developed for the use of plant after a risk assessment has been performed to cover all possible hazards associated with this machine, but not limited to.

Date:.....

Signature:.....

Review Date:

APPENDIX 8 – SAFE OPERATING PROCEDURE - EXAMPLE

BANDSAW

DO NOT OPERATE THIS MACHINE UNLESS YOU HAVE APPROVAL

SAFETY HAZARDS

- 1) Cuts, Abrasions, Lacerations and Amputations
- 2) Noise
- 3) Unintended ejection of work pieces
- 4) Dust
- 5) Timber imperfections
- 6) Broken blades
- 7) Jamming of materials

PRE USE OF MACHINE - SAFETY CHECKS

- 1) Locate ON/OFF button. Check where emergency stop button is located (mushroom button)
- 2) All guards are in fitted position
- 3) Push stick available
- 4) Dust extraction unit turned on

WHEN USING MACHINE - SAFETY CHECKS

- 1) Machine is not to be left on while unattended
- 2) Work piece to be held firmly on table keeping hands in a safe position and feed forward evenly for effective control
- 3) When feeding material past blade push stick **MUST** be used
- 4) Do not force any materials into blade
- 5) To make any adjustments machine **MUST** be turned off
- 6) The machine **MUST** be turned off when removing all work
- 7) If the blade develops a “click” stop saw immediately and report to teacher/supervisor.

HOUSE KEEPING

- 1) Machine to be left clean and tidy
- 2) Reset all guards to a fully closed position

PERSONNEL PROTECTIVE EQUIPMENT TO BE WORN

- 1) Safety glasses **MUST** be worn
- 2) Sturdy footwear **MUST** be worn
- 3) Rings and jewellery **MUST** not be worn
- 4) Long hair **MUST** be contained
- 5) Close fitting clothes **MUST**
- 6) Hearing protection may be required in some circumstances and **MUST** be worn

A safe operating procedure is developed for the use of plant after a risk assessment has been performed to cover all possible hazards associated with this machine, but not limited to.

Date:.....

Signature:.....

Review Date:

APPENDIX 9 – TEMPLATE FOR PLANT/EQUIPMENT

NAME OF PLANT

<i>Insert picture here</i>	<i>Description of item</i>
<i>HAZARDS</i>	<i>CONTROLS</i>
Maintenance	

APPENDIX 10 – TESTING AND TAGGING

It is important to know that all electrical equipment in Design and Technologies are to be test once every 6 months as per AS-3760:2010.

These tests must be performed by a competent person – either a person who has completed the test and tag course conducted by a recognised training provider OR holds an Electrical Workers License.

See below the table taken from AS-3760:2010.

TABLE 4 – Indicative testing and inspection intervals for electrical equipment
(CAUTION: This page must be read in conjunction with AS/NZS 3760 as a whole, and particularly 2.1)

Type of environment and/or equipment	Interval between inspection and tests				
	Equipment including Class I equipment, Class II equipment, cord sets, cord extension sets and EPODs	Residual current devices (RCDs)			
		Push-button test – by user		Operating time and push-button test	
(a)	(b)	Portable (c)	Fixed (d)	Portable (e)	Fixed (f)
1 <u>Factories, workshops, places of manufacture, assembly, maintenance or fabrication</u>	<u>6 months</u>	Daily, or before every use, whichever is the longer	6 months	12 months	12 months
2 Environment where the equipment or supply flexible cord is subject to flexing in normal use OR is open to abuse OR is in a hostile environment	12 months	3 months	6 months	12 months	12 months
3 Environment where the equipment or supply cord is NOT subject to flexing in normal use and is NOT open to abuse and is NOT in a hostile environment	5 years	3 months	6 months	2 years	2 years