Practical design and technology (ITD)

A practical handbook for design and technology staff

Queensland Government

Contents

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Glossary

- **Hazard** – a situation or thing that has the potential to harm a person. Hazards at work may include: noisy machinery, a moving forklift, chemicals, electricity, working at heights, a repetitive job, bullying and violence at the workplace – *or simply, anything that could hurt you or someone else.*
- **Hazard identification** – the process of recognising that a hazard exists and defining its characteristics.
- **Risk** – the possibility that harm (death, injury or illness) might occur when exposed to a hazard… the likelihood and consequence of that injury or harm occurring – *or, working out how likely it is that the hazard will hurt someone and how badly they could get hurt.*
- **Risk assessment** – the overall process of estimating or minimising the level of risk and deciding what actions will be taken.
- **Risk control** – taking action to eliminate health and safety risks so far as is reasonably practicable, and if that is not possible, minimising the risks so far as is reasonably practicable. Eliminating a hazard will also eliminate any risks associated with that hazard.
- **Control measures** – that part of risk management which involves the implementation of policies, standards, procedures and physical changes to eliminate or minimise adverse risks.
- **Monitor and review** – this is an essential step in the risk management process. It means that hazardous situations are to be continually re-evaluated to establish the effectiveness of any control measures and strategies that have been implemented to manage risk.
- **Reasonably practicable** – the extent to which schools and teachers are to go to meet a legal expectation (or duty of care) in a particular situation. These expectations or 'obligations' take account of any specific circumstances that may apply when determining what it is 'reasonably practicable' to do or to expect any employer to do.
  WHS Act – reasonably practicable
  SafeWork Aust. – Interpretive Guideline, The Meaning of 'Reasonably Practicable'
- **Competent person** – a person who has acquired through training, qualification, or experience, or a combination of these, the knowledge and skills, including health and safety knowledge and skills, qualifying that person to perform the activity required.
- **"plant and equipment"** is defined broadly to cover a wide range of items, ranging from complex static installations, portable power tools, welding and construction equipment and the increasing range of CNC technologies
- **Lock-out**: the process designed to physically ensure an item of equipment/machine is inoperable with the use of a padlock or suitable device before cleaning, adjustments or repairs are made.
- **Tag-out**: the process that clearly communicates to workers, with labels and tags, when equipment/machine is out-of-service and are not be operated until safely returned to normal service.

Useful links

Topic	Workplace Health & Safety Qld	Department of Education
1. Legislation	• Work Health and Safety Act 2011 (Qld) (the Act) • Work Health and Safety Regulation 2011 (Qld) (the Regulation) • WHSQ – Codes of Practice Index • Electrical Safety Act 2002 (Qld) • WHSQ – Guide to the Work Health and Safety Act 2011	• Education (General Provisions) Act 2006 (Qld) • Workplace Health Safety & Wellbeing policies and procedures
2. Training	• Site specific induction • Training and supervision	• Industrial Technology and Design (Technologies) Safety Awareness and Induction • Technologies (ITD) teacher pathway program • CHW – Induction Factsheet
3. Risk management	• Managing risks • How to Manage WHS Risks – Code of Practice 2011	• CARA - Curriculum Activity Risk Assessment webpage • Health and Safety Risk Management Guidelines • Creating Healthier Workplaces (CHW) – Health and Safety • Safety and Hazard Alerts
4. Practical workspace environment	• Healthy and safe work environment • Managing the work environment and facilities	• Key message for principals • Design standards for DoE facilities • Checklist – Assessment of practical workshops
5. Personal protective equipment	• Personal Protective Equipment • Respiratory protective equipment (RPE)	• CHW- PPE Factsheet
6. Machinery, plant & equipment	• Managing the risks of plant in the workplace • Guide to machinery and equipment safety	• CHW – Machinery and equipment resources • DoE—Guide to managing electrical equipment in departmental schools and workplaces (PDF, 1.2MB) • Safety and Hazard Alerts
7. Chemicals	• Managing the risk of hazardous chemicals in the workplace	• Chemical management procedure • Chemical management guideline

Part A

1. Introduction

This guideline document consists of two parts:

- **Part A: Practical handbook and guidance**
- **Part B: Resources and exemplars**

The guideline:

- is designed for Queensland state secondary schools – specifically for practical activities in workshops (e.g. industrial technology and design)
- provides practical information relating to the establishment, management and maintenance of a healthy and safe teaching, learning, and working environment for staff and students
- can be used by principals, school leadership teams, heads of department, subject coordinators, teachers, teacher aides, special needs teaching assistants, other support staff and trainees
- focuses on creating a 'culture of safety' within a faculty and developing and fostering 'work safe' attitudes
- provides information to support schools to comply with state legislation and regulations including the *Work Health and Safety Act 2011 (Qld)*
- templates, checklists and exemplars are provided in Part B of the guideline which can be modified and customised to meet specific school workshop needs.

1.1 Legislation and regulatory requirements

The department and its staff are required to comply with a range of legislation and department policies and procedures.

Schools are workplaces and, as such, operate under the ***Work Health and Safety Act 2011 (Qld) (the Act)***. The Act defines duty holders and provides the overarching concepts and objectives regarding the provision of workplace safety. For example, all staff and volunteers for the department are classified as workers and have specific duties under the Act.

Risk management

Risk management is a structured decision-making process that is fundamental to the Act. The concept of 'reasonably practicable' is defined in the Act and is used to guide the risk management process by providing key factors that the duty holder is to take into account, including:

- the likelihood that the risk could result in injury
- the seriousness of any injury that could result from realisation of the risk

Legislation

Key pieces of legislation related to practical workshop activities include:

- *Education (General Provisions) Act 2006 (Qld)*
- *Work Health and Safety Act 2011 (Qld) (the Act)*
- *Work Health and Safety Regulation 2011 (Qld) (the Regulation)* – provides prescriptive requirements in relation to plant safety (Part 5).

- *Electrical Safety Act 2002 (Qld)* – imposes obligations on all persons who may affect the electrical safety of others by their actions, and establishes regulatory electrical safety benchmarks for industry and the community, including schools

> Workplace Health and Safety Queensland (WHSQ) inspectors monitor compliance with WHS legislation. An inspector may take enforcement action during or after their visit, including verbal directions or issuing enforcement notices.

Codes of practice (COP)

Codes of practice are admissible in court proceedings under the Act. Courts may regard a code of practice as evidence of what is known about a hazard, risk or control, and may rely on the code in determining what is reasonably practicable in the circumstances to which the code relates.

Therefore, duty holders are to comply with an approved code of practice or follow another method, such as a technical or industry standard, if it provides an equivalent or higher standard of work health and safety than the standard required in this code.

Search the WHSQ – Codes of Practice Index for codes that apply in your setting. For example, how to manage risks, plant and more.

Policies and Procedures Register (PPR)

Procedures contextualise legislative requirements for department environments. Procedures also provide responsibilities and mandatory requirements for principals and staff. Regular reference is to be made to the Policy and Procedure Register.

The Workplace Health, Safety and Wellbeing procedures include topics such as first aid, chemical management, and incident management. Consult the Managing risks in school curriculum activities (CARA) procedure and webpage for the processes to follow when conducting curriculum activities.

Australian Standards (AS/NZS, ISO)

Standards may be referenced in codes of practice or other legislation as the required standard. In the absence of specific regulation or a code of practice about a hazard or activity, standards information is often used as the industry or expected practice. Department schools have access to a subscription for standards via OnePortal – eJournals.

1.2 Incidents, injuries and near misses

Incident management involves reporting, recording, notifying and investigating incidents to prevent future incidents and injury.

Robust incident management is essential in practical workspaces as it can alert staff to issues and prevent future incident and injury.

- All incidents are to be reported to a supervisor by the end of the day/shift.
- All health, safety and wellbeing (HSW) incidents are to be recorded in MyHR WHS by the next business day.

> Recording incidents allows patterns to be identified (e.g. low-outcome high-frequency incidents such as minor injuries from chisels). This can help schools to work on skill development or strategies to improve practice to minimise these incidents

- All incidents are to be investigated – the extent of the investigation is based on the severity of the incident.
  - Investigating thoroughly how a minor nick occurred whilst using a table saw has the potential to prevent a serious injury (e.g. identifying that staff are not using a push stick to assist in securing the material during the task).

For more information, templates and case studies see OnePortal, incidents injuries and investigations, or MyHR WHS Training and Support.

1.3 First aid and emergency management

Hazards are different in the workshop to other areas of the school therefore the first aid kit/response will also be different. Legislation requires that appropriate first aid facilities and practices are in place to ensure first aid can be provided in a timely manner. This means your first aid kit and first aid personnel are to suit the likely injury profile in your workshop environments.

Detailed information to assist with risk assessment, including ratios for first aid trained staff, is available in:

- Managing First Aid procedure
- Creating Healthier Workplaces (CHW) – First Aid
- WHSQ – First Aid in the Workplace Code of Practice 2021
- MyHR Student First Aid

1.4 Communication and consultation

Communication and consultation are key components of creating a positive safety culture. There are a range of mechanisms that exist to support this in schools.

Health, safety and wellbeing (HSW) committees

Every school is to have a health, safety and wellbeing (HSW) committee, or in small schools, a forum which may be part of a larger committee or meeting. School-based committees form part of the department framework so HSW issues can be escalated and communicated through all levels. Find out more in the HSW Committees procedure.

Health and safety advisors (HSA)

Larger schools will have a health and safety advisor (HSA) who supports the principal to manage HSW on site. The HSA will usually coordinate the Annual Safety Assessment and will also assist to address HSW matters by supporting people to access advice or facilitating proactive actions such as inspections, review of data or risk management.

Health and safety representatives (HSR)

Every school staff group has the choice to elect a health and safety representative. The HSR is to be properly elected and have completed approved training. HSRs represent the views of the staff group and, as such, are members of the HSW Committee.

The roles of the HSR and HSA are different however are most effective if they work together.

Read more about responsibilities and expectations for these safety roles:

- Procedure – Health and Safety Advisor (HSA)
- Procedure – Workplace health and safety representatives (HSRs)

2. Training

2.1 Staff induction and training

- There is a duty under the Act (s19) to provide information, training, instruction and supervision.
- Induction and training are a continuum throughout a staff member's lifecycle with the department.
- Informed and trained staff are an important part of creating and maintaining a safety culture. Knowing the hazards and risks of a task and how to work safely prevents injuries.
- Induction and training can be achieved through formal training, or informal processes such as mentoring, buddy systems, staff meetings or briefings.
- Records (refer to section 2.3) are to be kept of any training and include sufficient information, such as date, location, person, how instruction was provided, and a summary of the training content.

2.1.1 Staff induction

Induction will not detail all the work protocols relevant to a workshop. However, it will provide an introduction into the continuing learning associated with the environment and safety management processes.

Induction in the workshop environment includes:

- initial and introductory information to a staff member about the workplace or activities
- key hazards and risks
- establishment of expectations for the work area
- contacts and channels of communication.

The department has developed a standard induction package for staff delivering or assisting to deliver curriculum in a workshop setting.

The online course – Industrial Technology and Design (Technologies) Safety Awareness and Induction – is approximately one hour in duration and can be conducted using a facilitated discussion with a group of teachers or staff. Please ensure you use Microsoft Edge or Google Chrome as your browser for this course.

A site-specific induction is also to be conducted including induction for each piece of equipment a staff member will use.

2.1.2 Staff training

Teachers and staff will join a school with differing skill sets and experience. Depending on the size of your school, the delivery of ongoing training will vary.

Larger schools – through leadership teams and heads of department – may be able to match skill sets to subject delivery and provide in-house training and development. Smaller schools, with only one teacher, may have to look to other schools or external providers to support skill development.

Leadership teams are to ensure that staff working in practical workshops have adequate skills to conduct their classes and tasks. This will include a combination of appropriate information and training such as:

- safe use of plant and equipment – this is to be specific and targeted to each item of plant that will be used by the staff member
- Curriculum Activity Risk Assessment (CARA) processes and how these are implemented at the site
- emergency responses, first aid facilities, and procedures for incident reporting and recording
- resources – e.g. safe operating procedures (SOPs) and equipment and maintenance records (EMR) – and support mechanisms for collegiate guidance
- the importance of electrical safety, including all legislative requirements.
- hazardous workspace conditions and risk management strategies to be aware of, such as:
  - the safe use of all chemicals and hazardous materials stored, and familiarity with safety data sheets (SDS)
  - the dangers of atmospheric wood dust particulates
  - industrial noise and the Hearing Conservation Program (HCP)
- school and workshop rules and expectations:
  - the importance of good housekeeping and general departmental cleanliness
  - safety signage – what is mandatory, and where is to it be placed
  - the use of personal protective equipment (PPE), for both teachers and students.

TAFE and other providers offer a range of competency-based courses that can be accessed to support the delivery of your school's specific curriculum needs. For example, developing skills in specific technical areas relevant to the curriculum delivery such as welding, metal machining, robotics etc.

> The department has commenced the Technologies (ITD) teacher pathway program to assist eligible teachers to transition to teaching in ITD curriculum areas. More information is available on OnePortal.

2.1.3 Staff professional development

Staff members will liaise with their supervisors about accessing professional development opportunities.

The department provides the 'Managing risks in ITD workshops program' as professional development for existing teachers who are experienced in the workshop environment. This course provides an update on the department's resources and processes, and a refresher on risk management in the school context. This is not a skill development course regarding practical plant and equipment competency.

The program consists of two-days face-to-face learning, with supporting online material and resources. The focus is risk management of workshop areas by:

- increasing teacher awareness of the health and safety issues affecting ITD faculties state-wide
- assisting schools with identifying risks in practical workshops
- maintaining currency of existing ITD teachers
- increasing teachers' confidence and competence in teaching
- encouraging consultation with the development of group or regional forums to network and discuss ITD issues with other schools (i.e. management of risks in workshops, and more).

2.2 Student induction and instruction

Student safety preparation, induction and training is to be designed to promote student awareness of workplace safety. The curriculum/course is then to educate them about skills and work methods designed to make practical activities a safe learning experience. Once again, this is a continuum of learning to develop skills.

Student training is to comprise:

- induction – general
- instruction/training – activity/machine specific

2.2.1 Student induction

Induction information can be provided in a range of forms. Induction information is also to be provided to parents/caregivers to ensure they are informed of workshop activities and, in some cases, provide their permission. Information can be provided in:

- student handbooks
- student contracts
- written materials, videos and other resources
- test and assessment tasks.

Workshop safety induction booklets or worksheets for students are to highlight and reinforce the following:

- how the *Work Health and Safety Act 2011* and Work Health and Safety Regulation 2011 regulates and mandates safety practice in workplaces, and how this relates to the curriculum and student expectations and learning;
- the dangers, safety hazards, inherent risks and preventative control measures commonly encountered in practical workspaces
- the importance of safe operating procedures (SOPs) for all machinery
- the importance of appropriate personal protective equipment (PPE)
- the importance of departmental workspace safety rules and consequences.

2.2.2 Student instruction

Ongoing reinforcement of safety expectations, rules and behaviour is part of good workshop practice, and embeds this learning for students.

In relation to items of plant and equipment:

- A comprehensive and specific introduction to each new practical activity, plant and equipment and machine or operational process is to be conducted for all students.
- These can be supported by safety videos, theory tests, procedural practical demonstrations, information lectures or the issuing of 'machinery competency licensing'.
- Using a test process, by necessity, is to be positive, simple and as brief as possible. Testing could be written or oral in style, or a combination of these; some schools use tools or programs to issue machine competency licenses.
- The first occasion a student controls and operates any ITD machine, plant or equipment is to be under the direct supervision of a teacher who is experienced and skilled in using the item of plant. At this time, the student is to demonstrate orally and practically that the safe and proper methods of control and operation are clearly understood.

Regular and ongoing reinforcement is required regarding student compliance with workshop safety rules, consistent application of SOP requirements and all specific PPE expectations.

2.3 Recordkeeping

Records of **staff and student induction and training** are to be kept. Staff and student induction and training records are to be regularly monitored to identify new or absent students or staff across the program to ensure induction and training processes are provided in a timely manner to all participants.

A typical **staff** record includes:

- name, date and particular activity (e.g. completion of online induction, workplace induction, informal discussions, staff workshops, meetings and briefings, risk management discussions)
- who provided the training
- a summary of the content
- operational proficiency for specific items of equipment.

A typical **student** record includes:

- student name, date and particular process (e.g. whether the processes were demonstrated, observed or evaluated by the class teacher)
- the successful completion of an appropriate induction (e.g. 'Introduction to Workshop Safety' handbook or worksheets by each student at the commencement of each year level or program)
- a task-specific record based upon the introduction of new machinery, materials and processes as they occur through the program
- machinery and equipment proficiency testing or 'Safe Operational Machinery Licensing' of individual students
- 'assessments/records' may be a combination of teacher-observed, formative/summative tasks, for example:
    - the results of any verbal or written analysis (tests) relating to safety when using materials or machinery
    - details and dates of all class-group discussions and demonstrations on workplace safety, materials, machinery and processes
    - individual teacher observations of student participation, safety awareness and outcomes.

Some schools choose to utilise the services of a third-party program/provider to help manage their student recordkeeping requirements for induction and training.

There is currently a department disposal freeze in place on all records and until this is lifted you cannot dispose of any records. Refer to Records disposal freezes for further information.

As an indicator any training records (for staff or students) are to be kept for a minimum of 7 years. Some records, such as those for hazardous substance training are to be kept until the person is 80 or 7 years from date of separation.

More information about retention and disposal of documents (electronic or hard copy) is available on OnePortal. There are three key documents for reference:

- General Retention and Disposal Schedule (GRDS) for general administrative records
- Education and Training Sector Retention and Disposal Schedule (ETRDS) for early childhood education and care, school education, training and skilling records
- General Retention and Disposal Schedule for Digital Source Records for original records that have been digitalised

3. Risk management

The risk management process serves to:

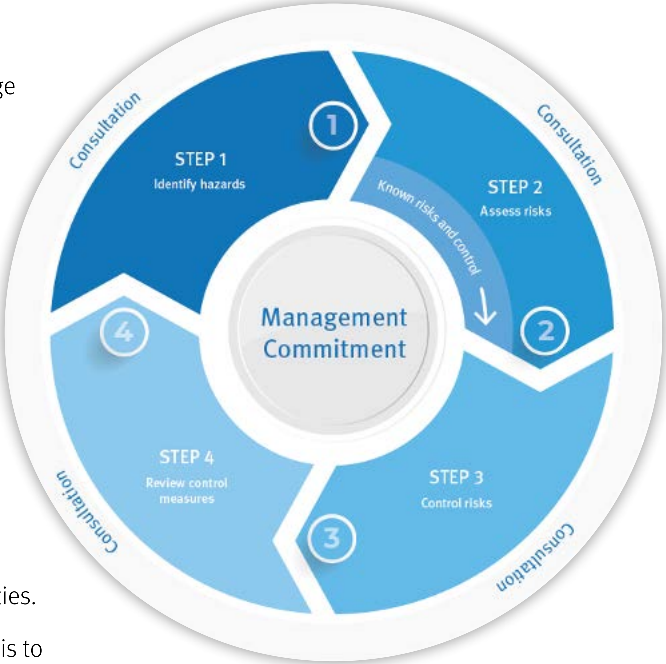
- achieve early awareness of potentially hazardous workshop situations
- provide a way to judge how dangerous these hazards might be, and assess any perceived risks
- promote decision making to identify and implement appropriate control measures
- establish regular monitoring or review of control measures to make sure that they remain effective, or new identified risks are managed.

3.1 Risk management process

The risk management process has four steps and there are a range of existing resources to assist teachers and school leadership teams to implement a robust process for practical workspaces.

Teachers are required to apply this process in accordance with the Managing risks in school curriculum activities procedure for curriculum activities.

The risk management process is also to be applied for operational activities. The level of complexity of the process and subsequent documentation required will depend on the assessed risk levels of the proposed activity.



3.2 The hierarchy of risk control

The WHS Regulation (s36) requires the hierarchy to be used in the determination of controls to manage risks in practical activities.

This means the **most effective** control measure (level 1), which is to **eliminate** a hazard, is to be considered first.

If this is not reasonably practicable then the risks are to be **minimised** by working through 'level 2' controls in the hierarchy, as follows:

- **substitute** the hazard with something safer (e.g. replace solvent-based paints with water-based ones)
- **isolate** the hazard from people. This involves physically separating the source of harm from people by distance or using barriers. For instance, install a guard rail behind the manually operated guillotine; or providing a fixed guard over a pulley assembly
- use **engineering controls** – e.g. use mechanical devices such as trolleys or hoists to move heavy loads; place guards around moving parts of machinery; install residual current devices (electrical safety switches) in all electrical switch boards, in all practical rooms.

Level 3 control measures do not control the hazard at the source. They rely on human behaviour and supervision, and used on their own tend to be least effective in minimising risks. Two approaches to reduce risk in this way are:

- **administrative controls** – administrative controls are work methods or procedures that minimise exposure to a hazard (e.g. SOPs to operate machinery safely, limiting exposure time to a chemical, painting yellow 'safe working zone' lines around fixed plant)
- personal protective equipment (PPE) – administrative controls and PPE are only be used:

- when there are no other practical control measures available (as a last resort)
- as an interim measure until a more effective way of controlling the risk can be used
- to supplement higher level control measures (as a back-up).

3.3 Curriculum Activity Risk Assessment (CARA) process

The Managing Risks in School Curriculum Activities procedure supports schools in identifying potential hazards, assessing risks and implementing control measures.

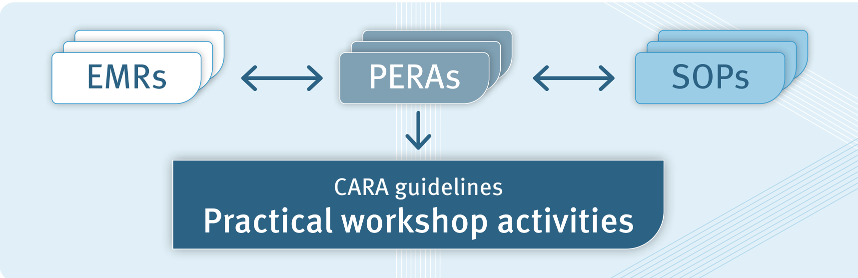
The procedure outlines the responsibilities of departmental staff and provides the minimum process to be followed by all state schools for curriculum activities. Summaries of the CARA process are provided on the Managing risks in school curriculum activities flowchart.

Refer to the Managing Risks in School Curriculum Activity procedure and the CARA webpage.

3.4 Plant and Equipment Risk Assessment (PERA)

A Plant and Equipment Risk Assessment (PERA) is a risk assessment tool that helps to identify hazards and risks and document appropriate controls for an individual piece of equipment.

PERAs form an important part of the risk management process. PERAs are completed for an item and then can be utilised across multiple activities (e.g. curriculum and non-curriculum). PERAs can be referenced within the CARA process as part of the documents that provide a complete picture of an activity.



Find more information on the Equipment and machinery resources webpage.

If a specific PERA template document is available from the department, it is to be completed and signed *(either in hardcopy or electronically)* as a written 'risk assessment' for that item. Adapt an existing template to suit the piece of plant if a specific template is not available.

It is not adequate for the PERA (or any risk management process) to be completed and 'filed'. Staff are to be familiar with the content and understand how to utilise this in their activities.

All completed PERAs are to be monitored and reviewed annually or whenever there are staff changes or changes to the way in which the equipment is used. If all documented information regarding inherent risk levels, management requirements and any recommended control measures remains unchanged, then a PERA will remain current for five years.

4. Practical workspace environment

4.1 Maintaining a practical workspace environment

Workplace planning and machinery placement

The selection, procurement, placement and fit-out of machinery, plant and equipment will need to comply with manufacturer specifications, and departmental requirements and procedures.

The department has a supply arrangement for the purchase of a large range of fixed workshop equipment. It is mandatory to use Part A of the arrangement

The Design standards for DoE facilities includes information about building requirements such as electrical installations, flooring, ventilation, fixtures and lighting. This document is to be referred to for major refurbishments or new building projects

New hazards may be introduced with the introduction of new machinery, plant and equipment, or modifications to existing machinery or plant. Prior to new plant being installed a risk assessment is to be undertaken which includes the location of the plant and consideration of adjacent activities.

Safe work zones

Safe work zones around plant and machinery are to be clearly delineated. However, it is important to recognise that a yellow safety line is only a visual reminder of the safe work zone. Safe work zones form part of the broader workshop safety system (behaviour, skills, supervision) that creates a safe working environment.

The Design Standards require that safety lines are to be marked in workspaces however the size of the safe work zones are to be determined from equipment supplier information.

> There are no Australian Standards that regulate a 'Safe Work Zone' around plant and machinery, so the zone is to be based on the risk assessment of individual fixed items and their use.

Several companies listed in the supply arrangement provide useful fully dimensioned, 'Safe Working Area' diagrams for their equipment.

Safe working areas are to be regularly reviewed to ensure:

- correct proportion to equipment and task
- adequate space to manoeuvre materials during set up, working or clean-up to reduce the risk of awkward postures and forceful exertions
- lines/spaces are clearly delineated.

Storage and housekeeping

Workspaces require the adequate, safe and effective storage of equipment, supplies, project materials and student projects. Appropriate storage will assist to reduce clutter and associated risks in work areas and minimise manual handling risks when accessing projects and materials.

Effective housekeeping within the facility reduces risks and prevents issues including:

- slips and falls from dust or slippery products on the floor (slips and trips account for more than 40% of our incidents and compensation claims)
- trips and falls over projects, materials or offcuts
- wasting time looking for the correct tool or equipment because it has not been put away in the right location.

Review workspace conditions including lighting and flooring. Refer to section 11.3 for considerations when you are planning or reviewing your practical workspaces.

DoE, CHW – Preventing Slips, Trips and Falls

Australian Standards: AS 1428.1-2009 – Design for access and mobility

Environmental dust and dust extraction

Dust is an irritant that can cause personal discomfort and health problems, it can trigger allergic reactions resulting in occupational asthma, rhinitis or other forms of severe respiratory distress.

In Australia, all wood dust is classified as carcinogenic – Group 1 (liable to cause cancer). A detailed description of the health concerns associated with exposure to dust can be referenced at Hazardous dusts.

Further information can also be found in section 7.2 Wood dust and Toxic timbers.

Staff and students are at risk of breathing in fine wood dust when processing and preparing natural timbers, particle boards, medium density fibre boards (MDF) or laminated products, such as plywoods and beams. Dust can be generated by:

- sawing, routing, woodturning, sanding, drilling, grinding, welding, fibre glassing
- cleaning down with compressed air
- dry sweeping or cleaning of floors, surfaces or machinery
- repairing machines or during routine maintenance work

Control measures need to be in place to minimise the risk of exposure:

- Use timbers that are less likely to cause health issues (i.e. soft wood in preference to hardwood).
- Capture any loose waste and dust at the point of generation when using machinery and portable power tools. This is best achieved using vacuum or exhaust extraction systems specifically designed to fit the machine or equipment.
    - small dust particles in the air can form a mixture that will explode if ignited.
- Maintain a good housekeeping schedule. Surfaces such as floors, walls, machinery, the tops of storage cupboards, fans, filters and accessible ceiling cavities are to be free of dust accumulation.
    - An accumulation of dust in collection equipment will burn easily if ignited. Overheated motors or sparks can cause wood dust fires
- Don't use compressed air when cleaning machinery, this will put more dust into the air. Use wet clean-up methods such as wiping surfaces with a wet rag or use a vacuum cleaner with a high-efficiency particulate air (HEPA) filter.
- Always securely bag and seal wood dust waste and dispose of waste safely.
- If PPE is required in addition to dust extraction methods, an Australian Standard approved respirator is to be worn. If using non-disposable respirators, they are to be maintained regularly, cleaned and stored in an airtight container.

Respiratory protection needs to fit properly to provide protection. Find out more here: Workplace Health and Safety Queensland – Fit-testing and Fit checking for respirators.

- Maintain effective ventilation and monitoring. There are two commonly used control measures natural/diluted forced ventilation and mechanical ventilation.

Natural ventilation or diluted forced ventilation (using fans, open doors, roller doors to allow flow of air through the workspace) may be suitable in your setting when:

- the airborne contaminants comprise low- to moderately-toxic materials (or dusts) generated in smaller amounts (e.g. when using hand sanding processes)
- a few open windows, or an extracted air system that complies with Australian Standards AS 1668.2 can be used as a control measure
- ongoing monitoring of the effectiveness of the system and generation of dust is required (e.g. visual dust residue, dust in air).

Mechanical ventilation systems or Local exhaust ventilation (LEV) may also have applicability:

- Strongly recommended where airborne contaminants and finer wood dusts are generated in moderate to large quantities or comprise toxic materials.
- Situations where multiple equipment/processes are present
- Australian Standards AS 1668.2 can be referred to when considering the installation of a ducted or forced exhaust dust ventilation system.

Find more information here:

- Workplace Exposure Standard for Airborne Contaminants, Safe Work Australia
- Hazardous Dusts, Workplace Health and Safety Queensland

Infrastructure, services and fittings

Workshops will be of varying ages, designs and complexity in terms of the fittings, services and facilities provided at the time they were built.

Compliance with building codes is dependent on the age of the building and when it was initially approved under the respective version of the building code. At the time a building was approved it would have met the building code current at the time of construction. As codes change over time the building may be non-compliant with current applicable codes. This is a very standard situation when it comes to infrastructure and unless significant upgrades occur there is not a requirement to bring up existing buildings to the current code.

As a general guide if there is renovation / improvement to 40% of the building this will trigger current code compliance. This is a guide only and the final decision is stipulated by the building certifier. Refurbishments on existing infrastructure will typically include rectification of Disability Discrimination Act ingress / egress issues. Accessibility compliance will also be considered outside of infrastructure renovation/ improvements depending on student needs.

Information is available online; a valuable resource available to state schools is the Instructions for School Managed Facility Projects document available on One Portal.

Principals are to seek advice and assistance from their Regional Infrastructure team regarding renovations or refurbishments.

The infrastructure, fittings and services installed in a workshop require a systematic process to ensure ongoing proper and safe function is maintained.

Ensure any emergency or room gas and electricity shut-offs are regularly checked and working.

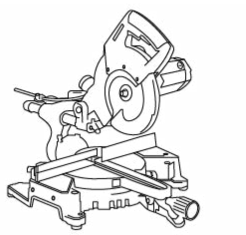
Emergency face and eyewash stations. Eyewash stations can be critical in the seconds after an incident. Refer to the chemical management guideline regarding requirements for regular checks.

4.2 Managing noise

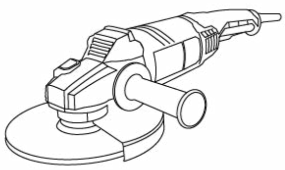
Hearing can be damaged by a one-time exposure to loud noise, or by repeated exposure to noise at various volume levels over an extended period.

Noise level is measured in decibel units (dB). The louder the noise, the less time you can safely listen to it. Sounds may be pleasant like music but if too loud can still damage your hearing.

Examples of decibel levels related to workshop equipment.



Compound mitre saw
Average noise level 120dB
Possible hearing damage after 5 sec



Angle grinder
Average noise level 110dB
Possible hearing damage after 64 sec

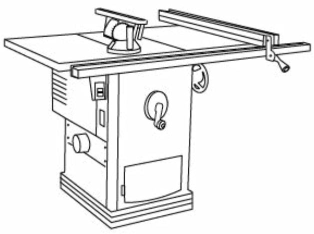
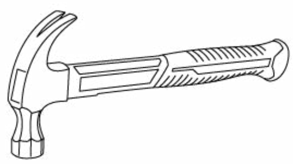
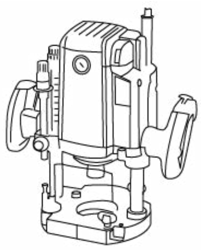


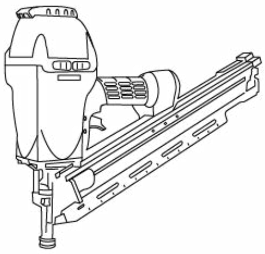
Table saw
Average noise level 105dB
Possible hearing damage after 6 sec



Hammering
Average noise level 115dB
Possible hearing damage after 28 sec

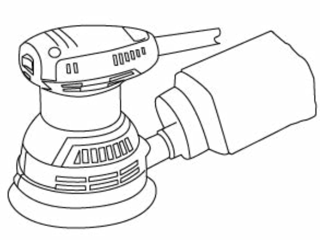


Router
Average noise level 95dB+
Possible hearing damage after 45 sec

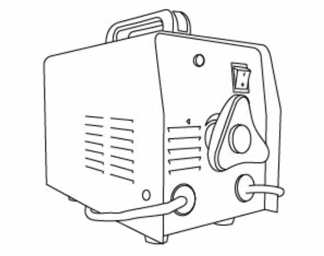


Nailing gun
Average noise level 95dB
Possible hearing damage after 45 sec

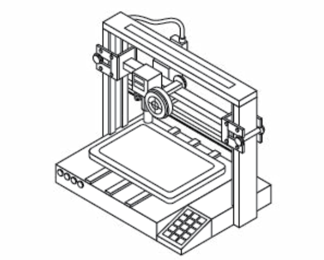
Battery drill
Average noise level 95dB
Possible hearing damage after 45 sec



Electric sander
Average noise level 95dB
Possible hearing damage after 45 sec



Arc welder
Average noise level 90dB
Possible hearing damage after 2 hrs



3D printer
Average noise level up to 90dB
Possible hearing damage after 2 hrs

Noise is considered excessive when you need to use a raised voice to be able to speak to someone at arm's length or about one metre away.

There are control measures that can be introduced to effectively manage noise, for example:

- research dB levels prior to purchasing equipment
- reducing noise at the source through motor encapsulation
- effective equipment maintenance.

However, in practical workspaces, personal hearing protection is often the most practical form of control measure to protect hearing. Hearing protection is to be worn:

- in all practical workspaces when noisy power tools and hand tools are in use
- when teachers and teacher aides are undertaking noisy preparation activities
- in any other circumstance where excess noise levels are a problem.

Hearing Conservation Program

ITD teachers and ITD teacher aides have been identified as being at risk of exposure to excessive noise and are therefore part of the department's Hearing Conservation Program. As part of the program, audiometric assessments (hearing tests) are conducted upon appointment to the department and at two yearly intervals. The assessment includes education and instruction regarding healthy hearing and PPE.

A detailed description of personal hearing protection can be referenced in Section 5.3 – Personal Protective Equipment – Hearing Protection.

Read the factsheets and review the current hearing protection in place for staff in your workshop. More information is available in the Useful links section.

4.3 Class sizes in practical workspaces

Practical workshop curriculum activities by their nature have inherent risks that require a greater level of supervision than theory classes.

A range of factors are to be assessed by teachers and school leadership teams in determining class sizes including:

- the requirements of the subject and the complexity of the activity
- inherent risk factors associated with plant and equipment used and processes undertaken in specific practical curriculum activities
- the composition of the class (e.g. student age, maturity, prior experience, educational background, and special/specific needs)
- the experience of the teacher and specific competency in delivering the practical components of the curriculum
- additional staffing factors, such as experience, expertise and availability of a trained teacher aide or special education teacher assistance, if required.
- the environment, including layout and capacity for supervision
- the supervision needs to deliver the subject effectively and provide a safe environment for the students and staff.

Curriculum Activity Risk Assessment (CARA)

Teachers and leadership teams are to refer to the Curriculum Activity Risk Assessment (CARA) procedure and associated guidelines to assess classroom risk and determine safe practices (including appropriate numbers of students for the class) in practical workshop environments. This includes:

- a CARA process (risk evaluation/risk assessment) undertaken for each practical workshop activity that they are intending to undertake
- an annual (or more frequent) review to assess and monitor all inherent risk levels identified.

If alternate class sizes are identified as a control strategy through the CARA process, the findings are to be presented for discussion and determination, via the school's usual processes, (e.g. via head of department) to the school leadership team.

Principals are responsible for ensuring that appropriate risk identification and risk management processes are implemented at their school for all curriculum areas. The CARA process is designed to support the appropriate assessment and approval of activities; this is of note for high or extreme risk CARA guidelines in practical activities.

Consultation is an important component of ensuring safe practice and a legislative requirement under the *Work Health and Safety Act 2011 (Part 5)*. Discussion between the leadership team and relevant staff about the issues and possible solutions is a sound practical approach.

Discussion and determination are to include:

- a sound knowledge of the inherent risks associated with curriculum activities
- an understanding of the range of control measures that can be used
- an ability to implement processes into the relevant curriculum context.
- alternate control options to manage the risks include:
- modifying the complexity of the proposed activity
- changing the environment or proposed workspace

- utilising a more experienced, more competent or more qualified ITD staff member
- temporarily suspending a particular subject offering from the ITD curriculum until such time as circumstances change.

Building and workshop design

The physical dimensions, layout, location of machines, number of work benches and fabrication areas will impact on the activities, student numbers and supervision for an activity within a practical workspace.

Architectural building plans will be available for newer schools. However, leadership teams will need to contact their Regional Infrastructure team for building plan information regarding the intended (designed) purpose of the facility. Discussion and advice may be required where there have been modifications from original designs.

ITD classrooms or practical workshops are considered a speciality space and have larger space per student requirement than general learning areas.

A general guideline for the appropriate workspace within a practical workshop is considered to be 5m2 per student though assessment of safe access to all machinery and facilities (ie.safe working zones) for tasks will also need consideration.

When considering the hazards and risks associated with designing, re-designing or conducting curriculum activity within a practical workshop the amount of space available must consider the Building Code of Australia and duties under health and safety legislation and fire and emergency legislation. Occupancy numbers based on these factors will assist in final class size determinations.

Principals are to seek advice from their Regional Infrastructure team regarding space provision in workshop areas and compliance with relevant legislation.

Certified agreement

Class size targets in Queensland state schools are outlined in the Department of Education State School Teachers' Certified Agreement 2019 (the Agreement). This industrial relations agreement commits the department to maximum class size targets for all Queensland secondary schools.

It is important that these targets are utilised appropriately. The Agreement does not prescribe class size limits. As with all practical classes, class size is to be based on the range of factors pertinent to that class and activity

5. Personal protective equipment PPE

Personal protective equipment (PPE) is designed to be worn by an individual to provide protection from an identified hazard. PPE is to be relevant to the hazard and will vary depending on the task (WHS Regulations, s44-47). Multiple items of PPE may be used for a task and PPE is to conform to the relevant Australian Standards.

Staff and students are to wear required PPE in accordance with any information, training or reasonable instruction. Instruction is to include an explanation of the PPE's function, why it is to be used, its proper use, and information on how to get a 'good fit' to make it as comfortable as possible. Involving staff in the selection of PPE will facilitate compliance.

Personal protective equipment (PPE) is an administrative control that does not reduce the risk to a person; it only acts as a physical barrier between the wearer and exposure to the hazard.

PPE relies completely on the user correctly wearing the PPE. Therefore, the use of PPE to manage health and safety risks is to occur:

- as a complementary practical control measures in designated workspaces.
- to supplement higher level control measures (as a back-up).
- as an interim measure until a more effective way of controlling the risk can be implemented.
- where it is a prescribed risk control (e.g. hearing protection when using machines).

Hazard	Risk	PPE
Gravity	falling objects, slipping, tripping, climbing, carrying, lifting objects	footwear, hard hats
Kinetic energy	cutting, crushing, pinching, flying, protruding or sharp objects	footwear, eye protection, aprons
Mechanical energy	crushing, pinching, moving or projected waste	protective eyewear and footwear
Sound (noise)	ringing in ears, temporary hearing loss, chronic long-term hearing damage	hearing protection: earmuffs or individually moulded ear plugs
Electrical	electrocution, electrical shock, sparks, burns, glare, welding arc UV 'flash burns' causing skin and eye damage	welding mask
Thermal energy	blisters, burns, scalding, splashes, spills, sparks	gloves, face shields
Chemicals and hazardous materials	splashes, burns, skin and eye irritation, dermatitis, respiratory, asthma, vapours, ingestion, poisoning	gloves, goggles, respiratory protection

What to do?

The following table lists the tasks that are needed to effectively implement the requirements for PPE in the practical workshops. While overall responsibility lies with the Principal/Manager, consultation with all staff involved in practical activities is necessary to ensure effective processes are established and maintained.

Task	Actions required
Select appropriate PPE to protect employees from workplace hazards	Consult with employees to determine suitable PPE: • Identify hazards and conduct risk assessments • Provide the required PPE (AS or equivalent compliant). Remember one size/ brand does not fit all. • Record the issue of PPE in the workplace PPE register • Develop and implement local policies to manage student PPE
Manage and supervise use	• Ensure employees/students know when PPE is to be worn and wear it correctly when required. • Develop and communicate proportionate management response to initial/ ongoing reports of employees failing to wear PPE when required. • Develop and implement local processes for PPE replacement and provision of student PPE (where applicable). • Display signage in areas where PPE is to be worn.
Maintain PPE	• Develop an inspection/maintenance program/schedule and identify responsible persons to ensure PPE is maintained, tested, repaired or replaced so that it is in good working order, safe, clean and hygienic. • Manage replacement of PPE (budget allocations, re- ordering etc.). • Record maintenance of PPE in the workplace Equipment Maintenance Register.
Provide training	Provide training to employees (and students where applicable): • Understand the types of PPE and which PPE is best for the task. • Select appropriate PPE for a variety of circumstances. • Understand what is needed for the proper use, care and replacement of PPE. • Communicate local processes for management of PPE including management response to non-wearing of required PPE.

Refer to Part B of this Guideline for further information related to the following PPE topics:

Footwear	Eye and face protection	Hearing protection
Hand protection	Welding protection	Clothing (body) protection

6. Machinery, plant and equipment

Machinery, plant and equipment (commonly called 'plant') includes any machinery, equipment, appliance, implement or tool, and any component, fitting or accessory used in, or in conjunction with them. In Queensland state schools, 'plant' refers to all workshop machines, handheld power tools, welding equipment, and extraction systems, and it is usually categorised into four sub-groups:

- non-portable or fixed machine tools, equipment and infrastructure
- portable power tools, including 240V, cordless (battery), pneumatic and explosive
- electrical appliances, equipment and computers
- hand tools.

In a school environment, any of these items of plant and equipment may pose a risk to the health and safety staff or students. This increased level of risk requires that robust procedures are in place to identify hazards and manage risks for all students in our school environments. Hazards include:

- moving or rotating parts and pulleys with risk of entanglement, cutting, amputation, scalping
- ejected materials causing lacerations, puncture wounds or eye injuries
- pinch and squash points causing bruising and crush injuries
- non-mechanical hazards such as emissions or fumes, dust, noise and electrocution.

Workplace Health and Safety Queensland (WHSQ) has identified that young workers (including school students) are much more likely to be injured than older experienced workers.

6.1 Managing plant and equipment

The management of plant is an essential component of a comprehensive and systematic approach to managing safety in the workshop environment. An effective approach involves the collaboration of principals, heads of department (HODs) and teachers.

Key factors for the safe management of plant include:

- Prior to purchasing, and as a condition of acceptance, all plant is checked for compliance with Australian Standards, and that appropriate information is provided with the item, such as operating and maintenance instructions.
- Fixed equipment is purchased in accordance with the supply arrangement
- All machinery is correctly installed and connected to the power supply prior to operation.
- Machines are fitted with appropriate guarding and safety devices.
- Plant/workshop has relevant waste/dust extraction equipment.
- Modifications are not made to plant unless this includes the rectification of identified hazard control measures, such as improved safety guarding, for safer operation. Any modifications are to comply with all relevant Australian Standards.
- All machines and equipment are regularly serviced and maintained in a safe operating condition.

- The Service Maintenance Program includes an annual condition check to fixed plant and equipment. Principals or HODs are to ensure the school is included in the program and any recommendations are reviewed for rectification.
- Machines designed to be operated in a fixed position are adequately secured to a stable supporting medium to prevent inadvertent movement when power is applied, or the machine is operated.
- All operational risks associated with any plant and equipment have been identified, assessed and controlled, and documented, for example:
  - Plant & Equipment Risk Assessment – PERA
  - safe operating procedures (SOPs) or instructions are fitted to or near all fixed machines and near where portable equipment is stored
  - equipment and maintenance records – EMRs.
- Staff and students have received an induction on each piece of plant prior to use. Students are engaged in sequential learning and staff are competent in plant use.
- All the identified appropriate PPE to be worn by staff and students, including regular, repetitive re-enforcement of PPE requirements.

For more information visit:

- DoE, PPR – Equipment management for schools
- DoE, Asset – Disposal/write-offs
- DoE, OneSchool asset stocktake

6.2 Designed safety controls and guards

Older equipment may not have all the safety features that are now included with newly purchased plant. Features to be considered when reviewing items of plant include:

- Controls and switches for power-driven, fixed machines to be in visible positions where they can be readily and conveniently reached by the operator.
- Starting controls designed and located to minimise the risk of inadvertent, mistaken or incorrect starting.
  - Start buttons shrouded or recessed and coloured green.
- Stopping controls (including emergency stops) readily and safely accessible to the operator:
  - stop buttons to protrude, be easy to locate, coloured red and clearly marked ‘stop’ on the button or as near to it as practicable.
  - access to stop buttons is to be given specific consideration if students with a disability are using the plant
  - multiple controls are of the ‘stop and lock-off’ type if a machine is designed to be operated or attended by more than one person. This ensures the machine cannot be restarted after a stop control has been used unless the stop control is physically/manually reset.
- Lockable, magnetic-control switchgear is recommended. This will also immediately cut power to the machine on loss of current to the workshop.
- The hazardous working parts of power-driven machinery and equipment to be safeguarded in accordance with the appropriate requirements of relevant standards issued by Standards Australia.

A formal lock out/tag out process is to be implemented if the guarding on a machine requires removal e.g. for the purposes of maintenance or cleaning. The guard/s are to be replaced before the machine is put back into normal operation.

- Other designed safeguards include installation of safety micro switches. These can be used with hinged covers and maintenance access doors. If inadvertently opened during normal machinery operation, a fitted safety micro switch isolates power supply to the motor causing the machine to stop.

More information can be found in Section 13.1 Safety devices.

6.3 Student use of machinery, plant and equipment

All items of plant and equipment will pose some risk to health and safety in any school.

- Plant and Equipment Risk Assessment templates for both fixed machinery and portable power tools have been prepared by the department and are available online. These risk assessment documents are designed to to assist the assessment of the risk levels inherent for each individual item when used in a specific way
- The hazards, risks and control measures of a curriculum activity (i.e. the risks associated with student interaction with the item of plant), are considered as part of the CARA process. (also refer also to Section 3.3 – 'Curriculum Activity Risk Assessment (CARA) process').

The following index is offered as guidance material only to help inform risk management decisions at your school.

The '**Student Usage Control Index**' *(refer below)* has been categorised into four levels of recommended control for student access and safe use. These levels have been evaluated based on the significant inherent risks associated with each item of plant or workshop process, and the likelihood of any student incident as a result of their access and usage under normal practical workshop conditions.

The four access levels referred to in the **Student Usage Control Index** are defined as follows:

LEVEL 1: Years 7–8	Students in Years 7 and 8 with limited exposure and experience.
LEVEL 2: Years 9–10	Students in Years 9 and 10 with regular exposure and proven levels of skill and experience. **PLUS** any inexperienced and insufficiently skilled students in Years 11 and 12 where individual assessment indicates support required.
LEVEL 3: Years 11–12	Students in Years 11 and 12 with regular workshop exposure and with proven levels of individual competence, experience and skill levels.
LEVEL 4: RESTRICTED	**Limited** to trained teachers/staff or Level 3 students working under close one-on-one supervision by a qualified trained ITD teacher

Student Usage Control Index

Level 1 – Years 7&8 **Level 2** – Years 9 &10 **Level 3** – Years 11&12

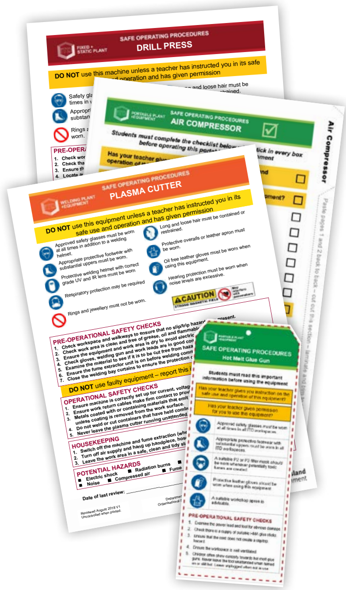
Fixed or non-portable plant and machinery	Level 1	Level 2	Level 3	Restricted
Air compressor (separately housed with fixed lines)		✓	✓	
Buffing machine, pedestal (or bench mounted)	✓	✓	✓	
Drill press, pedestal (or bench mounted)	✓	✓	✓	
Folder, light sheet metal	✓	✓	✓	
Folder, light sheet metal (electromagnetic)	✓	✓	✓	
Folder, pan brake, light sheet metal (manual < 1270mm)	✓	✓	✓	
Folder, press brake, heavy sheet metal (hydraulic < 40 ton)			✓	
Grinder, pedestal (or bench mounted)			✓	
• retrofitted with a linishing sander attachment			✓	
• retrofitted with wire brush wheels			✓	✓
Guillotine, heavy sheet metal (< 5mm, hydraulic < 40 ton)				✓
Guillotine, light sheet metal (< 1.6mm, manual)		✓	✓	
Hydraulic press (< 35 ton)		✓	✓	
Lathe, centre (metal turning)		✓	✓	
Lathe, wood copy			✓	
Lathe, wood turning (longbed and shortbed)		✓	✓	
Metal shears (sheet metal, bar and rods)		✓	✓	
Milling Machine (vertical and horizontal)			✓	
Mortiser, chisel		✓	✓	
Router, CNC table		✓	✓	
Sander, bobbin or vertical spindle	✓	✓	✓	
Sander, disc (<380 mm)	✓	✓	✓	
Sander, drum (variable speed, twin or single drum)		✓	✓	
Sander, linishing belt (<200 mm)	✓	✓	✓	
Saw, cold (metal cutting 300mm disc)			✓	
Saw, metal bandsaw (vertical or horizontal)			✓	
Saw, wood bandsaw (pedestal or bench mounted)		✓	✓	
Saw, panel (table, cabinet)				✓
Saw, power hacksaw		✓	✓	
Saw, radial arm				✓
Shaping machine			✓	
Spindle moulder			✓	✓
Surface planer or jointer				✓
Thicknesser			✓	
Combination fixed plant and machinery	**Level 1**	**Level 2**	**Level 3**	**Restricted**
Linishing sander and disc sander	✓	✓	✓	
Wood lathe with a 300mm disc sander			✓	

Portable power tools and machinery	Level 1	Level 2	Level 3	Restricted
Air compressor (small portable unit)		✓	✓	
Battery powered (cordless) angle grinders			✓	
Battery powered (cordless) drills and screwdrivers	✓	✓	✓	
Battery powered (cordless) laminate trimmer/router		✓	✓	
Battery powered (cordless, gas) nailing and framing gun >20mm			✓	
Battery powered (cordless) nailing and stapling gun <20mm		✓	✓	
Battery powered (cordless) planer			✓	
Battery powered (cordless) sanders	✓	✓	✓	
Battery powered (cordless) saw, circular			✓	✓
Biscuit jointer		✓	✓	
Blow former	✓	✓	✓	
Block and tackle (rope or chain)		✓	✓	
Concrete mixer (<120 Lt, electric)	✓	✓	✓	
Mortising machines (bench mounted)		✓	✓	
Dowell machine		✓	✓	
Dremel® rotary tools and attachments	✓	✓	✓	
Drill (AC Powered, <10mm chuck)	✓	✓	✓	
Explosive powered tools				✓
Grinder, angle (discs <115mm)			✓	
• with discs >115mm			✓	✓
• with wire brush attachments			✓	✓
• with wood carving attachments				✓
Hot air welder		✓	✓	
Hydraulic trolley jack		✓	✓	
Hot-wire poker (pyrograph)	✓	✓	✓	
Jackhammer (pneumatic or electric)			✓	✓
Metal nibbler		✓	✓	
Nail and framing gun (cordless gas, >20mm)			✓	✓
Nail and stapling gun (electric, <20mm)		✓	✓	
• Nail and stapling gun (electric, >20mm)			✓	✓
Nail and stapling gun (pneumatic, <20mm)		✓	✓	
• Nail and stapling gun (pneumatic, >20mm)			✓	✓
Oven, convection (for thermoplastics, etc. only)	✓	✓	✓	
Planer (electric, <90mm)			✓	
Router, laminate trimmer		✓	✓	
Router, palm		✓	✓	
Router, plunge			✓	
Router table (fixed or sliding – fitted with correct router)			✓	
Sander, belt		✓	✓	
Sander, orbital (random orbit)	✓	✓	✓	
Sander, sheet	✓	✓	✓	

Portable power tools and machinery	Level 1	Level 2	Level 3	Restricted
Saw, circular			✓	✓
Saw, metal cut off (300mm abrasive disc blade)			✓	
Saw, compound mitre (drop saw)			✓	✓
Saw, jigsaw		✓	✓	
Saw, scroll	✓	✓	✓	
Saw, wet table (tiles, stone and ceramics)			✓	
Sheet press (plastics) and granulator	✓	✓	✓	
Soldering iron, electric	✓	✓	✓	
Spray painting guns		✓	✓	
Strip heater/bender (acrylic, thermoplastics)	✓	✓	✓	
Vacuum former	✓	✓	✓	
CNC plant and machinery	**Level 1**	**Level 2**	**Level 3**	**Restricted**
CNC laser cutter/engraver	✓	✓	✓	
CNC mill and lathe		✓	✓	
CNC plasma cutter			✓	✓
CNC router		✓	✓	
CNC 3D printer/rapid prototyping	✓	✓	✓	
Welding applications and equipment	**Level 1**	**Level 2**	**Level 3**	**Restricted**
Brazing – fuel gas			✓	
MMAW or electric arc welding – manual, stick with VRD			✓	
MIG welding – portable, metal inert gas welding		✓	✓	
Oxy/acetylene cutting – fuel gas			✓	
Oxy/acetylene welding – fuel gas welding			✓	
Plasma cutting – portable, inverted air 40 amp			✓	
Spot welding – hand, portable, 240v (up to 2 mm)	✓	✓	✓	
Spot welding – pedestal, fixed, 415v 3Phase	✓	✓	✓	
TIG welding – tungsten inert gas (AC/DC high frequency)			✓	
Miscellaneous processes	**Level 1**	**Level 2**	**Level 3**	**Restricted**
Electro-plating (small 2-3 Lt bath)		✓	✓	
Powder coating (small booth)		✓	✓	
Solvent degreasing		✓	✓	
Glass reinforced plastics (fibre glass and MEKP catalyst)		✓	✓	
Glass reinforced plastics (sun cured UVC catalysts only)		✓	✓	
Resin casting and embedment (MEKP catalyst)		✓	✓	
Resin casting and embedment (sun cured UVC catalyst only)	✓	✓	✓	

Schools determine which students are permitted to access specific machinery, plant and equipment or processes based on the range of factors relevant to the student, activity, environment and workshop conditions.

6.4 Safe operating procedures (SOPs)



Safe operating procedures (SOPs) are documents that provide teachers and students with consistent and structured directions for the safe use of plant.

An extensive index of SOP documents for common plant found in most Queensland state schools is available here:

DoE, Equipment and machinery resources (SOPs EMRs & PERAs)

These SOPs are to be reviewed and amended by your school as relevant for the model/type of plant and local safety measures.

Ongoing review is to be scheduled e.g. at least annually or as changes are made to plant and equipment inventory, work processes or evolving curriculum requirements.

- SOPs for **fixed** or stationary machinery, plant and equipment have been available for some time in '**A4 poster**' format:
  - all fixed machinery SOPs are to be signed and dated
  - laminated and displayed prominently, close to the equipment where they can be seen readily by students and supervising teachers.
- SOPs for **portable** and cordless machines and power tools have also been developed by the department for use in schools. Three alternate formats are available including:
  - a small 'swing tag' that will attach with a cable tie to the electrical lead or the body of each portable power tool or machine. This tag will require folding, laminating, trimming to size and the fitting of a small brass grommet.
  - An A4 size 'checklist' that you can require students to complete (tick-box style) each time they use a medium to high-risk power tool, such as compressed air equipment, the compound mitre saw, the abrasive cut off saw or portable router table.
  - An A4-size 'poster' format that is very similar to the suite of fixed SOPs, and could be located where the portable power tools are usually stored or used.

6.5 Plant and Equipment Risk Assessments (PERA)

The Plant and Equipment Risk Assessments (PERA) templates provide a structured method to document the risk assessment process for individual types of equipment.

These templates utilise the elements of the four stages of risk management to outline how identified hazards and the related risks are managed and monitored. Actions recorded within these templates also direct the user to consider the hierarchy of control when deciding on appropriate control measures for the equipment being used.

Completing and maintaining PERAs together with SOPs and EMRs enables schools to demonstrate a sound and robust system for effectively managing machinery, plant and equipment.

Find out more about the importance of using and maintaining PERAs for machinery and equipment in the Managing plant and equipment in Industrial Technology and Design factsheet.

6.6 Equipment maintenance records (EMRs)

The Managing the risks of plant in the workplace Code of Practice 2021 provides detailed information on how to address specific issues related to the use of plant. Within the current Code, aspects of recordkeeping are outlined which require documents such as safe operating procedures (SOPs) and equipment maintenance records (EMRs) to be maintained and retained for the life of all fixed machinery, plant and equipment at the school.

In the event of an audit or an investigation into an incident involving plant it is likely that all EMRs, including any service, maintenance or repair documentation will be requested.

The department provides EMRs for a range of plant. The EMR layout is not mandatory but forms a baseline of information for local review and tailoring for the school's workshop practices. New EMRs can also be created from these templates for other plant.

EMR pages provide sample checks for each piece of fixed or non-portable equipment:

- **Maintenance record**: date, description of service, performed by, time taken, all costs, tagging details if required.
- **End of semester and annual checklist**: date, tick checked, any actions required. For more information, or if further guidance is required on EMRs in Queensland state schools, refer to the following links:
- DoE, Safety and hazard alerts
- DoE, Fact sheet – Using SOPs and EMRs in your school

6.7 Service maintenance and responsibilities

Servicing and maintenance are required to be undertaken on a regular basis to ensure that all equipment can function effectively, to maintain safety and to reduce the likelihood of expensive future maintenance and costly repairs.

> Be vigilant with identifying equipment related hazards and do not use equipment / machines if guards are broken, unsecured or missing.

The department has partnered with QBuild to manage the Service Maintenance Program (SMP) delivered to schools – except public private partnership (PPP) schools. This centrally managed program covers both statutory and recommended maintenance requirements.

Schools are to refer to the Asset Maintenance Strategy – reference guide (service maintenance) to identify assets included in the SMP. Where schools identify new, disposed or updated items of equipment, schools are to advise the department by completing and emailing a Plant and Equipment Registration Template to Central Office, Projects and Asset Management Systems (PAMS Team) at SAPPMInterface.FACILITIES@qed.qld.gov.au.

For more information, or if further guidance is required on service maintenance in Queensland state schools, refer to the following links:

- DoE, Service Maintenance
- DoE, Procedure– Equipment Management for Schools

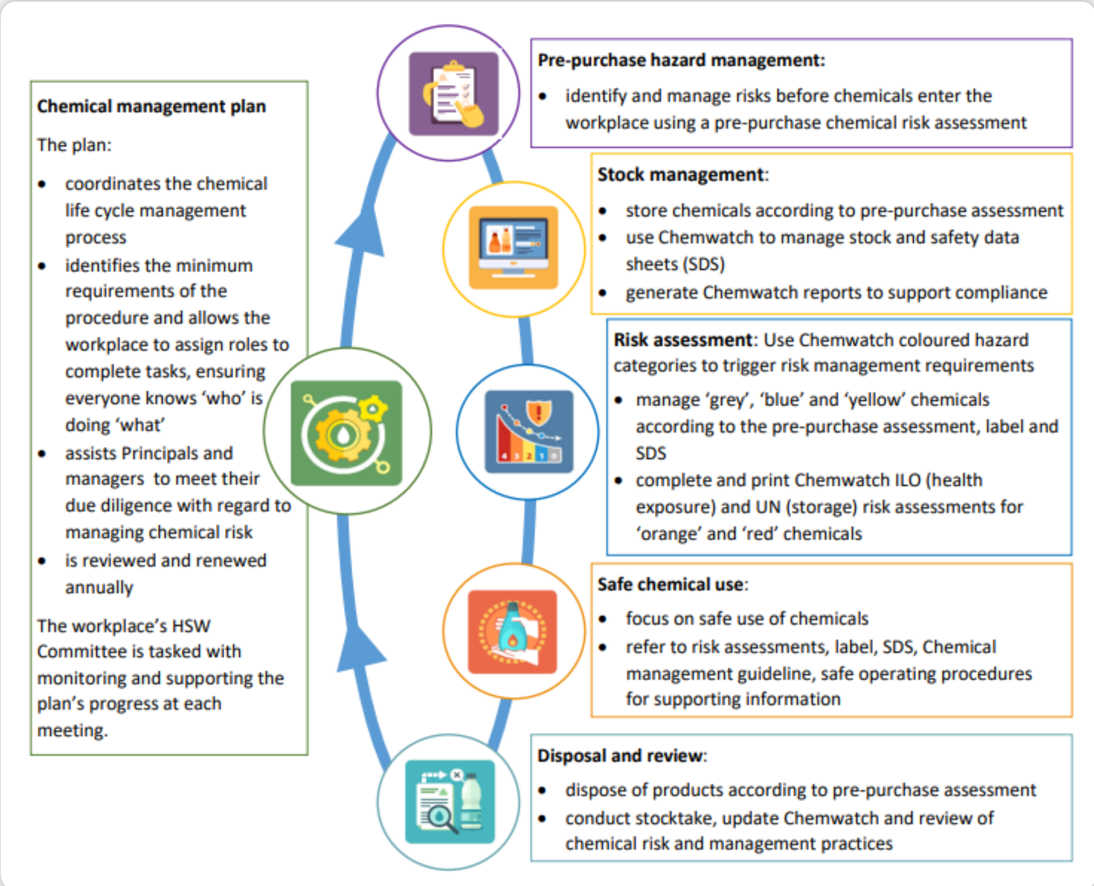
7. Chemicals and hazardous substances

Practical workshops may store and use a range of paints, solvents, compressed gases, adhesives, acids and other chemicals. These chemicals, whether classed as hazardous, non-hazardous, dangerous goods or waste products, pose a range of physical, health and environmental hazards that are to be managed.

To understand what needs to be done, who needs to do it and how to do it:

- Access the department's Chemical management procedure which provides clear processes you are to follow to manage these hazards.
  - The procedure uses a lifecycle approach to simplify chemical management from purchase to disposal (see diagram below) and lists the responsibilities and action needed to manage chemical risk appropriately.
  - a handy one-page summary is also available here: Flowchart: Chemical management system
- Your school is to have a chemical management plan that lists who is responsible for completing specific chemical management tasks – make sure you know if you are listed on this plan and what has to be done.
  - Ideally, staff that work in practical workspace areas are best placed to manage the chemicals in those areas because they know where the chemicals are stored, their hazards and what they are used for. If you are not listed, refer to the plan so you know who to ask for help or information.
- Complete a local 'chemical hazards' induction so you know where chemicals can be found in your work area, what the hazards are and how they are managed – your supervisor can help you with this. You should also find out if there are specific local management practices used in your work area to manage chemicals and their risks.
- Complete the Chemical management online course (departmental staff only) available through the Learning Place. Please ensure you use Microsoft Edge or Google Chrome as your browser for this course.
- Refer to the Chemical management guideline for practical support on how to implement the procedure and manage chemicals safely in your workplace.
  - Part 1 of the guideline describes how to manage chemicals and Part 2 provides information on the correct labelling, safe storage, handling, use and disposal of chemicals. Use the index as a quick-reference guide to find the information you need.
- Use the Pre-purchase chemical risk assessment before you buy a chemical to make sure the chemical is safe to use and you can manage any of its hazards.
- Use Chemwatch to manage stock, access a hazardous chemical register (and safety data sheets), conduct risk assessments and manage compliance.
- Access supporting resources and information and Hazards and Risks – to ensure you know how to work safely with chemicals.

Regular inspection of chemical storage areas helps to keep chemicals stored safely. Use the storage inspection checklist (appendix 2) in the Chemical Guideline to help.



7.2 Wood dust and toxic timbers

Wood dust can be defined as tiny particulates of wood produced during the processing and preparation of natural timbers, particle boards, medium density fibre boards (MDF) or laminated products such as plywoods and beams. The fine dust particulates released can very easily be inhaled. Teachers, staff and students are at risk of breathing in damaging fine wood dust particulates whenever timber is being handled or machined in any typical ITD workspace environment.

For example, wood dust can be a serious problem whenever an activity involves:

- sawing, routing, woodturning, drilling, and sanding
- cleaning down with compressed air
- dry sweeping of floors, walls, ceiling fans or machinery
- disturbing dust when repairing machines or during routine maintenance work.

7.2.1 Health concerns and symptoms

There are health concerns associated with even naturally occurring products like the timbers commonly used in ITD. Studies show that wood dust particulates are never to be considered as merely 'nuisance dust'. The majority of health concerns relate to the processing of timbers and the volumes of wood dust produced. The International Agency for Research on Cancer (IARC), as part of the World Health Organisation (WHO), has found that wood dust can be directly linked to some very serious health concerns. Exposure to wood dust from some of the commercially available native and imported species can often have a very devastating effect on individual workers.

The physical symptoms and the damaging health-related consequences of excessive exposure to wood dust in the workplace are many and varied:

- Allergic skin irritation, itching, dermatitis, eczema, urticarious (hives), eye irritation and inflammation
- Dust may also irritate the upper respiratory tract and cause sinus and rhinitis, throat irritations, shortness of breath, hoarseness and coughing, asthma, pneumonia, and even bronchitis. Chronic lung irritations may result in permanent wasting of the tissue
- The most sinister quality of wood dusts is that some may be carcinogenic (likely to cause cancer). Tannins and lignin-related compounds occur naturally in wood and are strongly believed to be carcinogenic. These are more abundant in hardwoods and Australian native hardwoods such as the Acacias and Eucalyptus species have high tannin contents
- The latent period for the onset of adenocarcinoma, (the most common cancerous condition caused by woodworking activities) is often 25 - 45 years.

In Australia all wood dust is now classified as carcinogenic (liable to cause cancer). Some timber species may also contain other biological or chemical contaminants in the wood sap, bark, leaves or roots or that have been applied, prior to commercial sale, as a CCA fungicide or insecticide.

To date, because of identified risks, there are two timber species that have been classified as totally unsuitable and are NOT to be used in Queensland schools for ITD woodworking: **Oleander or Rose Laurel** (Nerium oleander)
Western Red Cedar (Thuja plicata)

7.2.2 Toxic timbers

Some commonly used timbers may also contain other biological or chemical contaminants that either grow on the wood or have been applied as insecticides or finishing treatments. They might include:

- Moulds and fungi (spalted woods showing dark lines or discoloured streaks in the grain)
  - Common **spalted woods** are those which show decorative black lines or dark grain markings within the timber. This usually occurs in pale hardwoods such as maple, birch and beech. These markings can be regarded as a mould or fungal environment and, as such, can cause health problems such as serious lung diseases. They are to be worked and sanded only when wearing an appropriate, fit tested respirator. Be careful in selecting the species used for making kitchen utensils, food storage containers, or toys an infant might chew on, as heat, moisture and time stimulate the release of the toxins found in some of these timbers.
  - **'Bag-seasoned' timbers** (i.e. unfinished turning projects stored in plastic bags) may also generate a spore environment. This may promote sensitisation and result in allergic reactions.
- Glues and adhesives (such as formaldehyde)
- Resin binders, sealants and waterproofing compounds
- Pesticides and preservatives (CCA, ACQ, Cu Az, LOSP or PEC)
- Paints, lacquers, varnishes and strippers.
- Second hand or re-cycled wood products may have been previously coated with varnishes, lacquers, polishes, preservatives and other unknown chemicals. These may well cause serious harm to human health under some circumstances,

and ITD teachers are to be observant and aware that these unforeseen chemical hazards may be present.

Some of these substances can cause skin, eye and lung irritations, allergic reactions, and asthma. Schools are to be aware of the health hazards with these substances. Appropriate personal protective equipment based on the risk assessment is to be worn for the particular task (PPE) such as safety goggles, gloves, and hearing protection.

7.2.3 Managing the risks

The best protection from wood dust is to keep it out of the air in the first place by applying effective hazard control measures.

The most effective controls that will help minimise any health risks are:

- If possible, use timbers that are less likely to cause any health issues
- Minimise the generation of dust by operating woodworking machines inside an enclosure
- If possible, when using machines and portable power tools, capture any loose wood dust at the point of generation. This is best achieved using vacuum or exhaust extraction systems specifically designed to fit the machine or equipment
- Maintain effective natural ventilation
- Consider a professionally designed and installed, fully ducted, wood dust extraction and collection system for the entire woodworking workspaces. This will maintain maximum control over dust concentration levels throughout the facility.

Additional controls include:

- PPE is usually a final control option when other safety measures do not give enough protection. A long sleeve shirt will help protect the skin.

> Where it is decided that respiratory protection is required, it is necessary to ensure an effective fit to provide protection. Ensure respirators comply with relevant Australian Standards. Find out more here: Workplace Health and Safety Queensland – Fit-testing and Fit checking for respirators

- Be aware of how much dust is being produced. Teachers and students may need more protection when working wood at high speeds. Machine sanding causes more dust exposure than hand sanding because a larger area can be sanded in the same time
- Maintain a good housekeeping schedule. Keep surfaces and floors free of wood chips and dust to help prevent tripping or slipping
- Avoid using compressed air when cleaning machinery. This will simply put more dust into the air. Use wet clean-up methods such as wiping surfaces with a wet rag, or have the cleaning staff use a vacuum cleaner with a HEPA filter
- Always securely bag and seal wood dust waste, and dispose of waste safely
- Be aware that concentrations of small dust particles in the air can form a mixture that will explode if ignited. This type of situation may occur in dust collection equipment such as filter bags. Wood dust will also burn easily if ignited. Overheated motors or sparks can, and have, started wood dust fires in schools.

Part B – Resources

8. Sample safety resources

Warning Poster

A poster is an administrative reminder to students NOT to operate machinery and equipment in any practical workshop unless they have been assessed and given permission by their teacher.

For machinery, plant and equipment, students are to demonstrate knowledge, understanding and competent application of operational and safety procedures before being permitted to use a particular machine. This will be commensurate with the complexity and risk related to the equipment. The sample can be modified accordingly.

DO NOT OPERATE THIS MACHINE

unless you have demonstrated to your ITD teacher:

- **Correct method of starting and stopping the machine**
- **Knowledge of the location and use of all other controls**
- **Correct method of operating the machine**
- **Knowledge of potential hazards when using the machine**
- **Correct use and adjustment of guards and safety devices**
- **Recognising equipment faults or malfunctions that may cause harm**
- **Emergency action in case of a malfunction or injury**
- **Intended use of the machine and practices to be avoided**
- **Knowledge of protective clothing and equipment that is to be worn.**

Industrial Technology and Design Department
Example State High School

Mr I. M. Allthumbs, Head of Dept.

Sample message to parents for a student safety booklet.

Dear Parents/Carers of Design and Technology Students,

To ensure safe and quality education in the Design and Technology Department at Example High School we have implemented health and safety procedures that are aligned closely to those of Industry practices.

My letter to you today includes important safety information for you and Design and Technology students. Please take the time to read it.

Under the Work Health and Safety Act 2011 (Qld), everyone has a part to play to ensure safety is maintained. Teachers are obligated to provide students with a sound safety program, followed by informed instruction, workshop demonstrations and close supervision of safe working practices within all Design and Technology practical workspaces.

It is extremely important for parents to be aware that their child's actions also need to be safe for themselves and others around them. Unsafe actions unfortunately may result in a student being excluded from the Design and Technology practical workshop environment for a time.

Example SHS cannot allow any student that demonstrates the potential to injure themselves or others to actively participate in workshops. Our Design and Technology staff take comprehensive precautions to create the safest possible environment for all students. The Introduction to Workplace Safety booklet forms part of that process.

The Design and Technology department has developed several workshop safety rules and a range of consequences for breaches of these rules. A laminated poster listing our safety rules and their consequences is displayed in each classroom. Teacher instruction is provided to all students regarding our safe working environment and our culture of safety. Students are to become very familiar with their obligations regarding safety in Design and Technology.

CONSEQUENCES FOR SAFETY BREACHES

Depending upon the type and severity of the safety breach, consequences may include:

- A verbal warning: verbal warnings for minor breaches entail the teacher explaining to the student how they failed to meet their obligations
- Writing out the guidelines for safety and behaviour in Design and Technology
- The teacher contacting parents/carers either by phone or in writing which will require a parent's signature for acknowledgement
- The student may be required to complete a re-training program before returning to a workshop
- The student may be prohibited from using workshop facilities for a period of time determined by the subject coordinator or Head of Department
- The student may be prohibited from using practical Design and Technology workshop facilities indefinitely at Example SHS. Subject transfer arrangements would then need to be negotiated.

Finally, it is important to point out that students are required to complete a number of practical exercises for assessment and once completed they are permitted to take these items home. Parents and students need to be aware that these products are a result of an assessment exercise only. They do not and are never intended to conform to Australian Standards and therefore are to only be used with due care and consideration.

Should you have any further questions, we invite you to contact the school or the Design and Technology Head of Department.

Yours Sincerely.

....

Head of Department, Design and Technology **Principal**

Sample contract agreement

Some schools have introduced three-way student safety contract documents between teacher, student and parents/guardians. The contract outlines a number of requirements agreed to between student and teacher. It is signed by the student and their parent or guardian, signifying that they have each read and understood the safety contract conditions.

These contracts are not legal contracts. They are a mechanism by which teachers can demonstrate their duty of care by providing WHS information to all students. This enables parents to acknowledge their role and responsibility to help the school to provide a safe learning environment.

SAMPLE WORKSHOP SAFETY RULES

- Students are to complete their Safety Induction Booklet before being authorised to take part in practical lessons in the workshop.
- Students are to use only those tools and machinery that they have been taught to use by their teacher and, where applicable, only when they have been certified as being competent in their use.
- All tools and machinery are to be used correctly at all times.
- Workshop dress rules are to be complied with at all times in the workshop. These rules are outlined in the students' Safety Induction Booklet.
- Sensible and safe behaviour is to be observed at all times.
- Appropriate personal protective equipment (PPE) is to be worn at all times whenever in ITD workspaces. Strong, protective footwear covering the entire foot and safety glasses are considered the minimum requirement for any ITD practical workspace activity.
- Overalls and reinforced (steel-toe) safety boots are considered minimum requirements for engineering, metal fabrication and welding students.
- When machinery, plant and equipment are being used, students are to maintain a safe distance from the operator and not attempt to distract them in any way.
- Students are to remain outside the yellow safety lines unless they are using the machine.

SAMPLE STUDENT SAFETY CONTRACT

I______________________ (student) have read and understood the workshop safety rules and I agree to abide by them to the best of my ability. I am aware that if I breach these regulations I could be excluded from all ITD practical workshops for the safety of myself and others.

Student's signature: ____ Date: / /

I (parent/carer) have read and understood the workshop safety rules and agree to the enforcement of them for my child's safety. I am aware that if my child breaches the rules, my child could be excluded from all ITD practical workshops due to the danger they pose to themselves and others.

Parent's signature: ____ Date: / /

Sample parental/carer consent form – for high and extreme risk activities

Parental consent is required for some activities as part of the CARA process:

- Parental consent is recommended for risks designated as high
- Parental consent is mandated for risks designated as extreme.

Parental consent, including all relevant medical information for individual students, is to be obtained and recorded before permitting participation in the identified activities

Refer to the Managing risks in school curriculum activities procedure for further information.

The following is an example of a 'parental permission or consent form' designed to assist schools in ensuring the requirements of the Managing risks in school curriculum activities procedure for high and extreme risk activities are met.

This document could also be included in the student safety induction handbook issued to each student of each year level at the start of a new school semester or school year.

Dear parent/carer

Your child has elected to undertake study in at least one of the ITD Faculty practical subjects offered at Example State High School for 20xx. These courses require the students to be instructed on the use of a variety of materials and equipment in the production of their work. A number of typical resources and processes have been designated by the Department of Education to have a potential high or extreme risk of injury associated with their use.

As a requirement of our curriculum activity risk assessment process, for risks designated HIGH, and for risks designated **EXTREME**, our school is to obtain additional parental consent, including relevant medical information for students, before permitting them to use the ITD resources indicated below.

High risk: Oxy, MIG, TIG Welder, Metal & Wood Lathes, Bandsaw, Cold Saw, Power Hacksaw, Wall Saw, Circular Saw, Angle Grinders, Plunge Routers, Table Router, Electric Plane, Guillotine and Nailing Gun.

Extreme risk: Thickness, Spindle Moulder, Surface Planer, Compound Mitre (Drop) Saw, Table Saw, Radial Arm Saw, Metal Cutting Bandsaw, Metal Cut-off Saw.

Possible exposure to: Toxic Timbers and Wood Dusts including MDF and Formaldehyde, Plastics, Spray Painting Lacquers, Thinners and Solvents, Fiberglass and Resins, Oils, Compressed Air and Pneumatic Tools.

Students may choose not to use equipment they do not feel confident with. Similarly, students who do not demonstrate appropriate maturity or fail to complete safe operational training will be restricted in their use.

Subjects most likely to be utilising some or all of these resources and processes during 2022 are:

- **Years 10, 11 & 12** – Cert 1. Engineering, Cert 1. Construction, Furnishing Studies, Technology Studies.
- **Years 7, 8 & 9** – note: Junior practical workshop curriculum activities are designed to a modified structure, thus minimising exposure to all **high** and **extreme** risk plant and machinery. Students are, however, still likely to be exposed to some atmospheric wood dusts, lacquers, solvents and various plastics materials.

If you wish your child to participate in their selected subject, utilising the resources as identified, please complete the consent details on the form below.

I understand my child ____________________________is undertaking practical subjects which may involve the use of specific machinery, power tools and processes designated by the department as High or Extreme risk.

I DO / DO NOT give permission for my child to use processes designated **HIGH** risk.

I DO / DO NOT give permission for my child to use processes designated **EXTREME** risk.

Parent's signature:______________________________________ **Date**: / /

9.The four-step risk management process

A safe and healthy workplace does not happen by chance or guesswork. Firstly, think about what could go wrong at your workplace and what the consequences could be. Then determine and implement controls (in other words, whatever is 'reasonably practicable') to eliminate or minimise health and safety risks arising from the activity.

Step 1 – how to identify potential hazards

Look around the workplace and investigate what might cause you, your students or someone else, any harm or injury if you proceed with a particular activity or manufacturing process.

Hazards come in many forms. Some are common and easily identified, such as using power tools and machinery, tripping over timber, and using hazardous chemicals. Others may not be so easy to identify. Activities that are normally low risk become much riskier when they are done in a new or unusual way, such as, with junior students, with larger groups, for the first time, or in unfamiliar settings.

A range of processes can be used to support hazard identification (review incident records, checklists, observation, discussion).

Staff are to be alert to hazards during all activities and informal hazard identification is an important element to incorporate into the daily routine of staff/workshop practice.

However, routine, formal inspections of the workshops and work practices conducted regularly are also essential to demonstrate ongoing and systematic review. Scheduled inspections provide an opportunity for a thorough check and can be very effective if a person less familiar with the workshop completes the check as they may see new issues.

When new procedures or equipment are introduced or if there are changes to the physical workspace environment, a thorough hazard identification is to be conducted.

> Remember all stages of the risk management process are embedded in the CARA procedure. Your findings in the risk management process are to be reflected in your CARA documents.

Step 2 – how to assess the risks

A risk assessment involves considering what could happen if someone is exposed to a hazard and the likelihood of harm happening. A risk assessment can help you determine:

- how severe is the risk?
- whether any existing control measures are effective
- what action to be taken to control the risk
- how urgently the action needs to be taken.

Note: Curriculum activity risk assessment is required when conducting curriculum activities. Refer to Managing risks in school curriculum activities procedure and the CARA webpage.

Step 3 – Control the risks

Identify the range of effective control measures that could be implemented. Ensure these match the hazards and risks identified.

Decide which ones are going to be implemented – it may be a combination of controls. Controls need to be considered in relation to the hierarchy of control to ensure the most effective control is being implemented.

Implement the control as identified; there is no value in conducting a robust risk management process and not implementing the recommended controls.

Implementing the control may include communication of new processes or training. Ensure people involved in the work understand the new controls and why they have been implemented. Ideally, they will have been involved in the process to ensure it is a practical solution.

Step 4 – Review the controls

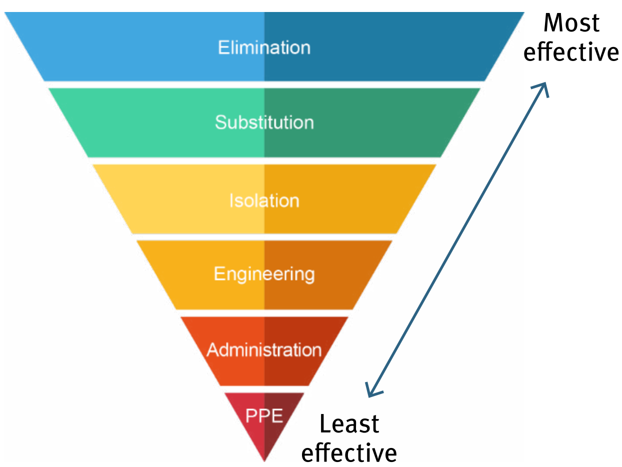
This is to check that the controls are working and if any new hazards have been introduced. A review can be done in a range of ways – observation (are people using the new process or finding a short cut?) discussion or feedback …

Review is essential in this cyclical process. It doesn't always work perfectly the first time!

10.The hierarchy of risk control

The hierarchy of risk control (or hierarchy of control) is the ranking of ways to control risks from the highest level of protection and reliability to the lowest.

The WHS Regulations requires the hierarchy to be used in the determination of controls to manage risks in practical activities. This means the most effective control measure, which is to eliminate a hazard is to be considered first. If this is not reasonably practicable to do this then the risks are to be minimised by working through the other alternatives in the hierarchy.



10.1. Levels of control measures

Level 1 control measures

The most effective control measure involves eliminating the hazard and associated risk. The best way to do this is by, firstly, not introducing the hazard into the workplace. For example, you can eliminate the risk of a fall from height by doing the work at ground level or not purchasing a particular chemical.

Eliminating hazards is often cheaper and more practical to achieve at the design or planning stage of a product, process or place used for work. In these early phases, there is greater scope to design out hazards or incorporate risk control measures that are compatible with the original design and functional requirements. For example, a noisy machine could be designed and built to produce as little noise as possible, which is more effective than providing workers with personal hearing protectors. As a purchaser, buying equipment with reduced noise emissions may eliminate noise issues.

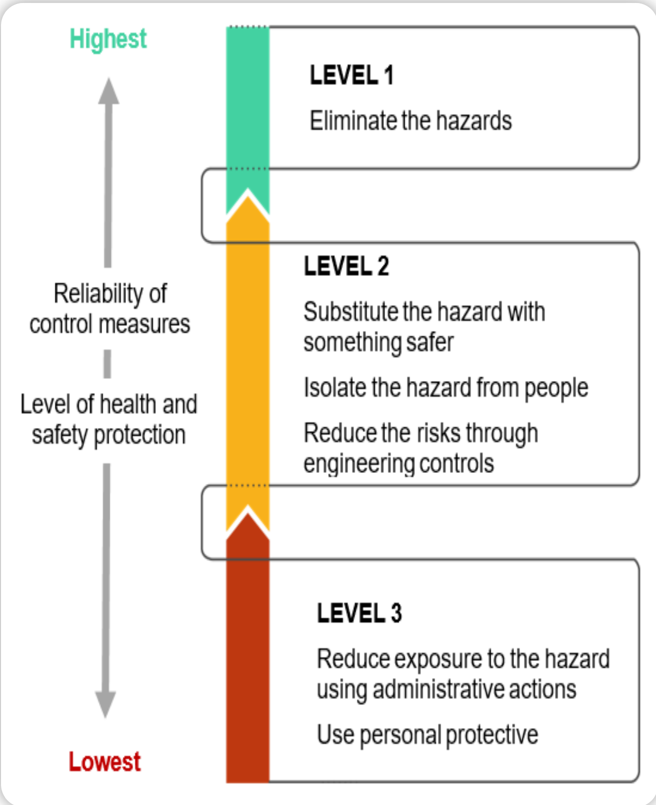
You can also eliminate risks by removing the hazard completely, for example, by removing trip hazards on the floor or disposing of unwanted chemicals.

It may not be possible to eliminate a hazard if doing so means that you cannot make the end product or deliver the service. If you cannot eliminate the hazard, then eliminate as many of the risks associated with the hazard as possible.

Level 2 control measures

If it is not reasonably practicable to eliminate the hazards and associated risks, minimise the risks using one or more of the following approaches:

- **substitute** the hazard with something safer e.g. replace solvent-based paints with water-based ones
- **isolate** the hazard from people. This involves physically separating the source of harm from people by distance or using barriers. For instance, install a guard rail behind the manually operated guillotine; or providing a fixed guard over a pulley assembly.
- **use engineering controls** – an engineering control is a control measure that is physical in nature, including a mechanical device or process, e.g. use mechanical devices such as trolleys or hoists to move heavy loads; place guards around moving parts of machinery; install residual current devices (electrical safety switches) in all electrical switch boards, in all practical workspaces.



Level 3 control measures

These control measures do not control the hazard at the source. They rely on human behaviour and supervision, and used on their own, tend to be least effective in minimising risks. Two approaches to reduce risk in this way are:

- use administrative controls – administrative controls are work methods or procedures that are designed to minimise exposure to a hazard, e.g. develop procedures on how to operate machinery safely, limit exposure time to a hazardous task, and use signage to warn people of a hazard paint yellow 'safe working zone' lines on the floor around all fixed plant and machinery.
- use personal protective equipment (PPE) – administrative controls and PPE is only to be used:
  - when there are no other practical control measures available (as a last resort)
  - as an interim measure until a more effective way of controlling the risk can be used
  - to supplement higher level control measures (as a back-up).

11. Workspace design and signage

There are many safety signs that can be found in the workplace. Each workplace will have different signs depending on the environment.

11.1 Classifications and usage

Safety signage is generally classified according to specific function:

1. regulatory and mandatory signs
2. hazard and danger signs
3. information, instructional and emergency signs
4. fire equipment and services signs

Safety signs are to always be used in accordance with recognised Australian Standards – AS1319:1994.

Workplace safety signage for practical workspaces is to be:

- Displayed in all areas where it has been determined that mandatory PPE is required due to the perceived risks associated with any curriculum activity, general departmental workshop processes or associated environmental hazards
- Located prominently in specific work areas, at eye level and always in a well-lit position so they are clearly visible to all approaching staff, students and visitors
- Located ahead of the hazard to allow time for approaching persons to heed the warning
- Worded simply, precisely, and where possible, positively expressed
- Sized appropriately so that the safety messages are legible and clearly evident
- Coloured predominantly using the standard colours reserved for specific classifications of signs. Standard sign colours are RED, YELLOW, BLUE and GREEN.

As with other items, signs age and deteriorate. Include signage as part of the regular review of your workshop areas. Replace signs when they are discolouring or becoming difficult to read.

Regulatory and mandatory signs

- **Mandatory signs** indicate that the message, usually depicting the use of personal protective equipment (PPE), are to be followed. These signs usually incorporate a white symbol within a blue disk. Usually contained within the message is the word MUST.
- **Prohibition signs** indicate actions or activities that are NOT permitted. These signs usually incorporate a white background with a red annulus (circle) and slash symbol.
  - Australian Standards – AS1319:1994 – Safety signs for occupational environment

Hazard, caution and danger signs

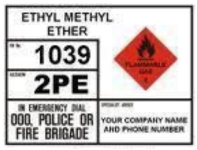
- **Hazard warning and caution signs** indicate that care is necessary because of possible dangers or to warn of unsafe practices. These signs usually incorporate a yellow equilateral triangle within a black enclosure.

- **Danger signs** warn of specific immediate or existing hazards. These signs usually incorporate the word DANGER in white letters on a red oval within a black background.
  - Australian Standards - AS1319: 1994 – Safety signs for occupational environment

- **Dangerous goods code signs** refer to the Australian Dangerous Goods Code (ADG7). Dangerous goods have specific transport requirements and are to be stored safely according to the AS separation and segregation advisory. Refer to appendices 7 and 9 in the Chemical management guideline.

- **Hazard pictograms** refer to the visual warning symbols of the Globally Harmonised System (GHS) for the classification and labelling of Chemicals. These symbols are to appear on all chemical substance labelling, re-labelling and all SDS (if required).
  - WHSQ – Globally harmonised system (GHS)

- **HAZCHEM** signs include a three digit, alphanumeric code, usually displayed only when transporting or storing larger qualities of any hazardous chemical or substance. This signage provides all initial emergency response information.
  - WHSQ – Placarding for storage of hazardous chemicals



Information, instructional and emergency signs

- **Disability information signs** indicate access or facilities for disabled, less mobile or visually impaired people: They are often blue and white in colour.
- There are a range of Australian Standards as referenced in the Disability Transport Standards (under the Disability Discrimination Act 1992)

- **Emergency information signs** indicate the location of first aid equipment, safety devices, emergency exits, etc. These signs usually incorporate a green rectangle with a white symbol and text within a white enclosure.
  - Australian Standards – AS1319:1994 – Safety signs for occupational environment

- **Information or notice signs** indicate such facilities as the Office, Parking, Teacher Only areas, etc. Although these signs are not regulated by an Australian Standard, they are produced here due to popular demand. They mainly convey information of a general nature.

Fire equipment and services signs

- **Fire equipment and services signs** indicate the location of fire extinguishers, fire blankets and hose reels, etc. These signs usually incorporate a white legend and border within a red rectangle.
  - Australian Standards - AS1319:1994 – Safety signs for occupational environment

11.2 Workplace safety colour codes

Standardised colours and shapes have been designed to attract attention. Australian Standards advise that particular 'Safety Colours' are part of incident prevention strategies and control measures.

- Australian Standards AS1345: 1995 – Identification of Piping, Conduits & Ducts
- Australian Standards AS2700: 2011 – Colour Standards for General Purposes

Standard safety colour codes can be used to discern physical hazards and identify risk management controls on and around machinery, plant and equipment. They are also used to clearly identify the contents of piping, conduits and ducts present in departmental work environments.

While safety signs and workshop colour coding is valuable in the warning of hazards, they are never to be considered a substitute for eliminating or reducing those hazards.

Some of the messages that safety colour codes are intended to communicate are:

- **Red** R13 (safety red) – conveys **Danger** or **Beware** such as:
  - flashing red lights signifying that an immediate danger exists
  - the location of fire protection equipment such alarms, hoses and extinguishers
  - electrical stop buttons or emergency stop controls
  - containers of flammable liquids
  - the possible presence of excessive heat such as hot surfaces
  - fire safety equipment – hose reels, blankets, extinguishers, etc.
- **Yellow** Y15 (sunflower yellow) – conveys **Hazard**, **Caution** or **Attention** such as:
  - the lines painted on the floor around fixed machinery clearly drawing attention to the hazard and delineating a 'safe working area' for the operator. 80mm wide solid colour bright sunflower yellow lines are ideal, (or bright yellow with black 45º stripes)
  - the interior of a machinery safety guard is to be painted yellow
  - drawing attention to fixtures or low beams which might be accidentally struck
- **Yellow** Y14 (golden yellow) – ionizing radiation hazards exist.
- **Orange** X15 (light orange) – conveys **Electrical Safety** such as electrical conduits.
- **Blue** B23 (bright blue) – conveys information of a **general** nature in places and on subjects such as:
  - toilets, wash rooms, entrances, admin office, storerooms, etc.
  - disability access
  - mandatory PPE guidelines
- **Blue** B24 (mid-blue) – potable or fresh drinking water
- **Purple** P24/23 (jacaranda/lilac) – denotes service pipes for treated recycled water
- **Green** G21 (jade) – conveys **safety** generally and indicates the location of devices, equipment and resources such as:
  - start buttons on machinery, plant and equipment
  - first aid cabinets, respiratory and revival equipment, school nurse's station (sick bay)
  - exit signs and emergency evacuation route.

11.3 Practical workspace environments – planning considerations

The following information can be used when planning or reviewing practical workspace environments.

Layout

- Avoid congestion around the machinery.
- Identify and define anticipated busy traffic areas i.e. the regular movements of staff, students and materials
- Safe working areas around fixed machines are to be identified and clearly delineated.
- Consider the normal operation of equipment including the length or overall dimensions of all materials likely to be machined. Table saws, for example, require large floor space allocation to comfortably accommodate full sheets of plywood and longer lengths of timber to be able to safely 'feed in' and 'tail out' without any interference and obstruction
- Plan routine cleaning and maintenance to eliminate or minimise the necessity for awkward postures, especially combined with forceful actions.
- Workspace planning (including appropriate signage) is to allow for a quick and efficient exit in case of fire or other emergency.
- If it can be avoided, do not locate fixed machinery that are closely adjoining (particularly back-to- back) in the centre of a workspace. Screening guards are to be erected if no alternative arrangements can be found.
- Consider the waste materials that will be generated and the ease of connection of machinery to waste (dust) extraction or any integrated ducting within the workspace
- Consider painting or defining all items of equipment that might protrude, such as bench vices or guard rails, to alert workshop users to pass with caution

Electrical

- Review the condition and functioning of emergency stops buttons, direct-on-line (DOL) switches and micro cut-offs switches for machinery items in the workspace

When planning new or refurbished workspaces:

- Consider if any particular items of heavy-duty fixed plant or machinery will require electrical connectivity to a 415 V – 3 phase power supply
- Hard-wiring of electrically powered fixed plant and machinery can help minimise electrical safety hazards.
- Identify the location and height for wall mounted isolating switches for fixed machinery items
- Plan the location of all wall mounted and suspended 240v power outlets of power tools.

Storage

- Ensure safe and easy access student projects e.g. if possible - avoid storing projects under workbenches and on top of cupboards. Do not stack in a corner of the room restrict or separate from general materials storerooms
- Store sharp and heavy projects at a low level

- Unused project materials either need to be disposed of or stored appropriately if they are to be recycled and reused
- Mezzanine or elevated storage areas are to be carefully planned and considered. A safety audit is to be completed and approval sought before any construction
- Ensure where 'module-style' storage units are used that they are securely assembled and fixed to walls
- Store overalls and aprons away to minimise further attraction of dust and metal filings etc.

Housekeeping

- Students encouraged to place all rubbish from their particular practical activities directly into a waste bin at the conclusion of each session
- Furniture such as portable workstations and benches regularly checked for practical suitability, structural soundness and maintenance issues
- Keep floors clean as they can become slippery when any rubbish is 'left for the cleaners'
- Check for any leaks of fluid on to the floor from activities or machines, etc.
- Don't allow poor drainage to cause pooling of fluids such as waste water
- Clean up any spills of chemicals and hazardous materials

Access ways

- Exits from buildings and other work areas signed and access to them kept clear of obstructions
- Fire extinguishers of the correct type readily available and suitably signed – preferably small models for ease of handling, with staff trained in their use.
- Be aware of any floor surface transitions that are sudden or not easily noticed, including transitions or joins to theory rooms with trip hazards such as loose tiles etc
- Highlight any isolated low steps that might become an unexpected tripping point.
- Maintain all painted anti-slip floor areas, coating profiles and yellow safety lines as they may be become worn, damaged and ineffective.
- Review the use of safety signs and marked safety zones in and around workspaces.

> Some signage in workshop areas are mandated in building and fire regulations or Australian standards. Ensure compliance is maintained if there are design or layout changes to workshops or access ways.

Workspace conditions

- Manage airborne dust from wood machining and monitor and maintain dust collection systems to reduce fire risk
- Control other environmental volatile fumes and vapours including in storage areas
- Control noise from various machines, plant and equipment, or the amplified percussion sounds from the use of hand tools

- Ensure adequate and consistent lighting for the task being undertaken e.g. fine work at electronics workstations.
- Identify and rectify where possible shadowy areas and glare which can lead to trips, falls and other injuries.
- Paint practical workspace walls a light colour in order to maximise available light reflection.
- Plan to maximise natural lighting. Make full use of daylight coming in through windows, doors or skylights. If possible position workstations near windows and areas where natural sunlight is available.

12. Personal protective equipment (PPE)

12.1 Foot protection

Appropriate footwear is important to prevent toe and foot injuries through risks of:

- crushing, fractures and bruising from heavy falling objects, or kicking objects
- penetration wounds and cuts from sharp hand tools falling from work benches
- exposure to hot liquids and solids or hot sparks when welding
- burns from chemical spills
- slipping, tripping or serious falls when footwear is insecure or improperly fitted.

Relevant standard: AS 2210.5:2019 Personal protective equipment Occupational footwear

The implementation of 'appropriate' footwear can present challenges for practical workshops. The uniform for each state school is agreed upon in consultation with the school community. The standards of footwear required for practical activities are to be incorporated into the school uniform policy.

Teachers can set a positive example for students through their own appearance and attire. For example, modelling equivalent and appropriate work safe clothing and leather footwear in all practical workspaces and classrooms where students have been instructed to do likewise.

Footwear examples in practical workspaces:

- Footwear such as thongs, open-weave shoes, or shoes with openings at toes or heels, platforms, or high-heels are not to be worn in workshop areas
- Fully enclosed, robust sports shoes may be considered the minimum appropriate footwear when working on electronics projects for example. Students would not be operating any heavy machinery, or be using heavy materials, but be primarily engaged with using minor hand tools, electronics components and operating from a student work bench.
- Fully enclosed school shoes or similar protective footwear of substantial construction with a sturdy sole and in good condition may be the minimum footwear considered appropriate to be worn in a general woodworking or light metalwork fabrication activity.

- Students engaged in curriculum activities where specific workplace risks are high to extreme, will be required to wear substantial footwear protection (i.e. safety boots).
- Steel reinforced (steel-toe) safety boots protect feet from common machinery hazards such as falling or rolling objects, cuts and punctures. The toe box and insole are steel-reinforced, and steel, aluminium or plastic materials protect the instep. Some safety boots also insulate against temperature extremes and may be equipped with special rubber soles to guard against slips, chemicals and electrical hazards such as welding.
  - An assessment as to when steel-capped boots are to be worn will be dependent on the tasks to be undertaken. Often students involved in industry work experience will also be required to wear steel-capped boots when visiting an external workplace.

Frequently asked questions regarding appropriate footwear for practical workspaces

Question 1: Can a parent insist that their child be allowed to wear soft, non-substantial, non-compliant shoes in a workshop and write a note to the school accepting responsibility if something should happen to the child?

Answer: No. The PPE requirements in practical workspaces are control strategies and non-negotiable. A parent signing a disclaimer provides no protection for the teacher or the department.

The PPE requirement will be confirmed through the CARA guidelines completed for the activity and is to be a condition of entry into any practical workspace.

A teacher or principal who knowingly permits students to enter practical workspaces without the necessary PPE is failing to follow their own risk management strategy and may be subject to enforcement action should an incident occur.

Question 2: What if the parent then provides a medical certificate indicating that this student has a medical condition and cannot wear any kind of sturdy, protective, PPE-compliant footwear? Does this medical certificate override legislation and allow beach sandals or casual canvas footwear to be worn in practical workspaces until the medical condition improves?

Answer: No. A medical certificate does not override WHS legislation. If a student presented with a medical certificate that says the student cannot wear appropriate protective shoes, then the school would have to undertake a Curriculum Activity Risk Assessment to implement strategies to control the potential or evident risk posed.

Question 3: What about the student who occasionally neglects to wear appropriate shoes for the practical workshop activities they are timetabled for?

Answer: A fair and reasonable approach is to then be taken.

It is generally accepted that students not having the appropriate footwear on a particular day may enter a practical workspace and complete safe learning activities (e.g. theory) separate from the main body of students, providing they can be closely supervised and do not participate in any practical work. This is entirely governed by the diligent duty of care discretion of the teacher in charge, the head of department and any pre-determined non-compliance policy in regard to PPE.

Where a student is seeking a more permanent exemption from wearing the right footwear, then it *cannot* be considered to be safe or appropriate.

Managing safety in a practical workspace is an ongoing process. Proactive risk management will establish the rules and safety standards to be maintained – such as the wearing of correct PPE. It is important that students and their parents understand these rules and standards, and that the minimum standards are always maintained.

12.2 Eye and face protection and managing long hair

Eye and face PPE can protect from dust, projectiles and splashes both from the activity being worked on and adjacent tasks.

Relevant standard: Australian Standards: AS/NZS 1336: 2014 – Eye and face protection

Considerations for the selection and purchase of suitable eye, face and hair protection include:

- The nature of the risk to the eyes or face (i.e. impact from flying objects, chemical splash, irritant or corrosive vapour, heat, welder's flash, UV protection or general irritation to eyes such as dust).
- The work conditions (i.e. indoors or outdoors, are side shields required).
- The personal preference of the wearer (i.e. wrap around, tinted or clear).
- The condition of operator's eyesight (i.e. need to be worn over glasses).
- Plastic generally has a higher resistance to breakage from sharp objects and hot materials, while glass has a higher abrasion and scratch resistance.
- Goggles provide a more reliable seal to keep products out of the sensitive eye area and are useful for protection against chemical splash, dust or vapour.
- Face shields are appropriate when the entire face needs protection (e.g. during activities where the worker may be welding or exposed to other burn types, or chemicals that are a skin irritant)

Maintenance of safety glasses and goggles

Refer to the manufacturers' instructions for the glasses and goggles you have in use. Establish and employ a schedule (e.g. checking for damage, cleaning) for all PPE used in the workspace, including for safety glasses and goggles.

Managing long hair

Loose hair poses a significant entanglement hazard around machinery which can cause scalping and other serious injury. Hair nets are not mandatory in state school practical activities. It is mandatory that controls are put in place to manage identified hazards and risks.

- Longer or uncontrolled hair is to be securely confined close to the head whenever a person works or passes near the moving parts of any machinery.
- Hair can be secured with hair band, rubber band, a hair net or a close-fitting cap (worn backwards).
- Ponytails are also to be tied up and contained so that they cannot fall forward, sideways or backwards into the moving, rotating parts of any machinery.

12.3 Hearing protection

Hearing protection is to be adopted to prevent hearing damage.

Relevant standard: AS/NZS 1269.3:2005 (R2016) – Occupational noise management

Hearing protection is to be worn:

- in all practical activities when noisy power tools and hand tools are in use
- when teachers and teacher aides are undertaking noisy preparation activities
- in any other circumstance where excess noise levels are a problem.

Earmuffs

Earmuffs are to be rated at Class 5 (for exposure up to 110dB) and be Australian Standard approved. Earmuffs are preferred over earplugs, because:

- they always provide a higher level of protection
- earplugs are difficult to insert accurately – the wearer never gets the advertised protection
- it is easier to detect if students/staff are wearing them
- when inserted with dirty hands earplugs may cause ear infections.

Noise-cancelling earmuffs

This form of earmuff reduces background noise in the workshop environment enabling the teacher to continue to wear their earmuffs but also communicate with students without having to remove their earmuffs to talk.

Individually moulded earplugs

Individually moulded earplugs are made by an audiologist who takes an impression of the wearer's ear and manufactures the earplugs to fit only the individual wearer. The benefits are a superior fit and comfort in the heat compared to the clamp force of earmuffs upon the head. They are attenuated to enable the wearer to hold conversations in noisy environments without having to remove the earplugs.

Earmuff and earplug maintenance

Refer to the manufacturers' instructions for the earmuffs and earplugs you have in use. Establish and employ a schedule (e.g. checking for damage, cleaning) for all PPE used in the workspace, including for all earmuffs and earplugs.

12.4 Hand protection

The risk of injury to hands is high in a practical workshop and the relevant hand protection is to be adopted to minimise the risk.

Relevant standard: AS/NZS 2161.1: 2016 – Occupational Protective Glove Selection – 1

Considerations for the selection and purchase of suitable hand protection:

- The nature of the risk to the hands and arms based on the activity (e.g. exposure to extreme heat, mild heat, chemical burns, sharp objects causing cuts or scratches, pinching and various fluids).

- Gloves that might be suitable for one application may not be suitable for another:
- Are the gloves made of suitable material to give the required protection? (e.g. PVC, latex, nitrile, rubber and leather)
  - Refer to the relevant safety data sheet (SDS) as some gloves may dissolve upon contact with particular solvents and cause harm to the wearer.
- The extent of hand and arm protection required (the glove length).
- The level of manual dexterity required.
- Are the gloves of a suitable style and fit?
- Are they disposable (single use), or reusable?

Note: thermal protective gloves, when required, are to be worn on BOTH hands to prevent accidental handling of hot materials.

Hand protection maintenance

Refer to the manufacturer's instructions for the hand protection equipment you have in use. Establish and employ a schedule (e.g. checking for damage, cleaning) for all PPE used in the workspace, including all hand protection.

12.5 Clothing (body) protection

There is a wide range of protective clothing available to offer protection in different circumstances. It's important to get your selection right.

Relevant standards: AS/NZS 4501.1:2008 Occupational protective clothing guidelines

The protective clothing is to be made from sturdy, non-flammable cotton material, examples include:

- cotton drill woodworking and painting aprons
- workshop overalls or coveralls
- heavy-duty cotton long-sleeved shirts and long pants (e.g. hi-vis workwear) for activities such as welding and grinding
- leather protective outer-clothing specifically designed for welding and heavy-duty grinding applications.

If hazardous chemicals are spilled on work clothes, remove the clothing and wash the skin immediately and thoroughly. Contaminated clothing is to be washed before re-using.

12.6 Welding protection

Burns caused by sparks, heat, molten metal and ultraviolet rays or cuts caused by flying spatter, and flash burns, commonly known as welder's arc flash or arc eye, all point to the importance of wearing the correct PPE when welding.

Relevant standards:

Australian Standards: AS/NZS 1336:2014 – Eye and face protection

Australian Standards: AS/NZS 1338.1:2012 – Filters for eye protectors

Australian Standards: AS/NZS 1716:2012 – Respiratory protective devices

Australian Standards: AS/NZS 2161.1:2016 – Occupational protective gloves

Australian Standards: AS 1674.2:2007(R2018) – Safety in welding and allied processes – electrical

Hearing, eyes, skin, neck, back, head, feet and the respiratory system are all at risk when performing both oxy and arc welding operations. Refer to manufacturer's advice and/or Australian Standards for information regarding appropriate protection.

Hearing: welding can generate noise at levels which cause hearing loss. (also refer to Section 12.3 – Hearing protection).

Medical devices: electromagnetic fields generated by certain equipment (e.g. plasma cutter, TIG welder) can be harmful to medical devices. Warnings are to be given to all staff or students prior to use of the equipment so individuals with devices such as pacemakers, cochlear implants and other devices are informed and can seek advice about whether they can use this type of plant.

Skin: when welding, unprotected skin is exposed to hot metal, sparks and splatter, and when arc welding, to UV radiation. UV light can cause severe 'sunburn' or cancer to unprotected skin. Electrocution could occur from poorly earthed or insulated structures.

a. Leather welding clothing for body protection (also refer to Section 12.5 – Clothing (body) protection).
b. Students might prefer to a wear a long-sleeve cotton shirt (fire-resistant, cotton, with no pockets) and work trousers (fire-resistant, heavy cotton and no cuffs).

Hands: leather welding gloves with extended cuff to give a full 46cm glove. They are to have a cotton lining and Kevlar stitching for strength, comfort and durability. They are to be sound, dry, and used on both hands while welding or changing electrodes.

> Electrical hazards are present when welding through contact with the electrode, the work piece, or through contact with an unearthed cable or tool. Moist and humid environments can increase the risk of electric shock.

Head: sparks can also burn hair, causing painful damage to the scalp and skin.

Neck and back: these areas also need protecting from possible exposure to hot metals, UV radiation, sparks and splatter. Note that standing for long periods of time bent over a welding bench can also cause stress to the neck and back.

Feet: burns caused by sparks or dripping molten metal, and even cuts, crushing and fractures from heavy falling objects or kicking solid structures can occur. Electrocution is possible through contact with poorly earthed or insulated damp concrete floors. Rubber-soled heavy-duty work boots for foot protection (refer to Section 12.1 – Foot Protection).

Respiratory system: when performing welding operations in a poorly ventilated area, teachers and students are at risk of inhaling fumes, gas and dust present in the air because of the welding process.

When arc welding, several highly toxic, irritant gases are given off including vaporised metals, fluxes, ozone, oxides of nitrogen, fluoride, silicone and enormous quantities of carbon dioxide.

Following both short- and long-term exposure, all these gases may cause inflammation and congestion of the respiratory tract. Exposures of just one ppm for more than half an hour may result in headache and feelings of general discomfort or uneasiness.

Eyes: ultraviolet (UV) radiation causes inflammation of the cornea and can burn the retinas of the eyes. Infrared (IR) wavelengths cause severe discomfort and redness. Welding helmets and welding goggles with dark IR and UV filtering lenses are to be worn to prevent this exposure.

Considerations for **selection and purchase of eye protection** for welding:

- Oxy/acetylene welding, oxy cutting and brazing processes emit IR radiation and will require the operator to wear welding goggles (50mm filter lenses) with a shade rating of no less than five.
- The various electric arc welding processes emit both IR and UV radiation and require a full-face welding helmet with UV filter lenses. These helmets vary enormously and are to be designed to be suitable for the particular welding process – with filter shades between 8 and 13.
- Many people mistakenly think that the lens shade number corresponds to the amount of protection that is provided to the eyes, and hence the higher the number, the better the protection. But all well-constructed quality welding lenses have a screen that filters out 100% of the harmful UV and infrared IR wavelengths and provides protection to the eyes. The number just denotes the amount of darkness provided by that particular lens and is to be used by operators as a guide to select the one that is most comfortable and yet provides good visibility for the particular application.
- Many newer helmet models feature a lens plate that self-darkens upon exposure to high amounts of UV light. This eliminates the need to raise and lower the lens plate when striking the arc. Helmets with these auto lenses are considered to be safer to use than traditional welding helmets as the helmet shield can always be in the down position, protecting your face and eyes. Your hands are not preoccupied with constant visor adjustment.
- Since high-quality auto-darkening helmets provide UV and IR protection even when the helmet is not activated, the operator is always protected. For maximum comfort, look for a high-quality helmet that has a response darkening time of 0.4 of a millisecond. Less than one millisecond is not perceivable by the human eye and will provide the most comfort. There is no arc flash (arc eye) evident with auto lenses because the lens changes too quickly for the eye to see a flash.

PPE such as welding helmets or goggles have to be checked regularly for condition and stored correctly to avoid damage.

Adjacent workers and workspaces

To protect student bystanders and unexpected visitors to the welding area, especially in adjoining classroom workshop environments, transparent welding screens or curtains are to be installed around all welding areas. These moveable screens or fitted curtains, made of a polyvinyl chloride plastic film, shield the rest of the class from sparks and harmful UV light rays during arc welding activities. Flying sparks create the potential for fires. The welding screens help to contain these hazards.

Safety screens and fitted welding bay curtains should never be expected to substitute for the effect of the filter glass lenses used in the welders' helmets.

13. Electrical safety

The safety of teachers, students and others using electrical equipment is of paramount importance and there are legislative requirements that are to be followed to ensure electrical safety.

All electrically operated equipment used in schools is to be wired and manufactured to Australian Electrical Standards e.g. AS/NZS 3000: 2018 and conform to the provisions of the Electrical Safety Act and Regulations.

General electrical safety processes apply to all workshop spaces including:

- Visual check of equipment, plug and lead for damage prior to each use
- Remove from use and tag out or label to prevent use of damaged or faulty items
- Double adaptors and piggy-back plugs are not to be used
- Only battery powered or non- powered equipment is to be used around wet areas (not 240v electrical equipment)
- All workshop areas are to have fixed electrical safety switches or a Residual Current Device (RCD)
- Portable RCDs used when working in non-protected areas (e.g. outdoor projects)

Electrical safety switches are also known as:

- Residual Current Device (RCD)
- Earth Leakage Circuit Breaker (ELCB)
- Earth Leakage Device (ELD)

You can identify a safety switch by its TEST (T) button

Requirements for specified electrical equipment are determined by the type of work the equipment is used for. Refer to the Guide to managing electrical equipment in departmental schools and workplaces

Only a licensed electrical contractor is to do electrical work – this includes the installation of hard-wired machinery, plant and equipment. A certificate of compliance is to be provided to the school by the licensed electrician on completion of any installation.

- All electrical incidents are to be reported to a supervisor on the day and recorded in MyHR WHS by the next business day.
- Any person who has received an electric shock (no matter how mild) is to be referred for medical attention.
- These incidents are also to be notified to WHSQ.

Be aware of electrical dangers:

- Never use damaged power points, switches, equipment or cords.
- Isolate damaged items from their power supply and remove from service until repaired.

13.1 Safety devices

The department requires that all new machinery, plant and equipment purchased through DoE Supply Offer Arrangement is to have appropriate safety switching devices pre-fitted by the supplier prior to installation and commissioning.

Isolating switches

All fixed, hard-wired machinery is to have a functional individual isolating switch/device that disconnects all motive power and that conforms to Australian Standards - AS1543: 1985. The isolating switch is to:

- have one **ON** and one **OFF** position only
- be clearly marked with **ON** and **OFF**, (or **O** and **I**)
- have a means of locking-off in the **OFF** position only (particularly for maintenance lock-out and situations where an increased risk is present)
- be mounted prominently in a clean and dry location, easily accessible about 1.5 metres from the floor and protected from any accidental damage.

Direct-on-Line (DOL) Starter Switches

All fixed machinery is to be fitted with effective and robust control equipment for use by the operator in the form of a Start/Stop switch. These devices are to conform to Australian Standards - AS1318 and AS1543: 1985.

The **START** button is to be:

- Any other colour but RED (the recommended colour is **GREEN**)
- Flush or recessed slightly to prevent accidental starting
- Identified by the word **START** or the symbol 'I'

The **STOP** button is to be:

- **RED** in colour
- Identified by the word **STOP** or by the symbol '**O**'

Note: the Direct-on-Line (DOL) switch will have a No-Volt/Low Release relay with thermal overload protection incorporated into the circuitry. This ensures that once power is lost the machine cannot re-start again until the START button is deliberately activated.

Emergency Stop Device (E-stop)

An emergency stop device will be fitted to machinery where the manufacturer has considered it necessary or when a departmental risk assessment determines that the machine would be more safely operated by students with the fitting of an emergency stop button. The device is to conform to Australian Standards - AS4024.1: 1996 and AS1543: 1985.

An emergency stop device is to:

- be fitted in addition to the DOL Start/Stop device (not as an alternative to the DOL)
- have a large button, preferably with a mushroom shaped head, that can be hit in an emergency
- be of the latch-in type so that the machine cannot restart until reset
- be pressed only in emergency and not used for normal stopping
- be located and mounted in a readily accessible, conveniently close location and yet where it will not be accidentally knocked and triggered (often knee-high is considered conveniently close for hurried and reactive hands-free emergency activation.)

Micro-switches

Micro-switches fitted to machinery safety guarding and access covers will help ensure that the machine is affectively disabled when the guarding or cover is lifted or accessed.

Retrofitting of micro-switched interlocking guards is to also be considered where not already installed, to disable moving/hazardous parts of machines.

> A licensed electrical contractor is required to carry out electrical work and rectify any electrical issues found or suspected.

13.2 Lock-out / Tag-out of machinery, plant and equipment

Lock-out / Tag-out is the term applied to a system or procedure designed to control all situations where the unexpected start-up or release of stored energy of the machinery, equipment or process (energising) would be likely to endanger or injure personnel. Lock out and tag out are designed to be used in combination. If lock out is not possible for the item then an alternative method to secure/isolate the item is to be implemented.

LOCK-OUT: the system/procedure designed to physically ensure an item of equipment/machine is inoperable with the use of a padlock or suitable device before cleaning, adjustments or repairs are made.

Lockout padlock is a physical device to prevent an item of equipment from being started. Padlocks are to be kept in place until the equipment can be safely returned into normal use.

TAG-OUT: the system/procedure that clearly communicates to workers, with labels and tags, when equipment/machine is out-of-service and is not be operated until safely returned to normal service.

Danger tags and out of service tags: used to prevent the accidental operation of machinery, plant and equipment undergoing installation, commissioning, repair, maintenance or cleaning represents a severe hazard. In order to prevent or at least minimise the risk of mistaken operation of equipment, an OUT OF SERVICE tag or a DANGER tag is to be implemented as part of a lock-out / tag-out system.

Documented process

Health and Safety legislation and Codes of Practice outline the need to isolate equipment/machinery prior to the commencement of activities such as repair, maintenance or cleaning processes. A documented 'lockout – tagout process' can provide an effective method of preventing risk to workers and communicates clearly the requirements of how isolation can be safely achieved.

Refer to the sample Lock-out / Tag-out checklist following.

13.3 Lock-out / Tag-out Checklist

Lock-out | Tag-out checklist

- ☐ **Ensure** the machine is switched off
- ☐ **Switch off** the power source/s at the isolating control/s or unplug electrical lead from the GPO
- ☐ **Apply lock** to the isolation control or to electrical plug & attach suitable tag/s
- ☐ **Test equipment** control buttons to ensure power has been disconnected
- ☐ **Perform the required maintenance checks** and/or cleaning process
- ☐ **Ensure** all guards and protective devices are reinstated
- ☐ **Check** that all tools and/or cleaning products are removed from around the machine
- ☐ **Remove** lock/s, lockout devices and tag/s
- ☐ **Reconnect** power source/s
- ☐ **Ensure everyone is clear of the machine and start machine**

14. Activity information sheets

The following 'information sheets', contain advice regarding 'Special Considerations', and 'Suggested Risk Control Measures' for specific practical activities.

These resources can be utilised during the risk management process for consideration during planning and determining control measures associated with the following practical activities.

- CNC Technologies
- Compressed Air Equipment
- Electric Arc Welding
- Electrics & Electronics
- Fibre-reinforced Plastics
- Fixed Machinery
- Mechanics
- Metalworking
- Oxy Welding/Cutting
- Portable Power Tools
- Power Generating Equipment
- Soft Soldering
- Spray Painting
- Thermo Plastics
- Woodworking

Note: For more information, or if further guidance is required on CARA guidelines for Queensland schools, also refer to the following useful links:

DoE, Curriculum Activity Risk Assessment Guidelines

PPR – Managing Risks in School Curriculum Activities

DoE, CHW – Risk Management

WorkSafe Qld. – How to Manage WHS Risks, Code of Practice: 2021

CNC – Computer Numerical Control

INFORMATION SHEET

All CNC machines, both fixed and portable, that are increasingly used in schools, are collectively referred to by the department as 'Emerging Technologies'.

CNC – Computer Numerical Control. This means a computer converts the desired product design concept, created using various forms of Computer Aided Design software (CAD), into a digital, numerical format. These numbers relate to coordinates on a 'graph' and they control the movement of the CNC machine tooling head, i.e. cutter, router, printer, laser engraver, etc. In this way the computer controls the cutting, engraving, milling, routing, shaping or depositing of the material.

Special considerations

- CNC machines are designed to be as safe as possible. One of the main advantages of CNC machines is that they are usually much safer for student use than some manually operated machines.

Suggested control measures

- Most modern CNC machines are designed so that the tooling head will not start unless the guard or closed, transparent safety door is in position. Many also automatically lock this door in position during operation and can only be opened if machining has stopped. Regularly check the safe operation of all safety guards and doors.
- Dusts and fumes are not to be allowed to escape into the atmosphere. Most CNC routers, lathes, mills, etc., used for shaping materials such as soft metals, wood and plastics, will have an efficient dust and fume extraction system incorporated into the fully enclosed unit. However, some table routing machinery will only have a localised vacuum dust extraction system at the cutting head which allows some dust to contaminate the air. Room ventilation systems are then to be operational.
- Ensure that all materials to be machined and their coating pose no risks or health hazards. Be familiar with all relevant Safety Data Sheet information and comply with all safety recommendations. For example, some plastics vapours have the potential to be highly toxic and dangerous to our respiratory system.
- It is essential that students receive adequate instruction and training before permission is given to use any CNC machinery or equipment.
- Suitable fire protection is to be available near all CNC laser cutting or engraving activity.
- Provide secure, well ventilated facilities for all CNC machinery and equipment. They can often generate a high degree of internal heat. Excessive heat build-up in the room could then adversely affect the operation of the internal computer software, etc. Room air conditioning is commonly provided.
- Safe Operating Procedures (SOPs) or instructions are to be fitted to, or displayed near, all CNC machines.
- Ensure that appropriate personal protective equipment (PPE) is available as required and correctly used – i.e. safety glasses, protective clothing, cotton gloves for handling hot plastics and an approved filtration respiratory for any toxic vapours that may be produced during operation.
- Supervise and monitor students during all CNC activities.

Compressed Air Equipment

INFORMATION SHEET

Compressed air pneumatic tools and equipment refers to all tools and equipment that use compressed air as a means of their functioning.

A variety of air compressors are commonly used by staff and students, ranging from small portable types to the larger capacity fixed unit.

Special considerations

- A plant and equipment risk assessment is to be completed to identify the associated hazards, assess their significance and manage the potential risks of equipment used by staff and students - Plant and Equipment Risk Assessment.
- It is recommended that the use of the air compressor is to be restricted to students in year 10 and above.
- Use of compressed air to blow away dirt or dust from the body, clothing or machinery is to be avoided and discouraged. Material accidently propelled with high-pressure air can result in serious eye injuries. Direct contact of the high-pressure air nozzle on to unprotected skin can cause serious penetration wounds and air bubbles in the blood stream (embolism) which is a dangerous medical condition.

Suggested control measures

- Air pressures regulated to the minimum pressure that will allow the appropriate functioning of the equipment being operated.
- Compressors are to be fitted with functioning relief valves and a suitable regulator.
- Measured pressures in the tank, pipelines and hoses are not to exceed the manufacturer's specifications.
- All air hoses are to be fitted with self-sealing fittings to prevent personal damage from an open-air hose.
- Tank inspection for large air-compressor unit with a cylinder capacity of 26 cubic feet or greater is required every six months. Certification reports are to be filed and available at the school.
- Any leaking air lines are to be fixed as soon as they are detected.
- Where the noise level of the air-operated device and the frequency of use demand it, appropriate ear protection is to be worn during operation. Noise level output is to be kept below 85 dBs.
- Ensure that the compressor unit is located clear of access and egress to all walkways and pathways.
- It is recommended that larger fixed compressor units be housed separately in a secure, well ventilated, externally facing, weather proof enclosure to minimise workshop noise levels. This also minimises the likelihood of any flammable, toxic, corrosive gases or airborne wood dusts to enter the air inlet of the compressor unit.
- Ensure adequate ventilation whenever smaller, portable air compressor units are being used.

Compressed Air Equipment

INFORMATION SHEET

- It is recommended that all spray-painting activities using the air compressor unit be conducted in a purpose built and well-ventilated spray booth.
- Safe Operating Procedures (SOPs) or instructions are to be fitted to, or displayed near, the air compressor unit.
- Maintenance on the air compressor, manifolds, air lines, hoses and all air tools are to be carried out regularly.
- Ensure that all appropriate personal protective equipment (PPE) is available and correctly used – i.e. safety glass, a face shield, ear muffs, protective footwear and suitable clothing is to be worn, as required.

Electric Arc Welding

INFORMATION SHEET

Electric arc welding refers to a metal fabrication process that uses a power supply to create an electric arc between an electrode and the base material to melt or fuse (join) metals at the welding point.

The process in schools falls into the categories of MMAW, MIG, TIG, plasma cutting and spot welding. Such electric arc welding processes can use either direct (DC) or alternating (AC) current, and consumable or non-consumable metal electrodes.

Special considerations

- A plant and equipment risk assessment is to be completed to identify the associated hazards, assess their significance and manage the potential risks of equipment used by staff and students – Plant and Equipment Risk Assessment.
- It is recommended that the use of any electric or gas welding equipment be restricted to students in year 10 and above.

Suggested control measures

- **Caution** – Intense electromagnetic interference generated from high voltage arc welding equipment has the potential to cause cardiac pacemakers to operate incorrectly. Staff and students with medical advices are to seek medical advice before operating – remain at least 2 metres from the power unit and 1 metre from the welding arc.
- Effective control measures are to include ways of preventing or minimising all inherent risks, including well designed welding bays and workshop layout that allow provision for sufficient teacher supervision. Supervision will vary depending on the maturity and responsibility of the students.
- The primary hazards associated with electric arc welding and cutting are electric shock, burns from hot material, radiant energy from ultraviolet and infra-red rays, toxic fumes, fires and explosions.
- Radiated light waves produced by the electric arc will seriously damage eyes. Ultraviolet (UV) radiation causes inflammation of the cornea and retina damage. Infra-red (IR) wavelengths cause severe discomfort or redness.
- Screens or UV curtains are to be installed around all welding areas to protect the class from sparks and harmful UV light rays during arc welding activities. Flying sparks create the potential for fires and screens help to contain these hazards. However, the safety screens and fitted welding bay curtains should never be expected to substitute for the effect of the filter glass lenses used in the welder's helmets.
- Safe Operating Procedures (SOPs) or instructions are to be fitted to, or displayed near, electric arc welding bays.
- Ensure that appropriate personal protective equipment (PPE) is available and correctly used. Apart from the usual leather gloves, and protective clothing, etc., all operators will require a full-face welding helmet with UV filter lenses. These helmets vary enormously and are to be selected for the particular welding process.

Electric Arc Welding

INFORMATION SHEET

- All operators are to be suitably insulated from electrical welding tables, from damp concrete floors and from any exposed parts of the work piece by rubber soled work boots, rubber floor matting or wooden slatted duckboards.
- Cables are to be correctly insulated to avoid any dangers of electric shock. All hoses are to be checked periodically to correct slow leaks of Argon, Argoshield, Helium, etc.
- Earthing of electric arc welding equipment is to be securely bolted to the welding table. This prevents the inadvertent connection of the earth to the body of the welding unit.
- Ensure that good ventilation and welding fume extraction systems are effective. This is critical as the build-up of fumes produced by the electric arc, molten metals and burning flux materials creates a toxic atmosphere.

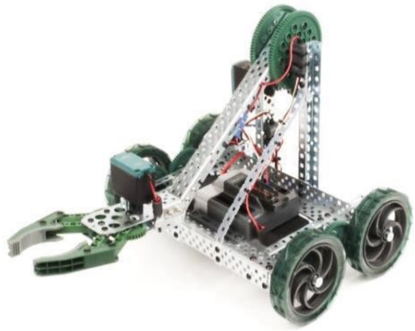
Electrics & Electronics

INFORMATION SHEET

Electrics and Electronics refer to:

- electrical circuits, components and devices to make simple projects,
- experiments in direct and alternating current, parallel and series circuits, and
- the introduction of a variety of electronic components, such as diodes, transistors, capacitors, resistors and integrated circuit devices.

Note: This activity is confined to low-voltage componentry, i.e. 32 volts or less.



Special considerations

- A plant and equipment risk assessment is to be completed to identify the associated hazards, assess their significance and manage the potential risks of equipment used by staff and students – Plant and Equipment Risk Assessment.
- Adhere to the advice available at: DoE – Guide to Managing Electrical Safety in Schools
- An Earth Leakage Circuit Breaker (ELCB) or Residual Current Device (RCD) unit is to be installed to any workshop power circuit used for soldering irons. Where available, double-insulated soldering irons are to be used in preference to earthed appliances.

Suggested control measures

- Plan the electronics workstation based on what tasks will be done in the area. For example, workstations with poor lighting could result in poor soldering, improper measurements, burns, eye strain and fatigue.
- Soldering areas are to also have good ventilation and fume extraction.
- A small bench top fume extractor may be necessary to remove harmful fumes caused by solder and fluxes.
- Provide a suitable fire-proof or non-flammable workstation surface.
- Exposure to lead fumes can have serious chronic health effects. Control measures are necessary to minimise the exposure of students to solder fumes both in relation to the lead content of the solder and the problems related to the flux.
- Lead-free soft soldering products are to be considered at all departmental schools.
- Safe Operating Procedures (SOPs) or instructions are to be fitted to, or displayed near, electronics workstations.
- Ensure that appropriate personal protective equipment (PPE) is available and correctly used – i.e. safety glasses, cotton gloves non-flammable or 100% cotton clothing that covers the arms and legs to help prevent burns.
- Closely supervise and monitor all students during electronic activities when hot soldering irons are being used. The temptation for young students to misuse this equipment can be common, and the consequences are usually serious burns and/or damaged workstations.

Note: ITD electronics activities are to be confined to low-voltage electric componentry, i.e. 32 volts or less.

Fibre Reinforced Plastics

INFORMATION SHEET

Fibre-reinforced plastics refers to the process of adding woven or matted glass or synthetic fibre material to layered thermosetting resins to produce a composite form or component parts of considerable strength and stability.

This fibre-reinforcing fabrication process is commonly used in the manufacture of products such as surfboards and boats.

Special considerations

- **Methyl Ethyl Ketone Peroxide (MEKP)**: Commonly used as a catalyst for curing polyester resins such as fibre- reinforced plastic projects. MEKP is considered a "hazardous material" by Standards Australia and is only to be used in the presence of a person who is familiar with its properties and experienced in its use. Pure MEKP is a colourless liquid, extremely shock-sensitive and explosive in this form. It is generally supplied in plasticiser solutions (such as dimethyl phthalate) with a flashpoint of 68ºC to reduce shock sensitivity. Precautions are to be taken when handling this product.

Note: Schools are to refer to the current manufacturer's SDS for complete and up-to-date advice.

Suggested control measures

- Because fibreglass contains fine silicate fibres very similar to asbestos, it has been called 'The Asbestos of the 21st Century'. However, modern bio soluble fibreglass is made from newer materials that disappear from the body much more rapidly than traditional glass fibre products. All the fibreglass manufactured in Australia since January 2001 has been of the bio soluble type.
- Woven filament fibreglass cloth or mat are to be handled with caution. Particular care is to be taken when cutting, sanding or grinding as high levels of irritant dust can be generated.
- Some of the fibres are fine enough to be breathed deep into the lungs and they can cause irritation to the eyes, nose, throat and skin.
- Epoxy resins sometimes used in the manufacture of fibreglass products can cause contact dermatitis and burns. Cured resins are generally non-toxic and, as such, are strongly recommended for use in schools.
- Suitable fire protection, including extinguishers are to be available near any spray-painting activity.
- Ensure that the fibre-glassing workspace has an efficient air extraction ventilation system or is well ventilated by opening all doors and windows in the area.
- MEKP is to be kept away from other combustible chemicals and hazardous materials, particularly acids and petroleum-based products, in a cool place away from any source of direct sunlight, heat, flame or sparks (including electrical switches). Do not store MEKP in the flammable's cabinet.
- Safe Operating Procedures (SOPs) or instructions are to be fitted to, or displayed near, fibre glassing workrooms.

Fibre Reinforced Plastics

INFORMATION SHEET

- Mixing of resins and catalysts is to only be carried out by teachers, in a well-ventilated area and near a readily available supply of water. Eyewash facilities are also to be available.
- After handling fibreglass, resins and MEKP, etc. hands are to be washed thoroughly with soap and water.
- Ensure that all appropriate personal protective equipment (PPE) is available and correctly used, i.e. protective safety glasses or face shield, protective clothing to protect the skin from spills, splashes and sprays and PVC gloves while measuring and laying-up sections of resined cloth.

Fixed Machinery

INFORMATION SHEET

Fixed machinery refers to larger machines and equipment that are not portable, but fixed permanently (stationary) within practical workshops. Such items are commonly referred to as 'Plant' and are often require to be securely bolted to the floor for their safe operation.

Special considerations

- A plant and equipment risk assessment is to be completed to identify the associated hazards, assess their significance and manage the potential risks of equipment used by staff and students – Plant and Equipment Risk Assessment.

Suggested control measures

- All fixed machinery is to be correctly installed, connected to the power supply and commissioned prior to operation.
- Machinery designed to be operated in a securely fixed position is to be bolted to a stable supporting medium to prevent inadvertent movement when power is applied or the machine is operated.
- Ensure that all fixed machines are fitted with the appropriate guarding, safety cut-off micro-switches and emergency stop mechanisms as required.
- Sufficient space is to be available and kept clear in the vicinity of any fixed power transmission machinery to enable any person to work, attend to, and clean it without risk of injury to themselves or any other person.
- All fixed machines are to have clearly defined 'safe work zone' floor boundaries marked with 80 mm wide bright yellow delineation lines.
- Dust extraction systems are to be working efficiently and maintained where required.
- Exposure to excessive noise is to be limited. New equipment is to be researched for noise emissions and 'buy quiet' implemented where possible. Existing equipment is to be serviced and maintained for optimum running.
- Hearing protection is to be worn by all staff in workshops as exposure to excessive noise may be from adjacent machinery and other workshop equipment. Refer to Managing noise in manual arts/industrial technology and design workshops for more information.
- Systems are to be in place to manage students wearing of hearing protection in workshops. Many schools have created a culture where it is standard behaviour to always wear hearing protection, and this is promoted and reinforced for both staff and students.
- Safe Operating Procedures (SOPs) or instructions are to be fitted to, or displayed near, all fixed machines.
- Ensure that all staff are competent in the safe use of particular machinery prior to teaching classes. Ensure a sequential learning program is in place with appropriate supervision for students and their proficiency is regularly observed and recorded.
- All machinery repair and maintenance is to be up-to-date and appropriately recorded.

Fixed Machinery

INFORMATION SHEET

- Modifications are not to be made to machinery, plant and equipment unless this is to rectify identified hazard control measures, such as improved safety guarding. Any modifications are to comply with all relevant Australian Standards and documented through a risk management process.
- The machine and work area is to be kept free of an accumulation of materials, hand tools, trade waste, oil, grease, sawdust and obstructions of any kind.
- Ensure that appropriate personal protective equipment (PPE) is available and correctly used – i.e. safety glasses, protective footwear and clothing, hearing protection, etc.

Mechanics

INFORMATION SHEET

Mechanics refers to the repairing, maintaining, modifying, sequential rebuilding, testing, adjusting and monitoring of both 2 stroke and small 4 stroke internal combustion engines.

Special considerations

- A plant and equipment risk assessment is to be completed to identify the associated hazards, assess their significance and manage the potential risks of equipment used by staff and students – Plant and Equipment Risk Assessment.

Suggested control measures

- Ensure that all mechanics machinery is fitted with the appropriate guarding, safety cut-off micro-switches and emergency stop mechanisms as required.
- Sufficient space is to be kept clear around all mechanics work stations to enable anyone to work, attend to, and clean it without risk of injury to him or herself, or any other person.
- All mechanics machinery and equipment such hydraulic lifts, trolley jacks and presses have clearly defined 'safe work zone' floor boundaries marked with 80 mm wide bright yellow delineation lines.
- Mechanics work area is to be kept free of an accumulation of materials, hand tools, trade waste, oil, grease, sawdust and obstructions of any kind.
- Dust and volatile fume extraction systems are to be working efficiently and maintained as required.
- Ensure that all staff are competent in the safe use of particular machinery prior to teaching classes. Ensure a sequential learning program is in place with appropriate supervision for students and their proficiency is regularly observed and recorded
- Hearing protection is to be worn by all staff in workshops as exposure to excessive noise may be from adjacent machinery and other workshop equipment. Refer to Managing noise in manual arts/industrial technology and design workshops for more information.
- Systems are to be in place to manage students wearing of hearing protection in workshops. Many schools have created a culture where it is standard behaviour to always wear hearing protection, and this is promoted and reinforced for both staff and students.
- Safe Operating Procedures (SOPs) or instructions are to be clearly displayed in all mechanics workshops.
- All machinery repair maintenance is to be up-to-date and accurately recorded.
- Modifications are not to be made to machinery, plant and equipment unless this is to rectify identified hazard control measures, such as improved safety guarding. Any modifications are to comply with all relevant Australian Standards and documented through a risk management process.
- Ensure that appropriate personal protective equipment (PPE) is available and correctly used – i.e. safety glasses, protective footwear and clothing, hearing protection, etc.

Metalworking

INFORMATION SHEET

Metalwork refers to activities using metal or metal-based products for the purpose of product fabrication and light construction, using a range of associated metalworking hand tools, power tools and fix machinery.

Processes include: measuring, marking out, cutting, sheet metal work, folding, seaming, drilling, soldering, riveting, cold chiselling, filing, turning, milling, welding, motor mechanics and surface finishing.

Special considerations

A plant and equipment risk assessment is to be completed to identify the associated hazards, assess their significance and manage the potential risks of equipment used by staff and students – Plant and Equipment Risk Assessment.

Suggested control measures

- Ensure that all fixed machines are fitted with the appropriate guarding, safety cut-off micro-switches and emergency stop mechanisms as required.
- Sufficient space is to be kept clear in the vicinity of any machinery to enable any person to work, attend to, and clean it without risk of injury to him or herself, or any other person;
- All fixed machines are to have clearly defined 'safe work zone' floor boundaries marked with 80 mm wide bright yellow delineation lines.
- Dust extraction systems are to be working efficiently where required.
- Ensure that all staff are competent in the safe use of particular machinery prior to teaching classes. Ensure a sequential learning program is in place with appropriate supervision for students and their proficiency is regularly observed and recorded.
- Hearing protection is to be worn by all staff in workshops as exposure to excessive noise may be from adjacent machinery and other workshop equipment. Refer to Managing noise in manual arts/industrial technology and design workshops for more information.
- Systems are to be in place to manage students wearing of hearing protection in workshops. Many schools have created a culture where it is standard behaviour to always wear hearing protection, and this is promoted and reinforced for both staff and students.
- Safe Operating Procedures (SOPs) or instructions are to be clearly displayed in all metalworking rooms.
- Practical workspaces are to be kept free of an accumulation of materials, hand tools, trade waste, oils and grease, student's projects and obstructions of any kind.
- All machinery repair maintenance are to be up-to-date and accurately recorded.
- Modifications are not to be made to machinery, plant and equipment unless this is to rectify identified hazard control measures, such as improved safety guarding. Any modifications are to comply with all relevant Australian Standards and documented through a risk management process.
- Ensure that appropriate personal protective equipment (PPE) is available and correctly used – i.e. safety glasses, protective footwear and clothing, hearing protection, etc. Senior students engaged in engineering, metal fabrication, welding or vocational education courses will be required to wear far more substantial footwear protection such as steel cap safety boots.

Oxy Welding & Cutting

INFORMATION SHEET

This Information sheet relates to Oxy-Acetylene gas welding, brazing, bronze welding, heating and shaping or gas cutting as a curriculum activity.

All of these processes require a mixture of a bottled fuel gas (acetylene) and oxygen burning as an intense, focussed flame at approximately 3,500°C, from a hand-held torch. As the flame comes in contact with steel, it can melt the surface to form a molten pool, allowing fusion welding to take place.

Special considerations

- A plant and equipment risk assessment is to be completed to identify the associated hazards, assess their significance and manage the potential risks of equipment used by staff and students – Plant and Equipment Risk Assessment.
- A safe working system is to be developed from these risk assessments for the performance of all oxy welding activities which addresses the inherent risks including extreme heat, infra-red radiation and volatile, explosive and toxic gases.
- Oxy/acetylene welding, oxy cutting and brazing processes all emit infra-red (IR) radiation and will require the operator to wear welding goggles (50mm filter lenses) with a shade rating of no less than 5.
- It is recommended that the use of the oxy welding is to be restricted to students in year 10 and above.

Suggested control measures

- Ensure well designed oxy welding bays and workshop layout that allows provision for sufficient teacher supervision at all times. This will vary depending on the maturity and responsibility of the students.
- Walkways and access around welding bays is to be left free of all obstructions.
- Provision for quenching hot metals are to be made available and be very close at hand.
- Safe Operating Procedures (SOPs) or instructions are to be fitted to, or displayed near, all oxy welding bays.
- Ensure that good ventilation and welding fume extraction systems are effective. This is critical as the build- up of fumes produced by all welding processes creates a toxic atmosphere.
- Oxy acetylene torches, hoses, gas lines, regulators and flashback arresters are to be inspected annually under the departmental 'Plant and Equipment Service Maintenance Program'.
- Gas cylinders that are connected and in use are to be on a wheeled hand trolley and secured in position by means of a safety chain. Stored cylinders, not connected for use, are to remain capped.
- Acetylene cylinders are to be secured in an upright position prior to and during use.

Oxy Welding & Cutting

INFORMATION SHEET

- Oil and grease are to be separated from and not come into contact with oxy/acetylene welding equipment. These substances may ignite spontaneously when in contact with oxygen.
- Full protective PPE covering for all welding operations is essential. All appropriate UV welding helmets, IR safety goggles, face shields, gloves, aprons, jackets, spats, etc. are to be available and in good repair. Watch for sparks in open pockets and cuffs of clothing when oxy welding or cutting.
- Closely supervise and monitor students using oxy-acetylene welding or cutting equipment in a workspace.

Portable Power Tools

INFORMATION SHEET

Portable electrical power equipment includes machines, tools and appliances that are portable by nature in their use. They may be mains powered, battery powered, pneumatic or gas-fuel operated.

Special considerations

- A plant and equipment risk assessment is to be completed to identify the associated hazards, assess their significance and manage the potential risks of equipment used by staff and students – Plant and Equipment Risk Assessment.

Suggested control measures

- Refer to the Guide to managing electrical equipment in department schools and workplaces for information.
- Equipment used in practical workspaces require specific electrical protection due to the type of work being conducted. (manufacturing work – see table 2 in the guide referenced above)
- All corded 240v portable power tools and equipment are to be regularly 'tested and tagged' and connected to a safety switch
- The intervals required for these inspections are:
  - Once every 12 months – for double-insulated electrical equipment such as most commonly used portable power tools
  - Once every 6 months – for non double-insulated electrical equipment
  - Once every 6 months – for multi-outlet portable power boards
  - Once every 6 months – for electrical power leads (extension leads)
- All power tools and work areas are to be kept free of an accumulation of materials, hand tools, trade waste, oil, grease, sawdust and obstructions of any kind.
- When using machines and portable power tools ensure that, where possible, any loose wood dust is captured at the point of generation. This is best achieved using vacuum or exhaust extraction systems specifically designed to fit the particular power tool.
- Have clearly delineated safe work areas for particular power tools to help prevent trip hazards, excess dust, etc.
- Safe Operating Procedures (SOPs) or instructions are to be fitted as tags, and/or displayed as A4 posters, near all portable power tools work stations.
- Ensure that all staff are competent in the safe use of particular machinery prior to teaching classes. Ensure a sequential learning program is in place with appropriate supervision for students and their proficiency is regularly observed and recorded.
- Hazards such as excessive noise, toxic fumes or other factors are to be managed.
- All power tool repair and maintenance is to be carried out as required and be up-to-date.
- Ensure that appropriate personal protective equipment (PPE) is available and correctly used – i.e. safety glasses, protective foot wear and clothing, hearing protection, all jewellery removed, etc
- Closely supervise and monitor all students using any portable power tools in an ITD workspace.

Power Generating Equipment

INFORMATION SHEET

Portable power generating equipment refers to all equipment which produces a 240-volt power supply using an internal combustion engine as its primary power source.

Special considerations

- A plant and equipment risk assessment is to be completed to identify the associated hazards, assess their significance and manage the potential risks of equipment used by staff and students - Plant and Equipment Risk Assessment.
- All portable power generating equipment is to be used in accordance with the manufacturer's operating manual.
- Adhere to the DoE – Guide to Managing Electrical equipment in department schools and workplaces
- All power generators are to be electrically inspected to make sure that they are safe and well maintained.
- Refer to the Qld Electrical safety information regarding appliances or devices being powered by portable generators in schools.
- Ensure all leads used to connect your generator are in good working condition, i.e. no damage to plugs or lead and no exposed wires.
- Only use power boards that are protected by a safety switch.
- Don't exceed the generator's load rating and follow the manufacturer's instructions. https://www.worksafe.qld.gov.au/news-and-events/news/2022/stay-electrically-safe-during-flood-clean-up
- Where available, double-insulated appliances or tools are to be used in preference to earthed appliances.
- It is recommended that the use of a portable power generator be restricted to students in years 11 and 12.

Suggested control measures

- Provide adequate instruction in the safe handling of electricity and electrical equipment and, if required, techniques for pull-starting petrol engines.
- Provide well ventilated operational location for the generator, preferably outside of the building. Build up of fumes can be fatal.
- Where required, establish temporary guards to isolate the generating equipment in a safe zone.
- Instruct students in correct manual handling techniques if the machine is to be moved.
- Establish clear signals for communication between the instructor and operator for situations in which the machinery is being used.
- Safe Operating Procedures (SOPs) or instructions are to be fitted to, or displayed near, all power generators.
- Usually the engine of a portable power generator is petrol-driven. Instruct students in the dangers associated with the transfer and distribution of fuel.

Power Generating Equipment

INFORMATION SHEET

- Ensure the machine is switched off before refuelling.
- Comply with relevant Workplace Health and Safety Queensland codes of practice – Managing electrical risks in the workplace.
- Ensure that appropriate personal protective equipment (PPE) is available and correctly used – i.e. hearing protective, safety glasses and work boots.
- Closely supervise and observe students during all activities involving the use a portable power generator.

Soft Soldering

INFORMATION SHEET

Soft soldering refers to the process of joining metals through the application of a metal alloy material (solder) with the aid of a fluxing or cleaning agent and a heat source – usually an electric soldering iron. Solder is a low temperature melt metal alloy that is available in a variety of forms depending on the application, and can be supplied in either stick or coiled wire form. The latter often contains a resin core flux agent. Fluxing agents (acid or resin) may be liquid or paste.

Special considerations

- A plant and equipment risk assessment is to be completed to identify the associated hazards, assess their significance and manage the potential risks of equipment used by staff and students – Plant and Equipment Risk Assessment.
- Adhere to the advice available at: DoE – Guide to Managing Electrical equipment in department schools and workplaces
- An Earth Leakage Circuit Breaker (ELCB) or Residual Current Device (RCD) unit are to be installed to any workshop power circuit used for soldering irons. Where available, double-insulated soldering irons are to be used in preference to earthed appliances.

Suggested control measures

- Plan the soldering workstation based on what tasks will be done in the area. For example, workstations with poor lighting could result in poor soldering, improper measurements, burns, eye strain and fatigue.
- Soldering areas are to also have good ventilation and fume extraction.
- A small bench top fume extractor may be necessary to remove harmful fumes caused by solder and fluxes.
- Provide a suitable fire-proof or non-flammable workstation surface.
- Safe Operating Procedures (SOPs) or instructions are to be fitted to, or displayed near, all soldering workstations.
- Soft solder alloys of lead and tin were universally used in the past, and are still available. However, exposure to lead fumes can have serious chronic health effects. Control measures are necessary to minimise the exposure of staff and students to soldering fumes both in relation to the lead content of the solder and the problems related to the flux.
- Lead-free soft soldering products are are to be considered at all departmental schools.
- Ensure that appropriate personal protective equipment (PPE) is available and correctly used – i.e. safety glasses, cotton gloves, non-flammable or 100% cotton clothing that covers the arms and legs to help prevent burns.
- Closely supervise and monitor all students during electronic activities when hot soldering irons are being used. The temptation for young students to misuse this equipment can be common, and the consequences are usually serious burns and/or damaged workstations.

Spray Painting
INFORMATION SHEET

Spray painting refers to the process of applying a protective and/or decorative coating to a variety of material surfaces using a variety of liquid finishes and matched solvents and using compressed air as a propellant.

Special considerations

- Spray painting activities may need to be tailored to the particular requirements of students, the physical environment and facilities which are present.
- Ensure that all relevant SDS are available, referred to and complied with. Spray painting vapours have the potential to be highly volatile and dangerously explosive.
- Spray painting can be a major health hazard. Be aware that most paint thinners, solvents and detergents can also be very toxic and harmful if they are inhaled or come into contact with the skin.
- All spray painting or air brushing is to occur in a well-ventilated area with adequate exhaust systems and lighting. Where a spray booth is not practical, use a local exhaust ventilation system to capture any overspray and solvent vapour as close to the source as possible.
- Do not use of 2-pack paints containing isocyanate compounds such as toluene di-isocyanate. HODs need to understand health risks involved, and know how to adequately protect all users against them.
- Whenever possible, use water-based paints instead of organic solvent-based paints

Suggested control measures

- All spray booth installations are to be checked for compliance with AS/NZS 4114.1:2003 / AS 1482:1985 and be inspected regularly by a qualified maintenance contractor every 12 months.
- Spray booth ventilation filters are to be inspected, cleaned and/or changed as required. Regularly clean the spray booth to prevent paint build-up.
- Any possible sources of ignition are to be identified and isolated, including naked flames or static electricity, in areas around any spray painting activity.
- All lights and switches in spray booths are to be spark proof.
- Safe Operating Procedures (SOPs) or instructions are to be fitted to, or displayed near, all spray painting booths.
- Suitable fire protection, including extinguishers are to be available near any spray painting activity.
- Always close the door to the spray painting room during operation so that the spray filtration and air ventilation systems operate more effectively.
- Ensure that any solvents, thinners or paints spilt in the painting area are cleaned immediately and the area ventilated by opening all doors and windows in the area.
- Provide secure, well ventilated storage facilities for all solvents, thinners or paints, preferably to the outside of the building.

Spray Painting

INFORMATION SHEET

- Ensure that appropriate personal protective equipment (PPE) is available and correctly used – i.e. protective clothing to protect the skin from spills, splashes and sprays, and an approved filtration respiratory or face mask.
- Ensure that the compressed air nozzle of the spray gun is directed away from the user and others.
- Closely supervise and monitor students during all spray painting activities in an ITD workspace.

Thermoforming Plastics

INFORMATION SHEET

Thermoforming plastics refers to a group of plastics that soften readily with the application of heat, and will harden again once the temperature is reduced to normal room temperature.

Plastic forming processes such bending, folding, injection moulding, vacuum forming, blow moulding and pressed sheet recycling can be repeated indefinitely, provided the correct thermoforming temperatures are kept below the level at which the material will burn or degrade.

Special considerations

- A plant and equipment risk assessment is to be completed to identify the associated hazards, assess their significance and manage the potential risks of equipment used by staff and students – Plant and Equipment Risk Assessment.

Suggested control measures

- Dust from certain plastics may be harmful if inhaled and may cause irritation to the skin and eyes. Sanding machines are to be fitted with dust-extraction equipment where it is considered appropriate.
- Toxic fumes given off by heated and superheated plastics including plastic solvents, can be a health hazard and precautions are to be taken to prevent them from being inhaled.
- Ensure adequate ventilation is available while cutting, filing, sanding, granulating, heating and thermoforming, especially when the plastics material being used may release toxic fumes or gases.
- Ensure there is sufficient free space in the vicinity of the plastics oven, strip heaters, thermoforming equipment or granulation machines.
- Safe Operating Procedures (SOPs) or instructions are to be displayed near all thermoforming work stations.
- Ensure that all staff are competent in the safe use of particular machinery prior to teaching classes. Ensure a sequential learning program is in place with appropriate supervision for students and their proficiency is regularly observed and recorded.
- All machinery repair maintenance is to be up-to-date and accurately recorded.
- Plastics thermoforming work areas are to be kept free of an accumulation of materials, hand tools, trade waste, oil, grease, sawdust and obstructions of any kind.
- Ensure that appropriate personal protective equipment (PPE) is available and correctly used – i.e. safety glasses, protective clothing and cotton gloves when handling hot plastics material.
- Closely supervise and monitor all students using any thermoforming equipment in an ITD workspace.

Woodworking

INFORMATION SHEET

Woodworking refers to activities using wood or wood-based products for the purpose of design, fabrication and construction using a range of associated hand tools, power tools and fix machinery.

Processes include: measuring, marking out, sawing, chiselling, hammering, sanding, drilling, planing, joining, assembling, nailing, screwing, gluing and surface finishing.

Suggested control measures

- Ensure that all fixed machines are fitted with the appropriate guarding, safety cut-off micro-switches and emergency stop mechanisms as required.
- Sufficient space is to be kept clear in the vicinity of any machinery to enable any person to work, attend to, and clean it without risk of injury to him or herself, or any other person
- All fixed machines are to have clearly defined 'safe work zone' floor boundaries marked with 80 mm wide bright yellow delineation lines.
- If possible, when using machines and portable power tools, capture any loose wood dust at the point of generation. This is best achieved using vacuum or exhaust extraction systems specifically designed to fit the machine or equipment.
- Consider a professionally designed and installed, fully ducted, wood dust extraction and collection system for the entire ITD workspace. This will maintain maximum control over dust concentration levels throughout the facility.
- Where possible, use timbers that are less likely to cause any health issues.
- Exposure to excessive noise is to be limited. New equipment is to be researched for noise emissions and 'buy quiet' implemented where possible. Existing equipment is to be serviced and maintained for optimum running.
- Hearing protection is to be worn by all staff in workshops as exposure to excessive noise may be from adjacent machinery and other workshop equipment. Refer to Managing noise in manual arts/industrial technology and design workshops for more information.
- Ensure that all staff are competent in the safe use of particular machinery prior to teaching classes. Ensure a sequential learning program is in place with appropriate supervision for students and their proficiency is regularly observed and recorded.
- Safe Operating Procedures (SOPs) or instructions are to be clearly displayed in all woodworking rooms.
- Practical workspaces are to be kept free of any accumulation of materials, sawdust, hand tools, portable power tools, clamps, trade waste, students' projects and obstructions of any kind.
- All machinery repair maintenance are to be up-to-date and accurately recorded.
- Ensure that appropriate personal protective equipment (PPE) is available and correctly used – i.e. safety glasses etc.
- Closely supervise and monitor all students using woodworking tools and machinery in an ITD workspace.

Queensland Government