INDUSTRIAL TECHNOLOGY + DESIGN

Industrial technology and design guideline

A practical handbook for ITD staff

Queensland Government

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1. Departmental management and safe practice

1.1 General introduction

This Guideline document on managing safety in Industrial Technology and Design (ITD) for Queensland State School secondary departments complies with all current state legislation and regulations including the national *Work Health and Safety Act 2011* (Qld). It is designed to be a source of easy reference and provides important information relating to the establishment, management and maintenance of a healthy and safe teaching, learning, and working environment for ITD staff and students.

ITD staff should find support for the due diligence required to ensure the safety of students through current legislative requirements and their departmental accountabilities. All teachers should appreciate that it is imposed upon them to take reasonable precautions at all times and to ensure that they have up-to-date knowledge of all health and safety risks involved in their ITD activities, thus avoiding foreseeable dangers to themselves and the students placed in their care.

All Information and guidelines offered are directed not only at ITD Heads of Department, Subject Coordinators and teachers, but also to others who work within your ITD department, including ITD teacher aids, Special Needs teaching assistants, other support staff and trainees.

1.1.1 Subject Guidelines – Queensland Curriculum and Assessment Authority (QCAA)

The term – **Industrial Technology and Design** *(previously Manual Arts)* generally refers to the secondary school faculty area reasonable for the delivery of the following range of related subjects:

Lower Secondary – Years 7 − 10

Design and Technology *(QCAA Syllabus and the Lower Secondary Subject Area Guidelines – refer below)*

The Lower Secondary curriculum can be somewhat innovative. For Years 7 - 8 & 9, ITD studies should incorporate the “Technology Essential Learning’s” syllabus requirements of an interactive, cyclical and recursive design process involving elements of **investigation**, **ideation**, **production** and **evaluation** when students design and create their class projects, individual artefacts or prototype models. Schools are also required to implement the Australian Curriculum (ACARA) learning areas of Digital Technologies and Design & Technologies.

Year 10 QCAA syllabus guidelines will provide schools with information and advice for the planning and delivery of challenging and engaging courses, specifically for students in Year 10.

Senior Secondary – Years 11 and 12

The QCAA supports several subject syllabuses specifically for Years 11 and 12 in the area of ICT and Design (Information Communication Technologies and Design). All *may* count as credits towards a student being awarded the Queensland Certificate of Education (QCE).

QCAA is redeveloping and revising senior syllabuses to support the introduction of Queensland’s new senior assessment and tertiary entrance systems from 2019.

Students will be required to select from the following:

- Aerospace Systems *General subject*
- Engineering *General subject*
- Design *General subject*
- Senior Syllabuses subjects *Applied subjects*
    - Building and Construction Skills
    - Furnishing Skills
    - Engineering Skills
    - Industrial Technology Skills
    - Industrial Graphics Skills

Additionally, schools may continue to offer VET certificates and competencies **separate** to these QCAA syllabuses.

- Vocational Education and Training programs (VET)

Note: refer to these QCAA web links for further details on ITD subject area guidelines:

❖ QCAA – Years 8 to 10 Design & Technology Subject Area Guidelines

1.1.2 Considering Safety in ITD Activities

Curriculum planning processes for ITD activities should embrace the consideration of students' learning needs delivered in a practical and safe learning environment; an environment in which the hazards inevitably associated with practical workshop activities are reduced to an acceptable level. 'Good practice' workplace safety considerations that include diligent risk management procedures and appropriate risk assessment strategies will hopefully become a default part of any ITD departmental activity planning and curriculum review process.

Because complex practical working environments change over time, department guidelines and safety advice for ITD will be regularly reviewed and underwritten, to ensure that one's diligent duty of care is consistently maintained.

This ITD Guideline aims to encourage a comprehensive departmental "Culture of Safety" within an ITD faculty – creating an atmosphere in the workplace conducive to developing appropriate "work safe" attitudes.

In addition, it is imperative that all ITD teachers model, to their students, the sound principles of Workplace Health and Safety (WHS) explicitly, including a mature and responsible attitude to safe working practices, theoretical knowledge, and technical skill levels relevant to all areas of Industrial Technology and Design. The principles that students learn at school should form the basis of common workplace safety applicable to their future employment. A culture of workplace safety is, therefore, an integral consideration for all planned ITD activity.

As an ITD staff resource, this publication will not provide all the answers to all ITD health and safety issues or concerns. Further detailed information, i.e. department policy and procedures clarification is always available online and many useful web-links are provided here for staff access:

Regular reference should be made to the Policy and Procedure Register and other essential department online sources, particularly our Organisational Safety and Wellbeing webpage:

- Creating Healthier Workplaces (CHW)

Finally, all EQ State Schools are encouraged to note the contact details for their Regional Workplace Health and Safety Consultant.

- Regional Senior Health and Safety Consultants

1.2 Management of Safety

The Queensland Department of Education (DoE) acknowledges that an effective and productive Industrial Technology and Design curriculum involves a significant amount of high risk practical workshop curriculum activity. Such experiences provide opportunities to introduce students to the concept of risk management and safe work practices. Naturally, it is essential that all ITD staff are fully conversant with the management of safety in their workplace and that they carefully plan curriculum activities.

1.2.1 Responsibility for the management of safety

Every person within a school has a responsibility and legal duty to be actively involved in the effective management of safety. Responsibilities focus on planning the curriculum, providing meaningful educational activities with ***appropriate supervision*** and working cooperatively for a safer environment or workspace.

An appropriate level of supervision when teaching ITD will depend on the range of equipment utilised, the number of students involved, their maturity and individual needs and the physical nature of the particular workplace. Minimum standards have been established for ITD supervision. Refer to the Curriculum Activity Risk Assessment Guidelines within this document.

Do not forget to consult with all ITD staff, Principals, Special Needs teaching assistants, ITD teacher aids, trainees and any voluntary staff when formulating the departmental safety management strategies. Ensure that adequate procedures be developed, implemented, managed and scrutinised meticulously to ensure that those responsible:

- can safely deliver any **High** or **Extreme** risk ITD curriculum activities with evidence of an appropriately prepared Curriculum Activity Risk Assessment
- regularly undertake curriculum activity risk assessments and enforce them rigorously
- hold specialist ITD teaching qualifications, and receive adequate health and safety training and regular ITD Professional Development training – only suitably qualified staff should be using designated restricted machinery or processes
- effectively communicate information, policy and procedures to those who need to know –ensuring all workshop users are aware of the various hazards and understand the procedures to control the assessed risks
- ensure all powered machinery, plant and equipment is regularly inspected electrically, tested and tagged as required and maintained to recognised standards and that good records are kept – all defective equipment is reported and ensure electrical safety is never compromised
- ensure all non-powered machinery, plant and equipment is also regularly inspected and maintained as required to the manufacturers standards and that good records are kept
- work in a positive environment and participate in consultation on all WHS issues
- ensure all Safety Data Sheet (SDS) information is up-to-date, available and followed
- immediately address issues relating to excessive dust, industrial noise, safety signage, etc.
- provide adequate space allocation for fixed machines, benches and tools, project storage and overall comfortable working arrangements;
- ensure a safe educational environment and provide diligent duty of care and appropriate levels of supervision during teaching and learning activities
- ensure special-needs groups are considered in regard to all WHS issues
- ensure the numbers of students working in any particular ITD area contribute to a safe working environment and do not present an unacceptable risk to health and safety
- provide and maintain adequate first aid facilities and provide for effective emergency management and reporting of all accidents and injuries
- take reasonable care of their own health and safety and that of colleagues and students
- do not interfere with, or misuse, resources provided for health, safety and welfare purposes, and do comply with our *Work Health and Safety Act 2011* (Qld).

1.2.2 Legislation and regulatory requirements

For the purposes of this ITD guidelines handbook for teachers, the following list of government legislation, regulations, policies, procedures and codes of practice requirements are all important sources of reference.

1. *Education (General Provisions) Act 2006* (Qld)

"An Act about the education of children and the participation of young people in education and training, and for other purposes."

2. Policies and Procedures Register (PPR)

Policies and Procedures Register is a centralised location for all departmental and corporate policies, procedures, guidelines and other administrative instructions and directives.

- **Policies** outline what the department intends to do through stated plans of action.
- **A procedure** is a step-by-step process that should be followed to achieve an outcome or result for the department, or on behalf of the Australian or Queensland Governments, in response to legislation, directives, standards or policy.

To help locate a particular procedure in this register, select the relevant category on the orange toolbar or use the search tool located at the top right of the screen. You will find navigational links to six listed procedural categories. Those of particular relevance to ITD might include the following:

- **'School Education'** and **'Corporate'**
  - 'School Education' Procedures

The "School Education" category within the register provides guidance in relation to the operational functions of schools, as well as the services and programs they offer.

The Sub-category '*School Management*' includes 'Managing Risks in School Community Activities'. This procedure specifically outlines the responsibility regional directors, principals, teachers and others have in managing the hazards and risks associated with all school curriculum activities.

The Curriculum Activity Risk Assessment Guidelines describe the scope of specific curriculum activities, sets minimum standards for supervision and qualifications, suggested risk control measures and guides staff through the written "Risk Assessment" process. This written assessment is necessary to help identify, minimise and record any inherent **High** or **Extreme** risks and subsequent control measures before the commencement of any proposed ITD curriculum activity.

- Workplace Health, Safety and Wellbeing procedures

The "Corporate – Human Resource Management" category within the register, and more specifically the "*Workplace Health, Safety and Wellbeing*" procedures provide guidance to implement practices which provide safe, supportive and healthy working and learning environments for department employees and other persons involved in department activities: e.g. First Aid, Managing Risks with Chemicals, WHS Officers, Incident notification.

3. *Work Health and Safety Act 2011* (Qld)

Schools are workplaces and, as such, operate under the *Work Health and Safety Act 2011* (Qld). New national legislation sets out legal rules that govern school workplaces to ensure the health, safety and effective welfare management of employees. The Act defines those with an obligation to ensure safety.

Note: for this legislation, the term 'The Act' is defined to include the regulations unless a particular provision provides otherwise.

4. Work Health and Safety Regulation 2011 (Qld)
    - The Work Health and Safety Regulation reflects the national model with some changes which will enable it to operate effectively in Queensland.
5. WHSQ – How to Manage WHS Risks, Code of Practice 2011

This Code of Practice applies to anyone who has a duty of care in the workplace. Health and safety obligations require duty holders (ITD teachers and administration, or 'workers') to consider all risks associated with work, not only those for which regulations and codes of practice exist. This Code operates under the national *Work Health and Safety Act 2011* (Qld) and the *Electrical Safety Act 2002*, to make sure all hazards in the workplace are eliminated or, at least, minimised to acceptably safe levels.

6. *Electrical Safety Act 2002* (Qld)

The Act imposing 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.

7. Australian Standards: **AS/NZS, 4801: 2001** – OHS Management Systems

"... organisations (including schools) must develop and implement control actions which, wherever possible, eliminate hazards or isolate people from the hazard. Where this is not possible, work activities should be planned or controlled through administrative means to the extent necessary to prevent injury and illness."

Note: for more information, or if further guidance is required on Health and Safety Legislation and regulatory **Codes of Practice** for department workplaces, refer to the following useful link:

- WHSQ – Codes of Practice Index

1.2.3 First aid facilities

In compliance with the *Work Health and Safety Act 2011* (Qld), all schools should ensure the health and safety of staff, students and "others". This statutory obligation requires Education Queensland to provide and maintain adequate first aid facilities in schools for the effective emergency management of accidents and injuries, based on an evaluation of risks and need.

Due to the many hazards and risks associated with the diversity of machinery, tools, materials and chemical substances used daily in ITD workshops, any injuries sustained have the potential to be more severe than might result in other subject areas in schools. ITD staff, therefore, should always be alert to quickly recognise reasonably foreseeable hazards and appreciate the levels of risk associated with them.

It is important therefore, that managed emergency first aid procedures be established to ensure that appropriate medical attention can be delivered in a timely manner. It is also recommended that the ITD department assist the school administration to identify and recommend all first aid equipment, placement of facilities and any professional staff training required.

Helpful MyHR W HS Staff Training Support Tutorials are available online:

- OnePortal – MyHR Student First Aid

The best way to be prepared for responding to injuries, accidents and emergency situations in ITD is to keep an appropriate, well stocked, First Aid Kit on hand – visible and accessible.

First aid kits should be wall mounted, dust proof, well signed, and contain an appropriate variety of dressings and bandages depending upon the environment in which they are to be used. The Queensland Ambulance Service has a number of different first aid kits available for use in environments ranging from the home, to schools and industrial work sites.

- Queensland Ambulance Service – First Aid Kit Fact Sheet

The Queensland Ambulance Service also has a very useful website. Staff can access numerous health and safety publications, details on first aid training courses available to teachers and several downloadable resources including some important emergency first aid and First Aid Training Courses.

Note: For more information, or further guidance on requirements for First Aid facilities and Staff training in Queensland schools, refer to the following useful links:

- Policy and Procedure Register (PPR) – First Aid
- Creating Healthier Workplaces (CHW) – First Aid
- WHSQ – First Aid in the Workplace Code of Practice 2014
- Regional Health and Safety Consultants

Further Useful Resources:

- Anaphylaxis Management
- Queensland Ambulance Service – fact sheets

1.2.4 Notification of accidents, injuries and incidents

The notification of accidents, injuries and health and safety incidents is also an important component in the management of health and safety in schools. The department has policies and procedures, in accordance with current legislation, that detail the requirements for the recording, notification and management of accidents and incidents in all department workplaces. The following link provides information on this procedure:

- PPR – Health, Safety and Wellbeing Incident Management

The department has also prepared for staff an “Incident Recording and Notification Guideline” providing information on the correct notification systems to be used, explanatory flowcharts and definitions.

MyHR WHS staff training material, including helpful online tutorials is also available:

- OnePortal – MyHR WHS Training and Support Material

The MyHR WHS Solution

All EQ Schools and Regional Offices that have access to the MyHR WHS Solution (MyHR WHS) are to record all health and safety incidents in MyHR WHS. If a “Notifiable” incident occurs then Workplace Health and Safety Queensland (WHSQ) must be notified immediately *(refer below).*

Note: If MyHR WHS is not available, e.g. system outage, school camp, excursion, staff with limited online access, then complete the paper-based Health and Safety Incident Data Collection Form.

Notifiable Incidents: For example, if a staff member or student sustained a significant, serious injury or illness whilst working in an ITD workspace, e.g. amputation, head injury, spinal injury, an electric shock, etc., then this incident is to be **notified**, by the school administration, directly to WHSQ immediately of the occurrence. It is recommended that workplaces notify WHSQ by phone on 1300 362 128 and then record the incident in MyHR WHS.

If notification is not made of a serious event in a department workplace, a WHSQ Inspector can issue an Infringement Notice for a breach of the legislation.

It is very important that all reported accidents and injuries be investigated by staff, irrespective of their degree of severity. Immediate interim safety control measures may need to be taken to help prevent any

similar recurrence. The current, proved Curriculum Activity Risk Assessment (CARA) or, perhaps, a particular Plant and Equipment Risk Assessment report may also need to be re- evaluated, modified and re-approved if necessary.

Note: for more information or guidance on requirements for notification of accidents and incidents in Queensland schools, refer to the following useful links:

- PPR – Health, Safety and Wellbeing Incident Management

Further useful resources

- DoE – Management of Safety in Design and Technology – checklist
- WHSQ – Managing Risks of Plant in the Workplace – Code of Practice 2013

1.3 Health, safety and the law

We are all expected to know the law. In a court of law, ignorance is not accepted as an excuse. Workplace Health and Safety legislation has gained an increasing profile. Trends in other parts of the world have resulted in an increase in litigation for negligence which is also evidenced in Australia. Obviously, it is uncommon for any one person to know and understand all of the law but it is important for teachers to have a basic understanding.

1.3.1 Statute law and common law

The various Acts and Regulations in relation to an ITD workplace are known as **Statute Law.** Such laws enforce rules and regulations imposed as an Act of Parliament. An example of such a law, and one that we all should abide by is the new "harmonised" National WHS Act, known as the *Work Health and Safety Act 2011 (Qld)*. The main aim of this national Health and Safety Act is to ensure that employers and employees can work together to help ensure we remain free from unacceptable risk of illness or injury created by workplaces and workplace activities.

- *Work Health and Safety Act 2011* (Qld)
- Work Health and Safety Regulation 2011 (Qld)
- WHSQ – Managing Risks of Plant in the Workplace – Code of Practice 2013
- WHSQ – Codes of Practice Index

Common Law establishes our diligent duty of care while at our place of employment (our school), i.e. acting in an appropriate manner and taking every care to prevent accidents and injury to our students, our staff, ourselves and others. It is imposed upon all teachers to ensure, so far as is reasonably practicable, that they take precautions to avoid foreseeable dangers to the students placed in their care. Such reasonable precautions are known as our statutory duty to take reasonable care, and include the following provisions:

- having a safe place to work, teach and learn
- identifying hazards and the seriousness of any resulting risks
- determining appropriate risk management measures
- ensuring safe, reliable workplace infrastructure, machinery, plant and equipment and materials
- providing competent, qualified and well trained staff.

Note: for most ITD curriculum activities in schools there is an increasing inherent potential for possible harm to students and staff. Consequently ITD teachers today have to be much more vigilant and hazard

aware, more ready to adopt protective and considered control measures through manageable ITD processes and systems, more persistent in taking precautions and invoking clear safety rules, and more prepared to proactively intervene to mediate professionally, knowledgeably and supportively where necessary.

1.3.2 Legal indemnity *(as of March 31, 2014)*

Departmental employees now have statutory protection from civil law actions while acting in their official capacity. If sued as a result of directly performing their duties and functions at school, ITD teachers should not incur any legal liability. This has transferred to the State following amendment of the *Public Service Act 2008*. Under the Queensland Government Indemnity Guideline, state employees *may* receive indemnity and legal assistance if involved in work-related civil or criminal proceedings, inquiries and investigations. If ever teachers are notified that they are a respondent, defendant or suspect in a proceeding, inquiry or investigation, they should contact (via email) the Legal and Administrative Law Branch or phone: (07) 3513 5800 for advice and assistance. Further information is available on our intranet OnePortal, and from the Public Service Commission.

1.3.3 What is 'reasonably practicable'?

This information provides some guidance for teachers on the meaning and application of the concept of '**reasonably practicable**' as defined in Section 18 - *Work Health and Safety Act 2011* (Qld).

When teachers and school administration *'workers'* are considering the hazards and risks associated with the health and safety of themselves, colleagues and students *'others'*, a number of their obligations under the Act are qualified by the words '**to take reasonable care**'. This relates to the extent to which schools and teachers should go to meet a legal expectation (or duty) of what is 'reasonable' in a particular situation. These obligations are framed to take account of the range of circumstances that might apply and to provide the ability to consider all the relevant factors when determining what it is '**reasonably practicable**' to do or to expect any employer to do:

- WHSQ – WHS Laws and Compliance Definitions – 'Reasonable Practicable'
- SafeWork Aust. – Interpretive Guideline, The Meaning of 'Reasonably Practicable'

Essentially, '**reasonably practicable**' means taking into account all relevant matters including:

- the likelihood that the risk could result in injury
- the seriousness of any injury that could result from realisation of the risk
- the availability, suitability, effectiveness and cost of the measures.

Finally, the required standard of care for all teachers and students is '**to take reasonable care**' for their self and others and to comply with reasonable directions and instructions as well as cooperate with any reasonable department policy or procedure. The term 'to take reasonable care' is ***not*** defined in the *WHS Act 2011* (Qld) but rather will be determined by a court under common law.

The test for what is '**reasonable care'** is an objective test. That is, a duty holder is to be judged by the standard of behaviour expected of a reasonable person in the duty-holder's position who is required to comply with the same duty and is:

- committed to providing the highest level of protection for people against risks to their healthand safety
- proactive in taking measures to protect the health and safety of people.

Note: for more information, or if further guidance is required on Health, Safety and the Law in Queensland Schools, refer to the following useful links:

- *Work Health and Safety Act 2011* (Qld)
- Work Health and Safety Regulation 2011 (Qld)
- WHSQ – Laws and Compliance
- WHSQ – Codes of Practice Index
- DoE, Creating Healthier Workplaces (CHW) – Health and Safety
- PPR – Managing Risks in School Curriculum Activities

1.3.4 Workplace health and safety school inspectors

Workplace Health and Safety Queensland (WHSQ) inspectors monitor compliance with WHS legislation. They also provide information and expert advice on WHS issues in the workplace.

- WHSQ – Return to work services

WHSQ workplace inspectors may:

- investigate workplace incidents
- investigate reports of unsafe or unhealthy conditions and hazardous work practices
- assess workplace health and safety risks to teachers and students
- conduct workplace health and safety inspections and audits
- provide information and guidelines on legislation.

Advance notice is not usually provided prior to a visit to a school. This is to ensure that the inspector can observe normal activities and procedures. W here advance notice is provided, schools should consult with their local or regional workplace health and safety consultant for advice about the pending inspection or audit. Schools should provide every assistance as requested. This could include the following:

- notifying your departmental regional WHS consultant of the presence of a WHSQ workplace inspector at the school and invite them to assist with issues raised during the visit
- providing all documents as requested
- answering questions and providing information
- providing convenient access to staff and students for interviews
- allowing access to workshops, machinery and computers including all files and records.

It is an offence to obstruct, threaten or interfere with a WHSQ workplace inspector. A WHSQ workplace inspector may take enforcement action during or after their visit, including:

- providing general guidelines and advice on health and safety issues
- giving verbal directions
- issuing Provisional improvement notices (PINs), machinery ‘lock-out’ notices, prohibition notices, dangerous goods directions, electrical safety protection notices or on-the-spot infringement notices
- cancel or suspend licences, approvals, certifications and authorisations.

For more information and guidance on WHSQ workplace inspectors and school safety audits, refer to the following useful links:

- WHSQ – Workplace Inspectors
- DoE, Regional Senior Workplace Health and Safety Consultants
- DoE, CHW – Managing Health and Safety

Further useful resources

- MyHR – Workplace Health and Safety – fact sheets

1.3.4 School-based health and safety advisors – HSA and HSRs

School based Health and safety advisors (HSA) and Health and safety representatives (HRS) play an important role in the department's commitment to maintaining and monitoring health and safety in our schools. HSAs advise management (administration) on the health and safety aspects at schools. They should assist principals with their responsibilities under legislation. The ability for a HSA to perform their responsibilities listed below will depend upon the level of support they are afforded.

- A qualified HSA should have undertaken any prescribed training
- The function of a HSA is briefly summarised by the following:
  - Conduct a departmental Annual Safety Assessment (ASA audit) to identify any hazards and unsafe or unsatisfactory WHS conditions or activity practices throughout the school every ***12 months***; ITD departments, as a work environment in a school, should be inspected during the audit to determine if all workshop spaces are free of hazardous conditions. HSA consultation with ITD HODs and staff is always critical. They will probably know of any existing problems and how to rectify them quickly
  - Record and report the assessment results to the Principal and WHS Committee
  - Make recommendations to rectify any identified hazards – then all records are to be retained by the Principal (School) for ***5 years***

The Principal also has a range of responsibilities to ensure the HSA can fulfil their functions:

- The Principal, as manager, should ensure an Annual Safety Assessment process is completed every year and all priority issues and strategies are noted in the school Action Plan - the HSA audit findings should also be incorporated into the school's Annual Operational Plan
- The appointment of a HSA does not, in any way, diminish the WHS obligations of the Principal, deputies, HODs or ITD staff.

Note: for more information, or if further guidance is required on HSA's in Queensland schools, refer to the following useful links:

- DoE, CHW – Health and Safety Advisor (HSA)
- DoE, Policy and Procedure – Health and Safety Advisor (HSA)
- DoE, Regional Senior Health & Safety Consultants
- DoE, CHW – Annual Safety Assessment
- DoE, Annual Safety Assessment Checklist – Industrial Technology and Design

1.4 Qualifications and requirements for ITD teachers and staff

1.4.1 Classroom teachers

To be eligible for employment as an ITD teacher in Queensland, you must have successfully completed a qualification accepted for teacher registration by the Queensland College of Teachers, such as:

- A course of preservice teacher education consisting of at least four years of academic study, including professional studies that are at least one year of academic study
- A graduate course of preservice teacher education consisting of professional studies that are at least one year of academic study, or
- Another course of teacher education, provided by a higher education institution, that the College is satisfied is the equivalent of a course mentioned above.

ITD teachers are normally required to be adequately skilled in the full range of subjects within the parameters of woodwork, metalwork, design technology, computer graphics, engineering and construction. However, depending on the qualifications and training of the staff member, it is possible to focus on one specific subject, i.e. Computer-aided Design and Drafting (CADD) rather than Technology Studies or Vocational Education and Training (VET).

For more information, or if further guidance is required regarding ITD teacher training options, minimum educational qualifications or practical workshop skills required, contact the department directly, or search and review online for current ITD Bachelor of Education (BEd) courses or upgrades availability through Universities in your area. ITD BEd or Grad Dip training programs may, for example, be offered through some Universities by combining practical workshop training through partnership with SkillsTech (TAFE Qld).

Minimum Qualifications Required for Practical Activity Supervisors

When teachers undertake to submit a Curriculum Activity Risk Assessment (CARA), they are required to list the qualifications held by all ITD staff involved in the delivery of that activity. The minimum qualification requirements are:

- Blue Card (working with children check) requirements should be adhered to
- a registered ITD teacher demonstrating experience and competency, (i.e. staff profile), or
- a registered teacher with additional training in a course where working in an ITD practical workspace was part of that course.

A registered teacher could demonstrate their competency to conduct an ITD curriculum activity to the person approving the Curriculum Activity Risk Assessment through their:

- possession of professional qualifications related to the subject manner of the activity
- demonstrated ability and/or expertise to undertake the activity
- experience (i.e. previous involvement) in undertaking a similar activity
- knowledge of the particular activity and the associated hazards and inherent risks.

Note: a leader other than a registered teacher (e.g. a visiting trade specialist) with formal trade qualifications and experience in a trade appropriate to a specific ITD practical activity, including VET, may participate **only** in the presence of a registered ITD teacher.

1.4.2 Vocational education and training (VET)

Vocational education and training (VET) is essentially "education and training for work" and forms part of a broader educational network in Australia that includes schools, universities and adult and community education.

Participating in VET at school can:

- support a student's transitions to employment, vocational and higher education pathways
- provide practical experience from work and familiarity on how workplaces operate
- develop employability skills and help improve interpersonal skills
- allow students to explore the potential career path they would like to pursue.

In our state, the Queensland Curriculum and Assessment Authority (QCAA) as a delegate for the national VET regulator, the Australian Skills Quality Authority (ASQA) registers, regulates and audits Queensland secondary schools as Registered Training Organisations (RTOs). When approved for registration as an RTO, schools can deliver and assess VET (to students in Years 10, 11 and 12 only) for all qualifications and accredited courses up to the Australian Qualifications Framework (AQF) Certificate IV level (except those declared as an apprenticeship in Queensland).

The school Principal (as the Chief Executive of the RTO) is ultimately responsible for ensuring that the school RTO complies with the VET Quality Framework. All RTOs should be compliant at all times. The Principal usually delegates responsibility and sufficient authority for day-to-day RTO operations to a school RTO Manager.

The Queensland Government has also recently established a Training Ombudsman as part of its commitment to providing quality training and reinvigorating the VET sector in Queensland.

- Training Ombudsman and FAQs

VET in year 10

Vocational education and training is an option for students in Year 10. Schools can offer a range of qualifications to help students proceed along a nominated pathway or to make decisions about future pathways not yet decided on.

For more information about delivering VET at the Year 10 level, consider the following:

- QCAA, Year 10 VET

VET in years 11-12

Schools can offer stand-alone VET courses, training and AQF qualifications for Year 11 & 12 students. The Australian Government website Training.gov.au has a database of all available training packages and their associated AQF qualifications.

Many schools also arrange for students to access VET qualifications through partnership arrangements with local TAFE colleges or private VET providers.

VET and the Queensland Certificate of Education (QCE)

VET certificates can provide credits towards the Qld Certificate of Education. Refer to the QCAA website for further details:

- QCAA – QCE Learning Options and Requirements

Note: for more information, or if further guidance is required on Vocational Education and Training (VET) in Queensland Schools, the Queensland Curriculum & Assessment Authority (QCAA) and industry skill requirements, refer to the following useful links:

- QCAA – Vocational Education and Training Information
- DoE, Vocational Education and Training
- WHSQ – Registered Training Organisation (RTO) Information

1.4.3 Conditions of employment for substitute ITD teachers

Substitute or relief teachers are employed under the teacher relief scheme (TRS) on a day to day basis to replace teachers who are absent for less than five consecutive days.

Industrial Technology and Design (ITD) is a specialised teaching faculty and requires that their substitute or relief teachers be suitably qualified if they are to instruct, or supervise practical ITD activities. Most practical ITD curriculum activities in schools pose increased potential for possible harm to students. Therefore, ITD teachers, substitute or otherwise, have to be vigilant and hazard aware, take precautions and invoke safety rules, be ready to install protective measures and systems and be ready to intervene and mediate. It is incumbent upon school administrators to consider these requirements when engaging any substitute, casual or contract staff for ITD vacancies.

- DoE, PPR – Teacher relief scheme – sick special emergent (TRS-SSW) fact sheet

1.4.4 ITD teacher aide qualifications and responsibilities

Teacher aides support teaching and learning in Education Queensland schools. The ordinary hours of work for an ITD teacher aide will vary enormously depending on the school and its size. Regular contact time can vary from 5 to 25 hours per week.

ITD teacher aides are also entitled to a meal break of 30 minutes (unpaid) if they work in excess of 5 hours on any day. There are no set uniform requirements however employees are required to wear protective clothing suitable for working in a workshop environment and are required to wear enclosed footwear at all times. Naturally, ITD teacher aides are also expected to wear all mandatory and appropriate PPE including vision and hearing protection.

Regular obligations and responsibilities

ITD teacher aide responsibilities might include:

- **Room and activity setup:** setting up of practical workshops and classrooms prior to a demonstration lesson by ITD teachers.
- **Stock control:** monitor the quantities of equipment, materials and supplies in the ITD department and advise the HOD or subject coordinator when purchases are required. The teacher aide should do a stocktake once every three months of items such as wood, metal, hand tools and electrical equipment. They may also unpack deliveries of equipment and materials into appropriate storage facilities. Additionally, the teacher aide may be required to monitor all ITD electrical and mechanical equipment to ensure they adhere to annual or bi-annual ‘testing and tagging’, etc.
- **Material preparation:** preparation of all materials for curriculum projects as requested by ITD teachers. This will usually require operating ITD plant and equipment such as a table saw, band saw, thicknesser and a docking (mitre) saw.
- **Maintenance:** responsibility for ensuring the maintenance of equipment, tools, and machinery at regular intervals or engaging the appropriate external tradespersons, e.g. a qualified electrician.

Maintenance may be undertaken with the ITD teacher if more than one person is required. This may involve operating ITD plant and equipment, performing simple welding tasks and undertaking minor departmental maintenance.

- **Administration:** provide administrative assistance to ITD teachers as requested. This may include photocopying information sheets for classes, conducting departmental stocktaking and keeping machinery maintenance records, phoning trades' people and assisting with quotes for repairs.
- **Basic cleaning and housekeeping:** this may involve emptying bins and dust filter collection bags, clearing unused materials, putting away hand tools and equipment, replenishing material supplies, and moving mechanical equipment between workshops as required. Cleaning should NOT include the duties of contract cleaners employed by the school to undertake regular daily cleaning tasks such as vacuuming, mopping of floors and cleaning windows.

There are no mandatory certificates or licences required to perform basic wood and metal machining or welding tasks for maintenance purposes in Queensland schools.

All ITD machinery, plant and equipment is potentially hazardous, particularly welding, and misuse can lead to catastrophic consequences. To demonstrate a minimum standard of competency, it is recommended that all ITD teacher's aides receive some technical training on standard ITD plant and equipment and expected related maintenance tasks. Training designed to provide basic skills in timber and metal preparation, welding, soft soldering, portable power tools and hand tools, etc., is desirable.

Note: it is important that ITD Teachers' Aides understand the significance of all larger construction tasks they are ask to undertake. Demonstrated experience is required to undertake ***any*** tasks described as 'structural construction' (in either steel or metal). Under no circumstances should ITD Teacher Aide and Schools Officer be expected, or encouraged, to undertake any structural construction work at a school unless they can demonstrate evidence of experience, suitable skill levels **and/or** carry the necessary trade qualifications up-to-dates, if and as required.

Refer to the table below for courses that are typical of those available:

MEM13014A	**Applying principles of occupational health and safety in the work environment** This unit covers adherence to occupational health and safety procedures in an engineering or similar work environment.
MEM14004A	**Planning to undertake a routine task** This unit covers a person planning their own work where tasks involve one or more steps or functions and are carried out routinely on a regular basis. It includes the concepts of following routine instructions, specifications and requirements.
MEM15024A	**Applying quality procedures** This unit covers applying established quality procedures to an employee's own work within a manufacturing, engineering or related environment.
MEM16006A	**Organising and communicating information** This unit covers accessing, organising and communicating information related to processes or tasks.
MEM16007A	**Working with others in a manufacturing, engineering or related environment** This unit covers operating in an interactive work environment. It covers contribution to a group effort in order to plan and carry out work. This includes identification of work roles, communication and cooperation with others.

ITD Teachers' Aides may at times also be asked to undertake work around the department considered to be **general** building and construction work. Under the national W ork Health and Safety Act: 2011, it is recommended that they also complete training and assessment to be issued with: CPCCOHS1001A - "W ork Safely in The Construction Industry", or **White Card**.

This qualification should provide the ITD Teacher Aide with some valuable basic knowledge and understanding of general construction work hazards and risk controls measures.

- WHSQ – Apply for a General Construction Induction Card

Note: for more information and guidance relating to ITD Teachers' Aides in Queensland Schools refer to the following link:

- OnePortal – Teacher Aides

1.5 Student induction to workplace safety and training

Student safety preparation, induction and safe operation procedures (SOPs) training must be designed to promote student awareness of workplace safety and educate them about the policies and procedures in ITD designed to make practical activities a safe learning experience.

1.5.1 Introduction to workplace safety – a student handbook

With any introductory workshop safety program, some points to remember:

- safety videos, theory tests, procedural practical demonstrations, information lectures or the issuing of “machinery competency licensing” should never substitute for a comprehensive and specific introduction to each and every new practical activity, plant and equipment and machine or operational process as they present themselves
- because of the number of different machines and the number of students involved, tests, of necessity, should be positive, simple and as brief as possible. They could be written or oral in style, or a combination of these
- the first occasion a student controls and operates any ITD machinery, plant or equipment should be under the direct supervision of a qualified ITD teacher. At this time the student should demonstrate orally and practically that the safe and proper methods of control and operation are clearly understood
- it is incumbent upon all ITD teachers to rigorously promote regular and ongoing reinforcement regarding student compliance with workshop safety rules and all specific PPE requirements.

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

- how the national *Work Health and Safety Act 2011* (Qld) regulates and mandates the curriculum content and the practical activity delivery process
- the dangers, safety hazards, inherent risks and preventative control measures commonly encountered in normal ITD workspaces
- the importance of Safe Operating Procedures (SOPs) of all machinery
- the importance of appropriate personal protective equipment (PPE)
- the importance of departmental workspace safety rules and consequences.

1.5.2 Student safety induction register

It is important to remember that a process of permanently recording a student's active participation in an introductory workshop safety induction program should be established in all ITD departments. Data gathered should accurately document individual student readiness and understanding of practical workshop activities and should be a measure of workplace awareness, confidence and operational proficiency.

Such a register, when completed effectively, should be collated by student name, date and particular process, for all ITD 'Workplace Safety Induction Procedures', and whether the processes were demonstrated, observed or evaluated by the ITD class teacher. In summary, a typical safety induction register might include the following content:

- the successful completion of an appropriate 'Introduction to Workshop Safety' handbook or worksheets (or similar) by each student at the commencement of each year level, plus a task-specific similar exercise based upon the introduction of new materials, machinery and processes as they present themselves
- the results of any verbal or written analysis (tests) relating to safety when using materials or machinery, etc.
- 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
- machinery and equipment proficiency testing or "Safe Operational Machinery Licensing" of individual students.

Student 'Workplace Safety Induction' registry data should be regularly monitored by HODs and retained by each school for their continuing students.

Some schools choose to utilise the services of a third-party program/provider to help manage their student record keeping requirements for 'Workplace Health and Safety Training and Induction'.

DoE is currently developing an online computer based register (possibly accessible through OneSchool) for the recording, collating, storing and sharing state-wide of individual ITD student 'workplace safety induction' participation data. Schools will be advised when this product becomes available.

Operational and safety procedures poster

For machinery, plant and equipment, students should demonstrate knowledge, understanding and competent application of operational and safety procedures before being permitted to use a particular machine. Below is an operational and safety procedures competency poster that could be displayed in all practical workspaces. This is a reminder to students NOT to be tempted to operate machinery and equipment in any ITD workplace unless they have been assessed as competent to do so.

DO NOT OPERATE THIS MACHINE

unless you have demonstrated competence 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 must be worn.

Industrial Technology and Design Department

Example State High School

Mr I. M. Allthumbs, Head of Dept.

January, 2018

1.5.3 A message to parents, and student safety contracts

A well prepared 'Introduction to workplace safety' booklet for students (or a similar folder of worksheets) will also encourage parents to become involved by keeping them up to date with ITD WHS policies and procedures. A formal introductory message to parents could be incorporated into the student safety booklet and might include such information as:

EXAMPLE STATE HIGH SCHOOL

Industrial Technology & Design Department

A MESSAGE TO PARENTS

Dear Parents of ITD Students,

To ensure the quality of safety education in the Industrial Technology & Design Department (ITD) at Example High School we have implemented WHS procedures that are linked closely to those of Industry practices.

My letter to you today includes important workplace safety information that you and ITD students need to be aware of. Please take the time to read it.

Under the national *Work Health and Safety Act 2011* (Qld), both teachers and students have obligations. Teachers are obligated to provide students with a WHS Introduction to Workplace Safety program, followed by informed instruction, workshop demonstrations and close supervision of safe working practices within all ITD practical workspaces.

It is extremely important for parents to be aware of their child's obligations to also be safe around themselves and others. Failure of students to comply unfortunately means that they may be excluded from the ITD practical workshop environment for a time.

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

The ITD 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 are displayed in each classroom. Teacher instruction is provided to all students regarding our safe working environment and our culture of safety. Students should become very familiar with their obligations regarding safety in ITD.

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 entails the teacher explaining to the student how they failed to meet their obligations
- Writing out the guidelines for safety and behaviour in ITD
- The teacher will contact parents either by phone, or in writing which will require a parents 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 ITD 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 should only be used with due care and consideration.

Should you have any further questions, we invite you to contact the school or the ITD Head of Dept.

Yours Sincerely.

Head of Department, ITD — *Mr. Allthumbs*

Principal — *Mr. Niceguy*

Student safety contracts

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

Note: the example shown below has no legal bearing and is nothing more than a mechanism by which teachers can exercise their diligent duty of care thus ensuring that appropriate W HS information is seen to be provided for all students. Most parents or guardians should welcome the opportunity to share in the ITD student safety induction process, acknowledging the fact that they too have an obligation and a responsibility for ensuring safety at school and thus offer their pledge to help the school to provide 'good practice' duty of care.

EXAMPLE STATE HIGH SCHOOL

Industrial Technology & Design Department

WORKSHOP SAFETY RULES

- Students must 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 must 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.

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/guardian) 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:** **/** **/**

Note: *this Safety Contract will be retained on file at the School for a period of one (1) year. Please return completed, signed and dated, to your ITD teacher ASAP.*

An obligation agreement

This is another form of safety contract often adopted by schools that is an excellent way for ITD teachers to make sure that all parents are adequately informed and are fully aware of the responsibilities of their child undertaking ITD as a course of study conducted through the ITD facilities at your school. The content of the agreement should ask all students and their parents to acknowledge that they too have an obligation and a responsibility for ensuring safety at school and help provide 'good practice' duty of care for students. The agreement document would usually 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.

Note: as with the Student Safety Contract, again, this type of document has no legal bearing and is nothing more than a mechanism by which teachers can exercise their diligent duty of care thus ensuring that appropriate W HS information is seen to be provided for all students. Most parents or guardians should welcome the opportunity to share in the ITD student safety induction process, acknowledging the fact that they too have an obligation and a responsibility for ensuring safety at school and thus offer their "pledge" to help the school to provide 'good practice' duty of care for our students in ITD.

EXAMPLE STATE HIGH SCHOOL

Industrial Technology & Design Department

OBLIGATION AGREEMENT

The majority of accidents in a workplace are caused by human factors. Students will need to show a mature attitude and display safe working practices at all times.

Student's name: _____ **Class:** _____

I have read and understand the ITD safety procedures and I will endeavour to carry them out at all times. I will follow my teachers' instructions and will always wear the correct safety footwear and safety glasses in practical workshop lessons. Failure to do so may deny me the use of workshop facilities.

Student's signature: _____

Date: */ /*

Parent's signature (as an acknowledgement): _____

Date: */ /*

Note to parents: Students are required to complete a number of practical exercises for assessment. Once completed and subject levies are paid, students 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 were never intended to conform to Australian Standards and should only be used with due care and consideration.

Note: T*his agreement will be retained on file at the School for a period of one (1) year.*
Please return completed, signed and dated, to your ITD teacher ASAP.

Parental consent form – for high and extreme risk activities

As a requirement of our risk assessment processes in ITD, it is recommended for risks designated **high**, and required (mandated) for risks designated **extreme**, that schools first obtain additional parental consent, including all relevant medical information for individual students, before permitting them to participate in these activities.

The following is an example of a 'parental permission or consent form' designed to assist schools in their planning for **high** and **extreme** risk activities. This is an excellent way for ITD staff to ensure that all parents are adequately informed and are fully aware of their child's undertakings in ITD curriculum activity programs at your school.

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.

PARENTAL CONSENT FORM – 2018

Dear parent/caregiver

Your child has elected to undertake study in at least one of the ITD Faculty practical subjects offered at Example State Hugh School for 2018. 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 Education Queensland to have a potential **high** or **extreme** risk of injury associated with their use.

As a requirement of our risk assessment process, it is recommended for risks designated **HIGH**, and required for risks designated **EXTREME**, that the school 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.

ITD subjects most likely to be utilising some or all of these resources and processes during 2018 are:

Years 10, 11 & 12 – Cert 1. Engineering, Cert 1. Construction, Furnishing Studies, Technology Studies.

Years 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 ITD subject, utilising the resources as identified, please complete the consent details on the form below.

NOTE: Should you require any further information, please contact the school on 07 31234567.

I understand my son/daughter _____ is undertaking practical subjects which may involve the use of specific ITD machinery, power tools or 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.

Please discuss any of your child's medical conditions you feel may be relevant, and indicate how they may affect your child's ability to use any particular machine, power tool or ITD manufacturing process.

I have privately advised the school administration of my child's medical conditions, and have detailed any concerns I have relevant to this PARENTAL CONSENT FORM. I have also identified how this condition may affect my child's ability to use particular machinery, power tool or ITD manufacturing process as outline above.

Parent's signature: _____ Date: / /

2. Risk management

Ensuring safety in any workplace is achieved through effective risk management. This is, of course, a significant part of our core business. It is important, therefore, that all teachers with responsibilities for the planning and implementation of ITD curriculum activities have a clear understanding of the risk management process and how it can be applied to safely manage the activities we undertake with our students.

2.1 Risk management guidelines

The resources in this section have been developed to support ITD staff in schools meet their responsibilities with confidence. They have been designed to provide teachers with information and tools needed to help identify a variety of ITD workplace hazards and how to manage exposure to the risks associated with those hazards or potentially hazardous situations.

Our department website, Creating Healthier Workplaces (CHW) – Health and Safety provides information, guidelines and advice to schools on all aspects of WHS including:

- Industrial Technology and Design (ITD) Home Page
- Health and Safety Risk Management Guidelines
- Curriculum Activity Risk Assessment Guidelines
- Health & Safety Policies and Procedures
- Safety and Hazard Alerts
- Incidents and Investigations Guidelines
- DoE, Regional Health and Safety Consultants contact details … and much more.

The Department of Education (DoE) is committed to the health, safety and wellbeing of students, staff and others involved in all curriculum activities conducted at schools or other locations. This requires all schools to proactively manage all aspects of risk for curriculum activities with consideration of learning outcomes and the safety and well-being of all participants.

Note: for more information, or if further guidance is required on risk management guidelines and advice for Queensland schools, refer to the following useful links:

- *Work Health and Safety Act 2011* (Qld)
- Work Health and Safety Regulation 2011 (Qld)
- PPR – Managing Risks in School Curriculum Activities
- WHSQ – How to Manage WHS Risks, Code of Practice 2011

2.1.1 Risk management overview

It is essential to have effective processes in place for the good management of ITD workplace hazards and inherent risks because ignorance or obvious disregard will predictably result in injury or illness with possible severe repercussions for any ITD staff, students and others associated with this instructive, practical educational environment.

Effective risk management starts with a commitment to health and safety. When considering risk management across ITD activities, the following guidance is provided:

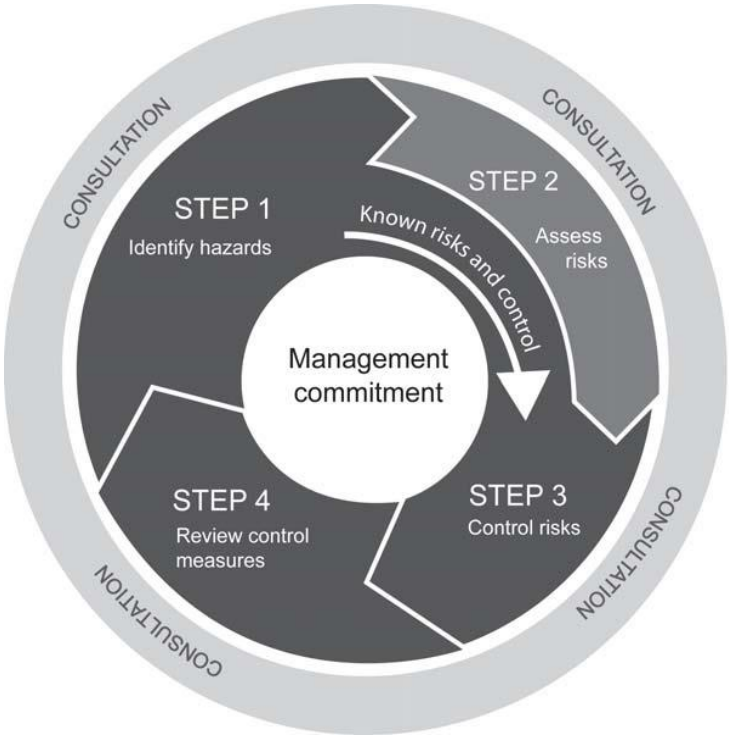
- an explanation of the ‘risk management process’
- Links to DoE risk management policies and procedures
- tools to assist ITD staff with the complete departmental risk management process

The national *Work Health and Safety Act 2011* (Qld) describes the risk management process as involving some basic principles:

- the early awareness and identification of potentially hazardous workplace situations
- judging how dangerous these hazards might be, and assessing any perceived risks
- doing something about it, by way of making decisions on, and then implementing adequate control measures
- the regular monitoring or review of your control measures to make sure that they are effective into the future, and that any identified risks are eliminated or at least, managed.

Risk management, in the simplest terms, is a structured and systematic approach to decision-making for a range of issues including health and safety management. Once a hazard has been identified, a series of four steps has to be followed – called the risk management process.

The risk management process



2.1.2 Risk management code of practice

The Workplace Health and Safety Queensland risk management code of practice defines and explains the recommended four step risk management process that teachers and leaders in schools (principals) are required to follow. This code commenced on 1 January 2012.

The Code operates under the national *Work Health and Safety Act 2011* (Qld) and the *Electrical Safety Act 2002* (Qld) to help ensure all hazards or potentially hazardous situations in the workplace are eliminated or, at least, minimised to safe levels.

ITD teachers are required to apply this process, in accordance with the department's policy and procedure managing risks in school curriculum activities, for the range of practical curriculum activities that occur in their department. The level of complexity of the process and subsequent documentation required will depend on the assessed risks levels of the proposed activity.

The meaning of key terms in risk management

- **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 – o*r, 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 should 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 must 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.
- **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.

2.1.3 The four step risk management process

A safe and healthy workplace does not happen by chance or guesswork. You have to think about what could go wrong at your workplace and what the consequences could be. Then they should do whatever they can (in other words, whatever is 'reasonably practicable') to eliminate or minimise health and safety risks arising from your business or undertaking.

This process involves four distinct and recognised stages of risk management as identified in the national *Work Health and Safety Act 2011* (Qld).

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.

- (refer also to Section 2.1.5; *'ITD Hazard Identification'* for further detail)

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 it happening. A risk assessment can help you determine:

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

Note: a risk assessment is mandatory under the WHS Regulations for **High** and **Extreme** risk curriculum activities.

Risk level is assessed by considering the '**likelihood**' of an incident occurring, any possible harm or injury 'likely' as a result, and if so, what you believe the likely health '**consequences**' might be. The more likely an incident is to occur and the worse its consequences, the higher the risk. Remember to assess the degree of risk for **each** hazard.

Risk = likelihood x consequence

Use the matrix below as a guide to assist with your risk assessment.

Likelihood	**Consequence**				
	Insignificant	**Minor**	**Moderate**	**Major**	**Critical**
Almost certain	Medium	Medium	High	Extreme	Extreme
Likely	Low	Medium	High	High	Extreme
Possible	Low	Medium	High	High	High
Unlikely	Low	Low	Medium	Medium	High
Rare	Low	Low	Low	Low	Medium

Step 3 – how to control and manage the risks

The most important step in managing risks involves **eliminating** them, so far as is reasonably practicable. If that is not possible, you must endeavour to **minimise** the risks, so far as is reasonably practicable.

There are many ways to control risks and some control measures are more effective than others. Effective risk management may involve a single control measure or a combination of different controls that together provide the highest level of protection that is reasonably practicable.

The ways of controlling risks are ranked from the highest level of protection and reliability to the lowest. This ranking is known as the 'hierarchy of risk control'. The WHS Regulations requires teachers to work through this hierarchy when managing risk under the WHS Regulations. Aim to **eliminate** a hazard, which is the most effective control. If this is not reasonably practicable, **minimise** the risk by working through the other alternatives in the hierarchy.

- (refer also to Section 2.1.4; *'The hierarchy of risk control'* for further detail)

Step 4 – how to monitor and review the controls

The control measures that teachers put in place should be reviewed regularly to make sure they work as planned. Don't wait until something goes wrong. There are certain situations where staff should review their control measures under the WHS Regulations and, if necessary, revise them. A review is required:

- when the control measure is not effective in controlling the risk
- if a new hazard or risk is identified that the existing control measures may not effectively control
- if the results of consultation indicate that a review is necessary
- if a health and safety representative requests a review.

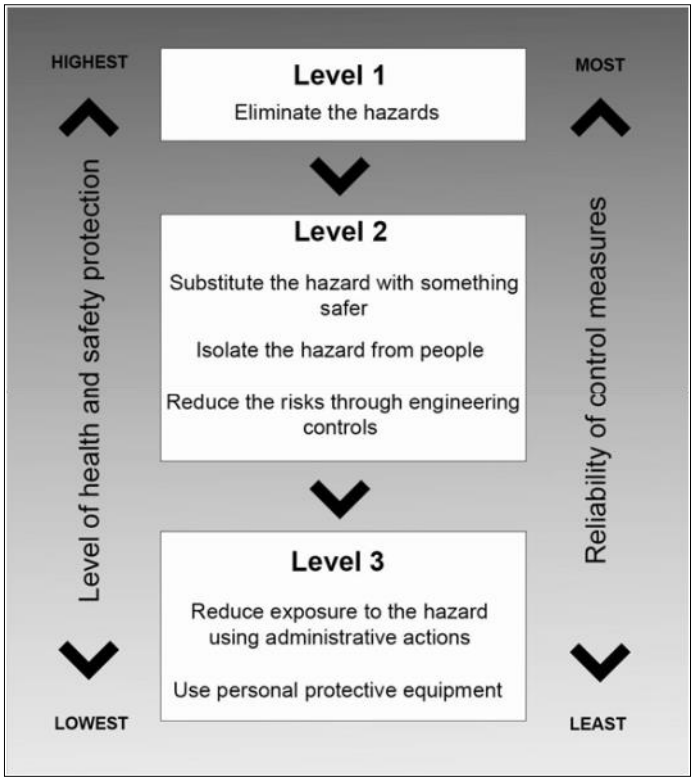
For more information, or if further guidance is required on the risk management process for Queensland schools, refer to the following useful links:

- How to Manage WHS Risks – Code of Practice 2011
- *Work Health and Safety Act 2011* (Qld)
- Work Health and Safety Regulation 2011 (Qld)

2.1.4 The hierarchy of risk control

The ways of controlling risks are ranked from the highest level of protection and reliability to the lowest, as shown in the diagram below. This ranking is known as the hierarchy of risk control. The WHS Regulations requires duty holders (e.g. Heads of department and their staff) to work through this hierarchy when managing risks in ITD practical activities.

The hierarchy of risk control



Always aim for the **most effective** control measure, which is to **eliminate** a hazard. If this is not reasonably practicable, endeavour to **minimise** the risk by working through the other alternatives in the hierarchy as follows:

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.

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.

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; paint yellow 'safe working zone' lines on the floor around all fixed plant and machinery; store harmful chemicals in a fume cabinet or a dedicated volatile store room.
- 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 rooms.

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.
- use personal protective equipment (PPE) – administrative controls and PPE should 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).

For more information, or if further guidance is required on the hierarchy if risk control in, refer to the following useful links:

- How to manage WHS risks – Code of Practice 2011
- *Work Health and Safety Act 2011* (Qld)
- Work Health and Safety Regulation 2011 (Qld)

2.1.5 ITD hazard identification

While staff should be alert to hazards at any time, routine inspections of the workshops and work practices should be conducted regularly. However, informal hazard identification should be incorporated into your daily routine. When new procedures or equipment are introduced or if there are changes to the physical workspace environment, a thorough hazard assessment should be conducted.

Hazards come in many forms. To assist schools in addressing their hazard identification and risk management process, a checklist has been developed. This checklist might be used to assist WHS officers and safety committees to report on the safety of an ITD environment.

A checklist for identifying hazards in ITD

This checklist provides guidance only. It is not intended as a definitive list for the identification of all hazards. Schools are advised to modify this list as needed in accordance with their own circumstances:

1. ITD buildings and practical workspaces

- All areas should be kept clean and tidy. Inspect for any slip, trip or fall hazards
- There should be sufficient space for each student to work effectively and safely.
- Floor surfaces should be maintained in a safe condition and be suitable for the type of activities conducted in the particular workspace
- Walls, ceilings and roofs should be structurally sound, safe and in good condition.
- Steps, stairs and access ramps should be in a safe condition with safety signage, a non-slip surface, and secure handrails where needed.
- All doors, windows, external and internal locks and latches are to be in good working condition.
- There should be adequate ventilation and fresh air to all workspaces.
- Isolation valves are to be readily accessible and clearly labelled.
- There should be adequate lighting to conduct practical activities safely.
- Toilet facilities are to be cleaned and maintained to an appropriately hygienic condition. Hand washing facilities should be available.
- Disability access facilities are to be provided and appropriate signage displayed.
- All gas and water pipes are to be clearly labelled with appropriate signage.

2. Electrical safety

- Electrical equipment is to be in good condition with any testing tags ‘up-to-date’ as required by the department's electrical testing procedures.
- All new power tools and equipment require ‘testing and tagging’ prior to initial use.
- Residual current devices (RCDs) should be regularly tested and in working condition.
- All power boards should have an overload switch.
- Overhead cables should not a hazard.
- Electrical cables and cords are to be kept clear of walkways, etc.
- The power distribution board should always be clean and readily accessible.
- All identified ‘electrical caution’ areas should be prominently signed.

3. Fire safety and emergency responses

- All departmental schools will have an Emergency management plan that will identify key personnel as controllers. All staff members should be familiar with their emergency control team
- Fire safety, emergency information and evacuation routes are to be prominently displayed
- The facilities and all surrounding areas should have an audible emergency fire and evacuation alarm system

- Doorways, walkways and evacuation exits are to be kept clear and at least 600 mm wide
- External exit doors must not be locked from the inside, be readily opened in an emergency without a key and be identified with appropriate emergency signage
- Battery backup for all emergency exit signs and corridor lighting should be installed
- Fire control equipment should be accessible, signed appropriately, and regularly tested
- All ITD facilities should have an emergency gas supply isolation valve where required
- An approved first aid kit should be readily available in each practical workspace and stocked appropriately – with extra consideration for eye injuries and burns
- There should be emergency eye wash and drenching facilities available.

4. Fume extraction hoods

- Fire and explosion from highly volatile, combustible materials is a major hazard. All fume extraction installations should be checked for compliance with AS/NZS 2243.8, 2001 and inspected by a fume maintenance contractor every 12 months.

5. Furniture, fixtures and fittings

- All workspace furniture, such as benches, cupboards, platforms, screens and display fittings or fixtures, should be safe and in good condition.
- Work benches should be are positioned for safe, comfortable use, access or egress.
- Light fittings, fixtures and ceiling fans should be in good working condition.
- Light bulbs and fluorescent tubes should be guarded where there is a risk of damage.
- Hanging fixtures, fittings and displays should not pose any hazards.

6. Chemicals and hazardous materials

- Safety Data Sheets (SDS) are to be readily available and current within five years.
- Chemicals and hazardous materials should be stored and labelled appropriately.
- Spill control systems should be in place, i.e. absorbing materials, etc.
- Chemicals presenting an uncertain or unpredictable risk must be controlled and monitored.
- Appropriate eye washing and dousing facilities should be available in the event of an accident with chemicals.

7. Management procedures

- Safe Operating Procedures (SOPs) should be displayed near potentially hazardous equipment.
- Equipment Maintenance Records (EMRs) should be available.
- Approved personal protective equipment (PPE) is to be available and in good condition.

8. Machinery, plant and equipment

- Manuals should be available for operating all ITD machinery, plant and equipment.
- EMRs should be regularly completed for all fixed plant and equipment.
- Moving parts of all plant should be guarded in accordance with the *Work Health and Safety Act 2011 (Qld)*.
- Plant and machinery should display all appropriate safety signage (including SOPs).
- Emergency stop devices are to be readily accessible on all machines that require them.
- No machinery and equipment should expose students and staff to hazards due to noise, fumes or other factors, (i.e. over 85 dBA for eight hours).
- Dust extraction systems should be working efficiently where required, and be fitted with an inspection point where a blockage is likely to accumulate.
- Fume extraction systems should be in place where required.
- All fixed machines are to have clearly defined ‘safe work zone’ floor boundaries marked with 80 mm wide bright yellow delineation lines.

9. Spray painting

- Skin contact or inhalation of spray painting material is a major health hazard. Spray painting or air brushing should, where practical, be carried out in an approved spray booth. The system should be fitted with a particulate filtration mechanism to filter any overspray.
- Always avoid the use of 2-pack paints containing isocyanate compounds such as toluene diisocyanate. HODs need to understand the added health risks involved, and know how to adequately protect all users against them.
- 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. Fans and natural fresh air (as well as local exhaust ventilation) should be used to displace contaminated air.
- Fire and explosion from highly volatile, combustible materials is also a major hazard. All spray booth installations should be checked for compliance with AS/NZS 4114.1:2003 and AS 1482:1985 and be inspected by a qualified maintenance contractor every 12 months.
- Any possible sources of ignition should be identified and isolated, including static electricity, in areas around any spray painting operation. Lights and switches should be spark proof.
- Use water based paint instead of organic solvent based paints whenever possible.
- Regularly clean the spray booth to prevent paint build-up.
- Flammable materials such as paints and thinners should be correctly stored.
- Appropriate breathing apparatus should be available and worn when required.
- Suitable fire prevention, including extinguishers should be available in this location.

10. Storage

- Storage areas can be secured to prevent any unwanted, unauthorised access.
- Flammable materials should be stored and handled in a safe manner.
- Materials, resources and equipment should be stored safely and securely.
- Free standing shelves or cupboards should be secured to ensure safety and stability.
- Storage areas should display appropriate signage and HAZCHEM labelling.
- Waste containers should be available in each workspace.

11. Welding and soldering

- There should be a separate storage area for full and empty gas cylinders.
- All gas cylinders are to be stored in an upright position and chained to a trolley or stand.
- Where applicable, manifolds should be located and guarded to protect them from damage.
- Operating instructions are to be prominently displayed for the safe ‘opening and shut-down’ procedures of all gas supply cylinders and manifolds.
- All appropriate UV welding helmets, IR safety goggles, face shields, gloves, aprons, jackets, spats, etc. should be available and in good repair.
- Operators should be suitably insulated from electric welding tables, damp concrete floors and any exposed parts by rubber matting, wooden duck boards or other means.
- Any water on the floor is to be investigated and removed immediately.
- All electric welding bays should be fitted with appropriate UV flash screens or curtain.
- Electronics soldering areas should also have good ventilation, lighting and fume extraction.

12. General

- All other potential hazards such as chemicals, waste, dust, fumes, sharps, glare, noise or even the evidence of possible vermin infestation are investigated and identified.

For more information, or if further guidance is required on hazard identification in ITD departments in Queensland schools, refer to the following useful links:

- DoE, Disaster and emergency management

2.1.6 Manual handling and ergonomics

Manual handling and ergonomics covers a range of activities in the schools and particularly the ITD workspace and physical education environments. This includes any manual task from entering data into a computer to moving heavy metalwork benches, unloading delivery stock, using portable power tools and equipment or even helping transferring a student from a wheelchair onto a toilet. These tasks involve the exertion of force to gasp, lift, lower, push, pull, carry, throw, move, slide, hold or retrain an object, load or body part.

Manual handling (also called manual tasks) can be hazardous and can contribute to a range of musculoskeletal disorders (injuries) for ITD teachers including:

- sprains and strains of muscles, ligaments, discs and other structures of the back
- injuries to soft tissues such as nerves, tendons, ligaments in the wrists, arms and shoulders
- abdominal hernias
- injuries such as abrasions, lacerations, bruising, fractures or amputations to the hands, fingers, legs, feet, toes, and head, etc.

These types of injuries are often cumulative with damage occurring over a period of time before pain or injury is apparent. Steps can be immediately implemented to minimise the risk of injuries associated with manual tasks in ITD. Planning the task, using equipment to reduce the effort required and asking for help are simple ways to reduce the risks.

By identifying the risks and preventing or minimising personal injury is the purpose of the various advisory standards providing guidance on manual tasks. The Manual Tasks Advisory Standards 2001 defines 10 risk elements associated with the performance of manual tasks.

ITD teachers need firstly to identify the potential risks created by:

- forceful exertion
- restricted or incorrect working posture
- repetition and duration
- excessive vibration
- slips, trips and falls on floors, stairs and ramps or in outdoor areas
- workshop or storeroom design layout and organisational factors
- characteristics of specific tools and machinery commonly used
- manual handling of heavy materials, workspace furniture and machinery
- an individual's capability.

When completing a manual handling risk assessment, teachers must also consider control measures that will help eliminate or minimise exposure to any risks. The most effective time to ensure that most manual task risks are controlled is when designing ITD practical workspace environments, recommending the procurement of new machinery, plant and equipment, and when planning practical curriculum activities.

For more information, or if further guidance is required on the risk of injury in ITD through manual handling tasks, refer to the following useful links:

- Worksafe Qld – Hazardous manual tasks – Code of practice 2011
- Worksafe Qld – How to Manage WHS Risks – Code of Practice 2011
- DoE – Slips, trips and falls checklist
- DoE, CHW – preventing slips, trips and falls fact sheet
- DoE, CHW – end of year clean up and relocations fact sheet

2.2 Risk assessment guidelines

This section aims to assist ITD staff undertake an effective risk assessment – required for a specific practical curriculum activity, to manage a practical workspace, to manage the use of ITD plant and equipment and to control and monitor the use of hazardous chemicals in the department. Information presented in these guidelines should be seen as the 'minimum expected standard' to manage risk, rather than the definitive list of department requirements.

When planning any ITD risk assessment, staff should carefully consider specific factors, such as:

- **Which students will be involved?** – *age, maturity, experience, specific needs, class size, etc.*
- **What will students be doing?** – *theory, construction, machining, welding, thermoplastics, etc.*
- **Where will the students be?** – *practical workshop, CNC lab, construction court, at height, etc.*
- **What equipment will students be using?** – *machinery, power tools, hazardous materials, etc.*
- **Who will be leading the activity?** – *supervisors, staff experience and qualifications, etc.*

All risk assessments are best completed collaboratively. Therefore, HODs are encouraged to involve those responsible for planning and delivering a particular practical activity in the overall risk assessment process.

2.2.1 Curriculum activity risk assessment (CARA)

The majority of routine classroom curriculum activities involve minimal risk to safety, and can therefore be considered **Low Risk**. As these activities have little inherent risk, a formal written risk assessment is not required. Schools can manage this risk through regular class planning.

For **Medium** risk activities, schools can document risks and controls, and manage risk, through regular curriculum planning processes.

For **High** and **Extreme** risk activities, a CARA must be prepared, approved and recorded – either online through OneSchool or alternatively with the school's administration, i.e. School Curriculum Activity Register.

Curriculum Activity Risk Assessment (CARA) activity guidelines have been developed for the most common curriculum activities in schools. These are available online, updated when necessary and are designed to help teachers navigate the risk assessment process.

These guidelines should be referred to when completing the CARA application module currently available through OneSchool, or alternatively, schools may elect to complete the following two ITD CARA templates that were previous available for download – these original templates are equivalent to, or exceed the minimum requirements specified in the OneSchool process.

Specifically, the two (2) CARAs to be considered by ITD staff are:

- Conducting an Industrial Technology and Design Activity
- Managing a Practical ITD Workspace

In summary - minimum procedural requirements for the effective management of **High** or **Extreme** risk assessments in any school curriculum activity include:

1. For **High** risk activities:

- Discuss the intention to undertake a high risk activity with the HOD or subject coordinator
- Complete a CARA for the proposed activity, either through OneSchool or by downloading and completing the original DoE risk assessment templates for both ITD CARAs.
- Obtain signed approval to undertake the activity from the Principal, a delegated Deputy or HOD, prior to the activity being undertaken. Maintain a register of all approved CARAs.

2. For **Extreme** risk activities:

- Consider whether the activity should be undertaken as a part of a DoE curriculum. Ask – "Do the potential benefits of the activity warrant the inherent **Extreme** level of risk?"
- Discuss the intention to undertake an **Extreme** risk activity with the HOD or subject coordinator and complete a CARA for the activity
- Attach any further supporting documentation that you believe may provide evidence of the school's systematic risk management processes for specific ITD practical activities
- Obtain signed approval of the Principal to undertake the activity, in accordance with the CARA, prior to the activity being undertaken
- Always inform parents and carers of the details of any **Extreme** risk ITD activity and obtain written permission for all students that may be involved.

Sample parental permission templates are available to assist schools in their planning for **High** and **Extreme** risk activities.

- DoE, Parental Permission Template
- Alternative Example - Parental Consent Form

2.2.2 ITD Activity Information Sheets – CARA Support Attachments

When teachers elect to lodge an ITD Activity CARA online through the OneSchool risk assessment process, it should be noted that there is provision to attach additional supporting documentation to each online submission The following 'Information Sheets', (included as appendices in Section 7 of this document), have been adapted from our superseded ITD CARA templates and all contain valuable advice regarding 'Special Conditions', and 'Suggested Risk Control Measures' for specific ITD practical activities.

To attach an ITD Activity Information Sheet as supporting documentation for an online CARA submission, teachers should follow these steps:

- Find the desired Information Sheet in the Appendices section
- Select 'Print' options and choose the PDF printer application for your 'printer'
- Select the relevant page number to print your chosen sheet
- When prompted, select where to save this new file
- Name the file appropriately
- Ensure 'PDF files' is selected for 'Save as type'
- Then 'Save'. This new file is now available to be uploaded into OneSchool as an attachment

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

Note: For more information, or if further guidance is required on Curriculum Activity Risk Assessment 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: 2011

2.2.3 Plant and equipment risk assessment

Risk assessment generally is the overall process of looking at what can cause harm, how likely and how severe the harm could be, and what could be done to minimise or prevent it. This process applies equally to **all** applications of "risk" determination, including the use of all ITD machinery, plant and equipment.

The term "machinery, 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 broadening range of CNC technologies.

An extensive online index of ITD Plant and Equipment Risk Assessment (P&ERA) templates has been prepared by the department. Templates are easy to access, download and print-off for a school's requirements:

- ITD plant and equipment risk assessment templates – (P&ERAs)

If a specific P&ERA template document **is** available from the department online, it should be completed and signed *(either in hardcopy or electronically)* as a written "Risk Assessment" for that item – and will remain current for five (5) years. However, if NO specific template document is currently available, the school should endeavour to create their own. Contact the department's Organisational Safety and Wellbeing Unit if further help is required.

Note: However, if the inherent or perceived risk level of a particular item is considered by staff or Head of Department to be **Low**, and there is only a slight chance of accident, incident or serious injury when used appropriately, then regular safety control measures may be managed through individual activity planning processes, and a written, signed risk assessment would NOT be required to be completed – however, many schools still do so.

Similarly, if the item of plant and equipment carries pre-determined inherent risks considered to be **Medium**, and there is some chance of an accident, incident and minor injury requiring first aid, then implemented control measures need to be documented, and **if** teachers considers it necessary, a full P&ERA ***can*** and ***should*** be completed.

For **High** to **Extreme** levels of preserved risk, i.e. '*should an accident occur, there would be a real chance of a serious or debilitating injury occurring*', then a P&ERA should always be completed, signed and approved by admin prior to its use in any ITD curriculum activity.

All completed Plant and Equipment Risk Assessments should be monitored and reviewed annually whenever ITD staff vary 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 P&ERA will remain current of five (5) years.

Note: For more information, or if further guidance is required on Plant and Equipment Risk Assessments guidelines for Queensland schools, refer to the following useful links:

- DoE, CHW – Risk Management
- DoE, CHW – Industrial Technology and Design
- DoE Fact Sheet – Managing Plant and Equipment in ITD
- WorkSafe Qld. – Managing Risks of Plant in the Workplace – Code of Practice 2013

2.2.4 Chemicals and hazardous materials risk assessment

The purpose of a chemical risk assessment is to enable decisions to be made about appropriate control measures, training, and monitoring of hazards associated with a chemical or a chemical process. The assessment does this by establishing:

- the nature and severity of the hazard for each hazardous chemical
- the degree of exposure of persons in the workplace
- whether existing control measures adequately control exposure.

Generic departmental risk assessment templates for managing hazardous chemicals in both curriculum and non-curriculum related activities can be found here.

The information collected, and the decisions made around the points above, allows for reasoned conclusions to be made about the risk of using of a hazardous chemical under particular working conditions. Making conclusions about a risk level is important as it allows staff to determine what action is required. Regardless of the risk classification, teachers always have an obligation to do what is reasonably practicable to eliminate the risk, or if that is not possible, **to minimise the risk to the lowest possible level.**

Note: Risk conclusions 1-4 differ from other CARA risk level matrices used by the department for non-chemical based curriculum activity risk assessments. These differences arise because of legislative requirements and because we know what the consequences are if we are exposed to a chemical during a curriculum activity – the consequences are documented in the safety data sheet (SDS). However, in non-chemical curriculum activity risk assessments informed judgements are made about the inherent risks associated with the activity, because the consequences can only be projected.

The result of this process means that **there can only be an indicative relationship** between the usual CARA risk levels of low, medium or high and risk conclusions 1 to 4.

Curriculum activities involving chemicals may only be undertaken at the Risk Conclusion 1 or Risk Conclusion 2 levels. Once risks are not effectively controlled (i.e. Conclusion 3 and Conclusion 4 activities), or where there is not sufficient certainty about the risks associated with an activity, the level of exposure to a chemical cannot be determined with confidence and the activity becomes unsafe. Therefore, Conclusion 3 risk classifications must be revised to reduce the risks, as risks are not effectively controlled. Conclusion 4 activities are **not to proceed** because there is insufficient information available to make a valid risk conclusion.

Schools are reminded that a Curriculum activity risk assessment register is to be maintained for Risk Conclusion '2' activities where the risk occurs at the higher end of the spectrum, and where risks are significant and not effectively controlled. A school curriculum activity register can assist schools to record and manage the details of their risk management strategies involving hazardous chemicals.

The **Risk assessment conclusions table** (shown next page) is to be used as a guide to assist with quantifying the overall risk levels for chemical assessments.

Note: For more information, or if further guidance is required on chemicals and hazardous materials risk assessment guidelines for Queensland schools, refer to the following useful links:

- DoE, CHW – Risk Management
- DoE, PPR – Managing Risks with Chemicals in DoE Workplaces
- DoE, PPR – Hazardous Chemicals Register and Manifest

Risk assessment conclusion table:

Overall risk level conclusion			Action required/approval
Conclusion 1	☐	**Risks are not significant now, and not likely to increase in the future** **(*i.e.* risks are low).**	☑ Comply with all requirements of the label and current SDS. ☑ Comply with the standard operating procedure for the substance(s). ☑ Manage and document through your regular planning processes and/or person(s) using the chemicals should approve and sign the risk assessment.
Select 1 – if you are using a concentration considered less than hazardous or if precautions are required and it is unlikely that the use of the chemical(s) will adversely affect the health of persons at the workplace and the risk is not likely to increase in the future e.g. you are using concentrations that are too small to constitute a risk, even if controls fail; or the operation strictly conforms to information on the label and SDS.			
Conclusion 2	☐	**Risks are significant but effectively controlled, and could increase in the future** **(*i.e.* risks are medium to high).**	☑ Comply with all requirements of the label and current SDS. ☑ Comply with the standard operating procedure for the substance(s). ☑ Implement the identified controls to minimise the chances of higher exposure occurring. ☑ Determine and implement additional measures for regaining control if a high risk event occurs despite the precautions already taken. Parental consent may be required. ☑ Document controls in planning documents and/or complete this chemical use curriculum activity risk assessment. ☑ The principal or delegated deputy principal or head of program (i.e. HOD, HOSES, HOC) to review and approve the risk assessment.
Select 2 – if you are satisfied that adequate controls are in place. Where serious health effects could result if the control measures fail or deteriorate. This usually results from the use of toxic hazardous chemicals or where the potential exposure is HIGH. Risks, while presently adequately controlled, could increase in the future.			
Conclusion 3	☐	**Risks are significant now and not effectively controlled** **(*i.e.* risks are extreme).**	☑ **The activity must not proceed**. Alternatives to undertaking the activity must be found. ☑ Obtain additional information or expert advice to reach a conclusion of 1 or 2 ☑ Comply with all requirements of the current SDS. ☑ Comply with the standard operating procedure for the substance(s). ☑ Implement sufficient controls to ensure the safe use of the material. ☑ The principal or delegated deputy principal is required to review and approve the revised risk assessment prior to conducting this activity.
Select 3 – if the use of a chemical is likely to constitute a significant risk and further investigation may be necessary (e.g. there are persistent or widespread complaints of illness, discomfort, irritation or excessive odour, hazardous chemicals are splashed, control measures are broken, defective or badly maintained, for example a poorly maintained extraction system which no longer draws a hazardous chemical away from the work area, recognised safe work practices are not being observed)			
Conclusion 4	☐	**Uncertain about risks.** **There is not enough information, or there is uncertainty about the degree or extent of exposure.** **DO NOT PROCEED.**	☑ **The activity must not proceed**. Alternatives to undertaking the activity must be found. ☑ Obtain additional information or expert advice to reach a conclusion of 1 or 2. ☑ In the meanwhile, implement work practices to ensure safety.
Select 4 – if **no** SDS is available, if labelling is inadequate, if the level of exposure cannot be estimated with confidence or further investigation is necessary. Obtain additional information from other sources, such as suppliers, occupational health and safety consultants and industry or trade associations. Meanwhile, implement good work practices to minimise exposure.			

2.2.5 Annual safety assessment

A work safety audit, or annual safety assessment (ASA), is a comprehensive study of a workplace and its operations to help identify health and safety issues and to review all current school safety processes or procedures. The aim is to identify those things that need improving, and to develop a school action plan to address them.

The ASA is an important process to be conducted at any workplace on a regular basis. At departmental workplaces, such as schools, it is recommended that a safety assessment is conducted each year. Hence, it is commonly referred to as the 'annual' safety assessment. All subject departments will be included in this comprehensive audit, particularly the practical subjects such as industrial technology and design, science, lifestyle management, art, physical and outdoor education and vocational education.

What is the purpose of the ASA?

By conducting a comprehensive ASA schools will:

- review the safety incidents, emergency plans and safety processes to determine if adequate levels of safety and compliance are being maintained in schools
- identify the hazards that exist at the school
- develop a safety action plan to document and prioritise how the issues will be addressed.

Who completes the ASA?

- It is recommended that all departmental workplaces conduct an ASA each year. For schools with over 30 employees an ASA is mandated. Normally this would be facilitated by a trained workplace Health and safety officer (HSA). For schools which do not have a trained HSA, a person with a designated responsibility for health and safety would be suitable to facilitate the ASA.
- Given the importance of the ASA, it is expected that sufficient resources are provide for it to be completed effectively each year.

What is the scope of the ASA?

- For departmental workplaces the ASA covers 13 performance criteria which are the safety aspects to be assessed. Each criterion is assessed against specific indicators which will be provided by DoE and a recording sheet is also available for each of the 13 criteria in the document.

For more information, or if further guidance is required on the annual safety assessment process in departmental workplaces, refer to the following useful links:

- DoE, CHW – Annual safety assessment
- DoE, Annual Safety Assessment (Checklist) – Industrial Technology and Design
- DoE, CHW – Health and safety advisor (HSA)
- DoE, PPR – Health and safety advisor (HSA)
- DoE, CHW – Regional senior health and safety consultants

2.3 Risk management professional development

2.3.1 Managing risks in ITD workshops program

This two (2) day, face-to-face professional development program is essentially a risk management workshop primarily for *existing* ITD teachers. The general aim is to provide an understanding of inherent risks associated with practical ITD workshops and to highlight the resources available to assist teachers in the managing of risks in industrial technology workshops.

The program focuses on issues such as:

- Increasing teacher awareness of the WHS issues affecting ITD faculties state-wide
- Assisting schools with identifying risks in practical workshops
- Maintaining currency of existing ITD teachers – (through non punitive assessment)
- Increasing teachers' confidence and competence in teaching
- Encouraging the development of group or regional forums to network and discuss ITD issues with other schools, i.e. management of risks in workshops, etc.

Program outline includes:

- Completion of four (4) units of competency – delivered online prior to the two (2) day course – Note: Participants will be required to complete a questionnaire to indicate their work experience and qualifications. This will be assessed to determine which competencies participants can receive 'Recognition of Prior Learning (RPL)
- Emphasis on the key issues of work, health and safety practices in ITD workshops
- Completion of a typical ITD construction project (to reinforce the safe use of machinery)
- The use of selected workshop plant and machinery, (i.e. Panel Saw, Bandsaw, Mitre Saw, Chisel Mortiser, Drill, Bobbin Sander, etc.), selected portable power tools and hand tools
- Risk management in ITD practical workshops, including the planning and coordinating of Curriculum Activity Risk Assessments and Plant and Equipment Risk Assessments
- Risk management online resources available to teachers
- General housekeeping and maintenance issues of ITD workshops

On completion of the program, all teachers receive a 'Certificate of Participation' crediting 20 hours of 'Continuing Professional Development' (CPD).

It is anticipated that this PD training program will continue to be conducted throughout the state as the need arises and as funding becomes available. Future locations will vary and will involve various regional State High School and/or College facilities, regional TAFE training centres and SkillsTech Australia.

3. Maintaining a practical workspace environment

Industrial technology and design (ITD) teachers need to develop a proactive culture of safety through practical curriculum activity experiences and from the environment in which they work. There should always be a logical relationship between valuable educational curriculum content, considerately sized practical class groupings, manageable timetabling schedules and appropriate hazard identification and risk assessment processes.

3.1 Establishing a culture of safety

Managing risk begins with the culture you nurture at your school towards safety. The beliefs, values, attitudes and behaviours of staff and students are as important as the condition of the practical workspace. Involving students in the process of risk management will help to reinforce the importance of safety and develop in student's personal responsibility for their own safety and the safety of others.

The following is a four step agenda that schools are encouraged to consider:

1. Clear safety rules and expectations

Establishing and maintaining a positive attitude and proactive approach toward safety in a practical workspace environment requires all participants to have an understanding of 'good practice' common sense expectations. Accidents can often happen when common sense is absent.

For ITD students – workshop safety rules should be:

- displayed in prominent areas in all practical workspaces and in student workbooks or design folios
- discussed and explained to students at suitable times such as, the start of a new school year, each semester or as part of the introduction to a new unit of work

ITD HODs may consider providing their staff with a staff handbook with clear and concise safety information highlighting their school's expectations. Any ITD staff safety training or staff information handbook provided should also introduce the location and content of important departmental resources for ITD teachers, including this *ITD Guidelines* publication.

2. Safety information and training

Provide students with sound information – practical workshop safety training with a structured machinery induction program and any relevant safe operating procedures (SOPs) for all plant and equipment introduced. Training should occur prior to use of any machine for the first time. This should include:

- written safety procedures, rules and expectations
- practical demonstration on the safe use of the equipment by the teacher
- written record of training given – what machine, student name and date of training.

Provide staff with appropriate information and training on issues such as:

- departmental health and safety requirements, first aid facilities, procedures for accident and incident reporting and recording
- the safe use of all machinery, plant and equipment (SOPs and EMRs)
- the importance of electrical safety including all legislative requirements
- risk assessments and curriculum planning.

Hazardous workspace conditions to be aware of such as:

- the dangers of atmospheric wood dust particulates, excessive industrial noise and any poor, slippery floor surfaces around practical workspaces, etc.
- the importance of adequate lighting, fresh air and ventilation
- the importance of good housekeeping and general departmental cleanliness
- the safe use of all chemicals and hazardous materials stored and familiarity with SDS
- the importance of safety signage – what is mandatory, and where should it be placed
- the importance of personal protective equipment (PPE), for both teachers and students.

This can be done through formal training (with RTO certificates issued) or informal processes such as at regular staff meetings or briefings.

Record all training provided to staff members on an ITD Staff Training Profile. Monitor and review regularly to ensure ongoing training opportunities (PD) are provided.

3. Model and promote safety

Students are generally influenced not only by what teachers say but by what they see teachers do. Modelling good safety practice by staff will help to not only reinforce the importance of safety but also help develop in students' personal responsibility for their own safety and the safety of others.

Every teaching space and practical activity undertaken by students can present different risks. Regularly discuss and explain safety requirements with students.

Display appropriate safety signage throughout the department and particularly at the entry to workshops. Signs provide good visual reminders to everyone to **think and act safely**. Workshop areas should have:

- mandatory signs – relating to the required PPE that ***must*** be worn in certain areas
- emergency information signs e.g. evacuation plan and emergency exit directions
- fire signs e.g. fire extinguishers and fire blankets
- safe operating procedures (SOPs) displayed near all fixed machinery
- safety rules or expectations and reminders of the consequences for breeching those expectations, prominently displayed.

4. Review and monitor safety

Ensure systems are in place in ITD centres that monitor, maintain and enhance practical workshop safety.

Undertake regular inspections of all workspaces to identify safety concerns and to maintain good safety processes. Use check lists to document and assist ITD staff with reviewing facilities and practices.

Maintain records of the systems utilised throughout ITD workshops. These records should include:

- equipment and machinery maintenance records (EMRs)
- training records relating to machines – for both students and staff
- risk assessments for curriculum activities, equipment and hazardous substances
- registers of all risk assessments and of all hazardous substances stored on the premises.

For more information, or if further guidance is required on 'Establishing a Culture of Safety' for ITD departments in Queensland schools, refer to the following useful links:

- DoE, CHW – Safety and hazard alerts
- DoE, CHW – Equipment and machinery
- DoE, CHW – Equipment and machinery resources SOPs and EMRs index
- DoE, CHW – Managing SOPs and EMRs in your school

3.2 Class size limits

Maximum class size targets in Queensland state schools were established in 2007 and subsequently included in the Department of Education and Training Teachers' Certified Agreement 2010. This industrial relations agreement, still current at the time of this publication, commits the department to the following maximum class size targets for all Queensland secondary schools:

Years 7-10	28 students per teacher
Years 11-12	25 students per teacher

Further, Section 2.1.1 of the agreement states that schools will only be funded for staffing in accordance with a student/teacher ratio based on these established maximum class size targets.

All ITD teachers will recognise that practical workshop curriculum activities, by their very nature, often have the inherent potential for dangerous situations to occur, and overcrowding the available work area with too many students should be avoided or minimised wherever possible. It should be emphasised that the current Teachers' Certified Agreement ***does not prescribe*** that class size limitations should be applied to specific "*practical classes" - in any subject area*.

However, ITD teachers and principals should be referring to current departmental procedures for CARAs through assessing overall classroom risk and determining safe practices (including reduced class size limits) in our practical workshop environments. This highlights the requirement for all ITD departments to firstly undertake a risk evaluation, or risk assessment for each practical workshop activity that they are intending to undertake. Curriculum Activity Risk Assessments (CARAs) should be completed annually to regularly assess and help monitor all inherent risk levels identified. If teachers then believe that WHS risk levels are exacerbated because of elevated student numbers allocated to a particular work space, then the CARA findings should be presented, via the ITD HOD, to the school principal to ***strongly advocate*** for ***more suitable, safer*** class size limits. Principals should review particular staff concerns very closely before signing off on any **High** or **Extreme** risk assessment reports.

Ultimately, individual schools are responsible for ensuring that appropriate risk identification and risk management processes are implemented throughout all curriculum areas. This is achieved by:

- 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.

There is a wide range of factors that need to be considered when assessing risk and advocating for any limits on class size numbers in specific ITD workspaces, including:

- The physical dimensions and layout, number of work benches and fabrication areas**,** safe access to all machinery and facilities, and, if it exists, building plan information regarding the "intended (designed) purpose" ***** that may recommend occupancy numbers appropriate for that particular workspace

  *******Unfortunately specific details regarding "intended (designed) purpose" are not always available and might only be available for our newer schools – i.e. found on architectural building plans and associated design specifications.*
- Student factors such as maturity, prior experience, educational background, and special needs
- Inherent risk factors associated with plant and equipment used and processes undertaken in specific ITD curriculum activities, and the complexity of that activity
- Competently trained ITD teachers available in schools

- Specific staffing factors such as experience, expertise and availability of a trained teacher's aide or special education teacher assistance, if required.

If, after all policies and procedures have been followed, and Curriculum Activity Risk Assessments have been submitted, reviewed, approved and signed-off, ITD teachers still have real safety concerns regarding their allocated class size numbers, they should continue to raise these issues, through their ITD Head of Department, with the school principal (or staffing deputy).

Finally, should such safety concerns remain unresolved, ITD curriculum activities should ***not*** be undertaken, at least in the format proposed. In the absence of an amicable staffing resolution, and to help minimise any disruption to the curriculum, it may be necessary for ITD teachers to investigate safer alternatives to their practical curriculum delivery including:

- 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
- Or, as a last resort, it might be necessary to temporarily suspend a particular subject offering from the ITD curriculum until such time as circumstances change.

Note: For more information, or if further guidance is required on class size limits for ITD departments in Queensland schools, refer to the following useful links:

- Working in DoE – State Schools
- DoE Teachers' Certified Agreement

3.3 Workspace layout

Many subjects taught in ITD expose the potential for hazardous situations to emerge if the work environment is too restrictive or poorly prepared. Overcrowding should never be acceptable. The overall size of any ITD workspace should be appropriate for its intended purpose.

The selection, procurement, placement and fit-out of machinery, plant and equipment will need to comply with all manufacturer specifications, and all departmental requirements and procedures regarding Workplace Health and Safety issues should never be compromised.

- OnePortal, Industrial machinery for industrial technology and design (manual arts)
- DoE, Design standards for DoE facilities

New hazards may be introduced as a consequence of the introduction of new machinery, plant and equipment, or modifications to existing machinery or plant. At such times, revised risk assessments ***must*** be undertaken by the department.

3.3.1 Workplace planning and machinery placement

ITD plant and machinery that is poorly located or too close together may not be safe even when it has been properly guarded. Some basic points to consider in relation to layout are to:

- Avoid congestion around the machinery. Eliminate or minimise the necessity for uncomfortable manoeuvrability in relation to operation, cleaning or routine maintenance
- Identify and define anticipated busy traffic areas i.e. the regular movements of staff, students and materials
- Safe working areas around fixed machines should also be clearly delineated. Painted yellow floor lines 80mm wide are ideal
- Consider 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
- Well-organised workspace planning must allow for a quick and efficient exit in case of fire or other emergency
- Consider if any particular items of heavy-duty fixed plant or machinery will require electrical connectivity to a 415 V – 3 phase power supply
- It is recommended that schools hard-wire all electrically powered fixed plant and machinery to help minimise any electrical safety hazards.
- 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 should be erected if no alternative arrangements can be found. Proximity to natural window lighting must also be considered
- Understand how any waste materials will be generated and consider the ease of connection of plant and machinery to waste (dust) extraction filters or any integrated ducting within the workspace
- Identify the room location and height of all wall mounted isolating switches for fixed machinery items
- Investigate if any emergency stops buttons, direct-on-line (DOL) switches or perhaps micro cut-offs on machinery guarding are required for machinery items in the workspace
- Plan the location of all wall mounted and suspended 240v power outlets of power tools.
- Consider painting or defining all item of equipment that might protrude, such as bench vices or guard rails, to alert workshop users to pass with caution
- Portable audio-visual equipment such as DVD players, laptops, multimedia digital projectors, television monitors and speakers should be secured on stable trolleys or tables away from traffic areas.

Safe work zones

Safe work zones around any ITD plant and machinery must be clearly delineated based on the risk assessment of individual items of fixed and portable equipment. Teachers and planners have to consider what injuries could result if an accident were to occur.

It should be noted that currently there are no Australian Standards that regulate a '**Safe Work Zone**' around plant and machinery. Australian Standard - AS 1318: 1995, references to an Industrial Safety Colour Code. Different States legislation in WA, Qld, NSW and SA gives reference to painted walkways and exclusion zones but no clear guidance. The emphasis appears to be on engineered control measures or physical machinery guarding and barriers. Although they are still required in all ITD workspaces, simply painting 80mm yellow safety lines on floors relies too heavily on the human factor.

A number of the DoE SOA machinery supply company websites provide a very useful fully dimensioned, supplier recommended, "Safe Working Area" diagram for each item of machinery, plant and equipment their company has offered for sale to Schools, TAFE College and Trade Training Centres throughout Australia. These machinery layout planning diagrams can be found at visiting the Company websites:

- From the top menu bar, select "Schools and TAFE Equipment"
- Select the desired machine (or similar) as required
- Scroll down to the horizontal menu tabs and select "Overview"
- Scroll down past "description" etc., to the "Safe Working Area" diagram.

In some ITD facilities these operational working areas are often incorrectly proportioned, poorly delineated and, from a safety perspective, ineffectively planned and managed. It is important to regularly review these 'safe working areas' within the workshops and maintain the painted lines to ensure they are clearly marked and provide adequate working space.

Note: For more information and guidance on ITD workspace layout and requirements for Queensland schools, refer to the following sections of this Guidelines document or other useful links listed below:

- *Queensland Building Act 1975* (QLD)
- DoE, Design standards for DoE facilities
- Section 3.4.1: Workspace Conditions - "Ventilation Systems"
- Section 3.5: "Safety Signage"
- Section 3.6.3: "Safety Switching and Electrical Isolation Devices"
- Section 5.1: "Purchasing of ITD machinery, Plant and equipment"
- Australian Standards: AS 1428.1: 2009 – Design for access and mobility
- Australian Standards: AS 1428.3: 2009 – Requirements for children with a disability

3.3.2 Project Storage

ITD workspaces require the adequate, safe and effective storage of equipment, supplies, project materials and student projects within their facility. Teachers should encourage an organised approach, particularly for the storage of student projects in all practical workspaces, considering the following:

- Items should never be stored under workbenches and on top of cupboards if at all possible. This does not facilitate safe and easy access and removal of these items
- Do not allow work areas to become cluttered by simply stacking student projects in a corner of the room. In addition to being an unsafe practice, other classes may also be using this workspace regularly
- The main storeroom that contains uncut lengths of timber should also be organised. Areas between shelving should not be cluttered, and easy access should always be maintained. Students ***should***

not be encouraged to store individual projects in these material storerooms. This will simply add to any congestion and untidiness

- 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 should be carefully planned and considered. A safety audit should be completed and department HOD approval sought before any major building construction is undertaken within the facility.

For more information, or if further guidance is required on ITD project storage requirements in Queensland schools, refer to the following useful links:

- *Queensland Building Act 1975* (QLD)
- DoE, Design standards for DoE facilities
- Australian Standards: AS 1428.1-2009 – Design for access and mobility

3.4 Workspace conditions

In all ITD practical workspaces, safety factors are a priority consideration and schools have a clear responsibility to ensure all reasonable precautions are taken to minimise risk to staff and students. Effective housekeeping within the facility needs to be continually reviewed. For example, the common practice of simply sweeping wood waste, dust and metal filings etc. from work benches onto the floor for the cleaners to then remove at the end of the day, should be discouraged. 'Good practice' should be the aim.

- Students should be encouraged to place all rubbish from their particular practical activities directly into a waste bin at the conclusion of each session
- Exits from buildings and other work areas should be suitably signed and access to them kept clear of obstructions
- Fire extinguishers of the correct type should be readily available and suitably signed – preferably small models for ease of handling. All staff should be trained in their use
- Furniture such as portable workstations and benches should be regularly checked for practical suitability, structural soundness and be well maintained
- Observe safety signs and marked safety zones at all times. Use extra caution when accompanying visitors on the premises
- Excessive, irritating and potentially toxic airborne dust from wood machining and other environmental volatile fumes and vapours should be controlled effectively
- Industrial noise from various machines, plant and equipment, or the amplified percussion sounds from the use of hand tools, can damage hearing and should be controlled
- The floors can become very slippery when any rubbish is 'left for the cleaners'
- Ensure that machine safety guards are always in place and well maintained
- Be extremely careful when handling all chemicals and hazardous materials
- Overalls and aprons become covered with dust and metal filings etc. when they are thrown onto the floors instead of be stored away in appropriate locker storage
- Discarded shoes and work boots should never be left lying around in rooms
- Students' half-finished projects need adequate storage space. It is often a challenge for staff to find enough room to safely accommodate these, sometimes very large, items.

3.4.1 Ventilation systems

Ventilation systems in ITD workspaces can be of two main types. When the airborne contaminants comprise of low to moderately toxic materials (or dusts) generated in smaller amounts, general forced dilution ventilation, such as a number of open windows, or an extracted air system that complies with Australian Standards **AS 1668.2**, can be used as a control measure – with careful monitoring.

Where airborne contaminants and finer wood dusts are generated in moderate to large quantities or comprise of toxic materials, then a forced exhaust ventilation system is strongly recommended. Many schools already use this system. Australian Standards **AS 1668.2** might be used for guide when considering the installation of a ducted or forced exhaust dust ventilation system in ITD facilities.

In either situation, the fresh air circulation or the exhaust ventilation system adopted for your particular circumstances should be capable of reducing the level of airborne contaminants in such a way that staff, students and others are not exposed to more than the relevant exposures specified in the Adopted National Exposure Standards for Atmospheric Contaminants in Occupational Environments.

3.4.2 Environmental dust and dust extraction

(refer also to Section 6.3 – *Wood Dust & Toxic Timbers*

In the average ITD practical workspace and associated environments, many different identifiable types of dusts will be present.

Dust is an irritant that will cause personal discomfort and health problems. It can even trigger allergic reactions resulting in occupational asthma, rhinitis or other forms of severe respiratory distress. A detailed description of the health concerns associated with exposure to dust can be referenced at Hazardous Materials – Section 6.3.1 *'Health Concerns and Symptoms'*. Dust is usually generated by a variety of mechanical and chemical processes, such as:

- Sawing, routing, woodturning, sanding, drilling, grinding, welding, fibreglassing
- Cleaning down with compressed air
- Dry sweeping of floors, walls, ceiling fans or machinery
- Repairing machines or during routine maintenance work
- Cleaning or disturbing carpets, rugs and floor mats or using cotton waste and rags
- Internal combustion engines adding fumes and particulate matter into the atmosphere.

Wood dust is of particular concern and can be created when processing and preparing natural timbers, particle boards, medium density fibre boards (MDF) or laminated products such as plywoods and beams. The micro fine dust particulates released are so fine they can easily be inhaled. Teachers, staff and students are at persistent risk of breathing in large amounts of damaging fine wood dust particulates whenever timber is being handled or machined in any typical ITD workspace environment. In fact, in Australia all wood dust is now classified as carcinogenic – Group 1 (liable to cause cancer). In the interests of maintaining a safe working environment, it is recommended that workplace exposures to all wood dust should not exceed 1.0 mg/m^3.

Risks and control measures: dusts

Schools have an obligation to effectively manage all known or perceived risks that can be associated with exposure to excessive dust in ITD workspaces. Control measures need to be introduced to ensure that the levels of dust particles in the air do not exceed national exposure standards and limits. These are known as Permissible Exposure Limits (PEL). This is a measure of air quality or airborne dust concentration in a particular workspace.

Where concerns exist, air quality can be tested by a qualified examiner using a real-time monitor (e.g. Casella Microdust Pro®), and is recorded as 'milligrams of wood dust per cubic metre of air, and at 25°C, as a time weighted average' (calculated over a normal working day).

The best protection from dust is to keep it out of the air in the first place by applying effective hazard control measures. Effective controls that will help minimise health risks are:

- If possible, use timbers that are less likely to cause any health issues
- Minimise the generation of, and exposure to, excessive wood dusts in the atmosphere
- If possible, when using machines and portable power tools, capture any loose waste and 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; or consider a professionally designed and installed, fully ducted exhaust ventilation dust extraction and external collection system for your ITD facility. This will maintain maximum control over dust levels throughout the facility by removing airborne contaminants from the environment at their source
- 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. Where possible, have cleaning staff keep all surfaces such as floors, walls, machinery, the tops of storage cupboards, fans, filters and accessible ceiling cavities free of dust accumulation.
- Don't use compressed air when cleaning machinery. This will simply put more dust into the air. Instead, use wet clean-up methods such as wiping surfaces with a wet rag, or have ITD cleaning staff use a vacuum cleaner with a HEPA filter.
- Always securely bag and seal wood dust waste, and dispose of waste safely.
- Remember that concentrations of small dust particles in the air can form a mixture that will explode if ignited. This situation may occur in dust collection equipment. Dust will generally burn easily if ignited. Overheated motors or sparks have been known to start wood dust fires.
- Provide and always wear correct PPE such as a good dust mask or respirator. It is important to remember that any PPE **should** be the last control measure to be chosen from the hierarchy of control. This is because simply wearing appropriate and effective PPE does not actually remove the hazard.

For more information, or if further guidance is required on environment dust hazards and controls measures in Queensland schools, and recommended PPE for dust and respiratory protection, refer to:

- DoE, CHW – Hazards in Schools – Dust
- DoE, Design standards for DoE facilities
- DoE, CHW audit checklist – Building Fire Safety
- Adopted National Exposure Standards for Atmospheric Contaminants
- WorkSafe WA – Controlling Dust and Fibre Hazards at Work

3.4.3 Industrial noise

(refer also to Section 4.2.3 – *Personal Protective Equipment – Hearing Protection*

High noise levels are usually unwanted sound that may, in time, damage one's hearing. The loudness of noise is measured in decibel units (dB). For example, the hum of a refrigerator motor is about 40dB, normal conversation can be approximately 60dB, and heavy city traffic noise can be 85dB and above. An angle grinder will often measure 95dB and a pneumatic hammer, 105dB. In a typical ITD practical workspace, particularly in the senior school, noise levels could well reach levels of 95dB or more and at times, could well be sustained for hours. These intolerable noises levels that teachers and students can often be exposed to are extremely damaging to our health and hearing and should be controlled.

The harmful effects of exposure to high noise levels have been well documented. ITD departments need to clearly identify those activities or any plant and equipment that might generate excessive noise levels and then implement affirmative measures to help remove the exposure hazards and prevent the harmful effects.

Risks and control measures: noise

Schools have an obligation to effectively manage all known or perceived risks that can be associated with exposure to excessive noise in ITD workspaces. Effective management of loud industrial noise in ITD departments should be directed at minimising the health risks by including control measures such as:

- Acknowledging that workspaces utilising hand tools such as hammers and mallets on metal surfaces can generate excessively amplified percussion noise levels often higher that of some machinery, plant and equipment
- Evaluating how long we are exposed each day in these noisy environments
- Limiting or avoiding exposure to loud noises (i.e. 85dB and above) wherever possible
- Researching and determining noise levels of plant and equipment prior to their purchase and trying to 'buy quiet'
- Redesigning curriculum activities, general maintenance tasks and the placement of specific machines so that staff and students are not exposed to loud noise over extended periods – for example, air compressors should be located in a separate enclosure
- Regularly maintaining plant and equipment to help reduce their high noise levels
- Prominently displaying safety signs indicating that personal hearing protection (PPE) should be worn
- Provision of PPE and training for relevant staff and students in the correct use of appropriate hearing protection – (rated to Class 2 for noise exposure up to 95dB units)

It is important to remember that any PPE should be the **last control measure** to be chosen from the hierarchy of control. This is because simply wearing appropriate and effective PPE does not actually remove the hazard.

Hearing protection only works when it is worn correctly, is the right type and is well maintained. It is therefore important to manage PPE properly to ensure maximum protection.

For more information, or if further guidance is required on industrial noise hazards and controls measures in Queensland schools, refer to the following useful links:

- DoE, CHW – Hazards in schools – noise
- DoE, CHW – Managing noise for ITD teachers and teacher aides
- DoE – Design standards for DoE facilities
- Managing noise and preventing hearing loss at work Code of Practice
- DoE, CHW – Reviewing noisy environments in schools
- DoE, CHW – Noise induced hearing loss

3.4.4 Flooring

The workspace floors in most ITD facilities are a hard-wearing smooth concrete finish. Ideally they should also be impact resistant, slip resistant and have an easy to clean surface. The Department of Education, Queensland, has trialled a thin roll coat system and, more recently, a seamless resin system (e.g. Flowcoat SF41® Composite (Flowcrete®)). These **epoxy workspace floors** not only offer superior durability, they are also non-slip, very easily cleaned and resistant to most chemicals, oils, fats and greases. Whatever flooring schools have at present, ITD teachers must be aware of some basic housekeeping and floor maintenance considerations. If practical workspaces and classrooms are to remain safe, consider the following:

- Workspace floors should be non-slip under normal circumstances and area managers should ensure they are maintained to reduce the occurrence of slips, trips and falls. Never have hard, smooth floors in wet, dusty or oily areas
- 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
- Be aware of any floor surface transitions that are sudden or not easily noticed
- Safe working areas around fixed machines should be clearly delineated — painted 80mm wide yellow lines are ideal.
- Maintain all painted anti-slip floor areas, coating profiles and yellow safety lines as they may be become worn, damaged and ineffective.
- Carpeted areas in Graphics or Theory Rooms that might be lifting at the seams and joins, or have loose or lifting tiles etc. should be repaired promptly.
- There should never be any raised carpet edges, corners of mats, holes worn in carpets, linoleum, broken or raised tiles.
- Highlight any isolated low steps that might become an unexpected tripping point.

For more information, or if further guidance is required on safe workplace flooring requirements in Queensland schools, refer to the following useful links:

- DoE, CHW – Hazards in schools
- DoE – Design standards for DoE facilities
- DoE, CHW – Preventing Slips, Trips and Falls

3.4.5 Lighting

Proper lighting not only helps teachers and students see better while doing their work, but it can also help prevent health issues, improve productivity and create an overall better working environment. If practical workspaces and classrooms in ITD are to remain healthy, safe and productive, consider the following:

- Improper lighting in a work environment can cause health-related issues. Eye strain and headaches are the most common lighting-related ailments.
- Inadequate lighting can also cause fatigue and physical stress. One example of poor lighting having a detrimental effect on workers is how well the eyes adjust from looking at a computer screen then looking at paperwork.
- Sufficient and even lighting can reduce the impact of having to re-adjust our focus in changing light variations.
- Exposure to adequate light levels can boost melatonin production in the body, which can help relieve fatigue and improve productivity.
- Sufficient and appropriate lighting goes beyond productivity and health effects such as fatigue and eye strain. A poorly lit practical workspace such as in ITD can cause accidents. Shadowy areas and glare can lead to trips, falls and other injuries.
- Plan the workspace lighting based on what tasks will be done in the area. For example, electronics workstations with poor lighting could result in poor soldering, improper measurements, burns, eye strain and fatigue.
- Paint practical workspace walls a light colour, such as cream, in order to maximise available light reflection.
- Plan to maximise natural lighting. Make full use of daylight coming in through windows, doors or skylights. Position workstations near windows and areas where natural sunlight is available. Not only can this reduce the need for artificial lighting, but it also creates a good working environment.

For more information, or if further guidance is required on adequate workplace lighting requirements in Queensland schools, refer to the following useful links:

- DoE, CHW – Hazards in schools – Electrical
- DoE – Design standards for DoE facilities
- *Electrical Safety Act 2002* (Qld)

3.5 Safety signage

There are many safety signs that can be found in the workplace. Each workplace will have different signs depending on the environment. It is important that ITD teachers understand the most common signs and their correct application.

3.5.1 Classifications and usage

Safety signage is generally classified according to specific function:

- regulatory and mandatory signs
- hazard and danger signs
- information, instructional and emergency signs
- fire equipment and services signs

Whenever safety signs are purchased or prepared for display in a workspace, teachers should always use them in accordance with recognised Australian Standards – AS1319:1994.

Workplace safety signage for the ITD department should be:

- Displayed in all areas where it has been determined that mandatory PPE is required due to the perceived risks associated with any ITD 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 using the standard colours reserved for specific classifications of signs are show below and should be the predominate colour in the sign. Standard sign colours are RED, YELLOW, BLUE and GREEN.

1. Regulatory and mandatory signs

- **Mandatory signs** indicate that the message, usually depicting the use of personal protective equipment (PPE), should be followed. These signs usually incorporate a white symbol within a blue disk. Usually contained within the message is the word MUST.
  - *Australian Standards – AS1319: 1994 – Mandatory signs*

- **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 – Prohibition signs*

2. 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.
  - *Australian Standards - AS1319: 1994 – Warning and caution signs*

- **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 – Danger signs*

- **Dangerous goods code signs** refer to the Australian Dangerous Goods Code (ADG7) and state government "Dangerous Goods, Storage and Handling" Regulations.
  - ❖ *Australian Standards - AS1216-2006 – Dangerous goods signs*

- **Hazard pictograms** refer to the newly introduced visual warning symbols of the Globally Harmonised System (GHS) for the classification and labelling of Chemicals. These symbols should appear on all chemical substance labelling, re-labelling and all SDS (if required).
  - ❖ *GHS approved under Section 274 of the WHS Act: 2011*

- **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.
  - ❖ *Australian Standards - AS1216-2006 – HAZCHEM signs*

3. 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.
- As of 2002 these signs should comply with 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 – Instructional signs*

- **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.

4. 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 – Fire signs*

3.5.2 Workplace safety colour codes

Standardised colours and shapes have been designed to attract our attention and Australian Standards advise that particular 'Safety Colours' are to be used extensively throughout ITD departments in schools as part of our regularly accident prevention strategies or control measures.

- Australian Standards AS1318: 1985 – SAA Industrial Safety Colour Code
- Australian Standards AS1345: 1995 – Identification of Piping, Conduits & Ducts
- Australian Standards AS2700: 2011 – Colour Standards for General Purposes

These standard safety colour codes can be used to discern physical hazards and identify your 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.

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 all 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 should 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 nurses station (sick bay)
- exit signs and emergency evacuation route.

When teachers and students are aware of the hazards around them and take the necessary precautions, the possibility of an injury, illness or other loss is minimised. However, 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, whenever possible.

3.6 Electrical safety

The safety of teachers, students and others using electrical equipment is of paramount importance and there are legislative requirements that should be followed to ensure electrical safety. All electrically operated equipment used in schools should be wired and manufactured to Australian Standards specifications, i.e. AS3100: 1994 and AS3300: 1992 and should conform to the provisions of the Queensland Electrical Act and Regulations.

3.6.1 Regulatory electrical requirements for ITD workspaces

Specific electrical regulatory requirements apply to all ITD workspaces, as follows:

- Double adaptors and piggy-back plugs should never be used
- 240v electrical equipment should never be used around wet areas. (Only battery powered or non-powered equipment may be used)
- Double insulated equipment should be tested and tagged every 12 months and connected to a fixed safety switch (e.g. hand-held drill or angle grinder)
- Non-double insulated equipment should be tested and tagged every six months and connected to a fixed safety switch (e.g. drill press, lathe or bench grinder)
- All ITD classroom workshop areas should have fixed electrical safety switches or a Residual Current Device (RCD)
- All external freestanding storage sheds and workspaces should have either a fixed or portable RCD
- Fixed RCD should be tested every six months by the school and every 12 months by a licensed electrician
- Portable RCD should be tested regularly by the school and every 12 months by a licensed electrician as part of a scheduled ‘Test ‘n’ Tag’ program
- Multi-outlet portable power boards (EPOD) should be tested regularly by the school and every 12 months by a licensed electrician as part of a scheduled ‘Test ‘n’ Tag’ program
- Electrical power leads and plugs should be tested regularly by the school and every 12 months by a licensed electrician as part of a scheduled ‘Test ‘n’ Tag’ program. If power leads are showing damage in any way, they should be immediately taken out of service until tested
- For high use, heavy duty and welding areas, leads should be tested every six months
- In between testing and tagging, during normal use of equipment, electrical leads, plugs and EPODs should be visually inspected for damage when machines or power tools are undergoing routine maintenance (housekeeping) or when removed from storage for use.
- Fixed ‘heavy-duty’ machinery is often supplied with a 415 volt 3-phase motor. 240 volt single-phase motors are more common for smaller fixed machines, plant and equipment and applications requiring less forceful operation or performance. It is recommended that schools hard-wire all fixed or stationary machinery to minimise electrical safety hazards. Because of the risk of damage to some machinery wiring, it may also be necessary for an electrician to provide additional protection by using appropriate, heavy duty wiring conduit.

Only a licensed electrical contractor can be responsible for the installing of hard-wired machinery, plant and equipment. A certificate of compliance should be provided to the school by the licensed electrician on completion of any installation.

For more information and guidance on the electrical switching requirements, isolation and lockout devices for ITD machinery, plant and equipment, refer to the following useful links:

- DoE, CHW – Hazards in Schools – Electrical
- DoE, CHW Checklist – Guide to Managing Electrical Safety

3.6.2 Testing and tagging

The *Electrical Safety Act* and Regulations 2002 requires that all portable electrical appliances, electrical hand tools, extension leads, multi-point power boards and RCDs (safety switches) need to be tested regularly to ensure the safety of all staff and students that may use them.

Each piece of equipment should pass a series of tests to prove that they are electrically safe. Specialist metering equipment will ascertain the insulation resistance, earth continuity, electrical continuity and the integrity of the earth conductor. A visual and mechanical test is also required. Once a piece of equipment has been tested it will have an approved 'tag' affixed to the power lead which will clearly show the test date and the next scheduled test and inspection date.

A regularly scheduled 'Testing 'n' Tagging' program for all portable ITD power tools and equipment is the responsibility of each school.

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 six months – for **non** double-insulated electrical equipment
- Once every six months – for multi-outlet portable power boards
- Once every six months – for electrical power leads, (extension leads)

Any 'Testing 'n' Tagging' procedure should be completed in accordance with Australian Standards - AS/NZS 3760 and AS/NZS 3012, and carried out by a licenced electrical contractor.

Equipment that fails testing should be immediately taken out of service and an "OUT OF SERVICE" or "DANGER" tag attached, warning others not to use the equipment.

Remember that it is also an offence under the *Electrical Safety Act 2002* (Qld) to repair electrical equipment unless you have the appropriate electrical work licence.

3.6.3 Safety switching and electrical isolation devices

1. Electrical safety switches, or RCDs, protect people against shocks from an electrical current passing through their body to earth. This is the most frequent cause of electrocution.

Electrical safety switches are also known as:

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

All ITD portable power equipment should be connected through one of the following:

- An electrical safety switch permanently installed at a switchboard
- A portable electrical safety switch (power pack) when **not** in a permanent workplace (e.g. working around the school or an outdoor practical teaching space).

Regular operational checks are required for safety switches permanently installed at the switchboard. This should be a simple "push button test" by a staff member every six months and an "operating current test" by an electrical contractor every 12 months. Portable safety switches should have the "push button test" by a staff member every time they are used and then an "operating current test" every 12 months by an electrical contractor.

2. Isolating switch: all fixed machinery ***must*** have a functional individual isolating switch that disconnects all motive power and that conforms to Australian Standards - AS1543: 1985. The isolating switch should:

- 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.

3. DOL Starter Switches: all fixed machinery should be fitted with effective and robust control equipment for use by the operator in the form of a **Direct-on-Line (DOL)** Start/Stop switch. Such devices ***must*** conform to Australian Standards - AS1318 and AS1543: 1985.

The **START** button should 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 should be:

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

Note: the Direct-on-Line (DOL) switch should 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.

4. 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 should conform to Australian Standards - AS4024.1: 1996 and AS1543: 1985.

An emergency stop device should:

- 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.)

5. 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. Schools are advised to consider retro-fitting micro-switched interlocking guards to all ITD plant and machinery in their facility that is not already protected, to eliminate uncontrolled access.

Note: the department requires that all new ITD machinery, plant and equipment purchased through DoE Supply Offer Arrangements must have all of these safety switching devices pre-fitted by the supplier prior to installation and commissioning.

3.6.4 Lockout of machinery, plant and equipment

Lockout 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. It may also be used to refer to the actual task of applying proper locks.

Danger tags and out of service tags

The accidental operation of machinery, plant and equipment undergoing installation, commissioning, repair, maintenance or cleaning could represent a severe hazard. In order to prevent or at least minimise the risk, an OUT OF SERVICE tag and a DANGER tag ***should*** be implemented as part of a lock-out system.

'CAUTION – **DO NOT OPERATE'** or **'OUT OF SERVICE'** tags are normally yellow and black. They should be fixed to the isolating control and should include the reason for being out of service. The tags should be in place BEFORE any danger tags are attached and they should be the last notice or tag removed before the plant and equipment is restarted.

'DANGER – DO NOT OPERATE' tags are normally red and black. They are used to warn people about hazards associated with a particular item of machinery, plant or equipment. After isolating the machine, the danger tag should be printed with all appropriate information detailing any identified hazards and securely attached to the isolating control. Once the safety of all personnel is ensured, the person who attached the danger tag should be responsible for the removal of that tag.

Multi-padlock safety lockout hasps

Multi-padlock safety lockout hasps are often used when several individuals might apply their own padlock to the one isolating control device. Each lock should be identified and personally tagged to fully explain each individual's safety concerns and circumstances.

For example, if a number of different maintenance personnel, such as private contractors, are to be working on a particular item of machine, plant or equipment, they could apply their own individual lock to the lockout hasp (besides the danger tag) and then remove **their** lock separately only when they are satisfied the safety of all personnel is assured.

For more information and guidance on the electrical switching requirements, isolation and lockout devices for ITD machinery, plant and equipment, refer to the following useful links:

- DoE, CHW – Hazards in schools – electrical
- DoE, CHW – Managing electrical equipment in departmental schools and workplaces
- Worksafe Qld – Managing risks of plant in the workplace – Code of practice 2013
- DoE, Design standards for DoE facilities
- DoE, CHW – Electrical safety – what is a competent person?

3.7 Fire safety

Accidental fires in ITD facilities should be preventable. They are typically caused by:

- open flames coming in contact with combustible rubbish
- gas welding and cutting
- portable heaters or ovens being left on and unattended
- hot surfaces and sparks from machinery components and machining processes
- faulty electrical equipment
- incorrect use of storage of chemicals
- static electricity.

It is of vital importance that teachers understand their responsibilities in the event of any emergency situation including any accidental fire in their practical workshops or classrooms.

❖ DoE, CHW – Building fire safety checklist

- All departmental schools will have a Disaster and emergency management plan that will identify key personnel as controllers. All staff should be familiar with their emergency control team
- It is the duty of the Principal to ensure that all teachers and students have been thoroughly drilled in the procedures to be adopted in the event of an emergency of any type, anywhere in the school
- Fire evacuation drills should be carried out regularly by the school administration
- The facilities and all surrounding areas should have an audible emergency fire and evacuation alarm system
- The first response to a potentially significant ITD fire, or to the school's fire alarm, should be for teachers to move all students out of the facility to a safe position as quickly as possible and to maintain supervision of them
- Escape routes and exits to be used in case of emergency should be planned, clearly marked, kept clear of obstruction at all times
- No door should be so securely locked as to prevent it being opened from the inside while a workroom is occupied by students
- At least one appropriate fire extinguisher and a fire blanket should be available and installed in a practical workspace where a fire hazard exists.

When a fire has occurred in a classroom, and it has not been serious enough to warrant evacuation, the teacher should report the incident to the Principal, through the HOD, and with full details, actions taken, possible causes and any follow-up preventative recommendations.

3.7.1 General precautions for ITD departments

- Fire extinguishers of the correct type should be readily available — preferably small, portable models for ease of handling — and all ITD staff should be trained in their use
- Fire extinguishers should be positioned near exit doors and outside of storerooms
- Fire blankets should be sited near exit doors
- Workspace layout should also allow for a quick and efficient exit in case of fire or other emergencies
- Safety signage should clearly denote the locations of all fire safety items such as fire extinguishers fire hoses, fire blankets, exits, evacuation routes and first-aid kits
- Avoid the accumulation of fine wood dust on the top of storage cupboards and shelves
- Fine wood dust poses an explosion and fire hazard in all workspaces
- Spray painting booths should have filters inspected and changed regularly and should have an approved fire extinguisher in immediate proximity to each booth. Any ignition sources should be identified and isolate, including static electricity. Lights and switches should be spark proof

- Always store resins, catalysts and other volatiles in fireproof storerooms. Fires involving such substances should be extinguished with carbon dioxide or dry powder appliances
- Beware of spontaneous combustion. Incidences of fire resulting from “clean up” rags discarded in the corner of a workspace igniting spontaneously have occurred at several schools
- Ensure that during the end of year clean-up, any rags that are saturated with oils, volatile solvents or oil-based paints are disposed of safely to minimise the risk of fire. Hot weather during the Christmas holiday break can contribute to creating the perfect conditions for spontaneous combustion.

FUEL + HEAT + OXYGEN = FIRE

3.7.2 Fire extinguishers – types and uses

Portable fire extinguishers must be of the correct type for the particular fire, and used correctly. There are a number of types of extinguishers available in Australia and each type is rated for one or more classes of fire. The classes of fire are as follows:

Class A - Ordinary combustible materials such as wood, paper, textiles and rubber

Class B - Flammable and combustible liquids such as petrol or thinners

Class C - Flammable gases

Class D - Combustible metals such as magnesium or potassium

Class E - Electrically energized equipment such plant, machinery or switchboards

Class F - Hot oils and cooking fats.

Portable fire extinguishers are distinguished by their labels and their colouring. In 1999 the standard colours of some portable extinguishers were changed. It is therefore likely that you may encounter two of the same type of extinguisher with different identifying colouring.

Older types of fire extinguishers include the solid yellow coloured **Halon 1211** (BCF) or (Freon 12B1) extinguishers. It must be noted that these have been banned and should be returned to a fire protection supplier or fire brigade as soon as possible for save destruction.

The most common types of extinguishers available today are:

Water – solid red

Suitable for Class A fires only. They are ***not*** considered effective for Class B or C fires, and are dangerous if used for electrical, oil or fat fires.

Foam – red with a blue band or label (previously solid blue)

Suitable for Class A and Class B fires, and have limited effectiveness for Class F fires. They are ***not*** considered effective for Class C fires, and are dangerous if used for electrically energised equipment.

Powder – red with a white band or label

These extinguishers are rated as either ABE or BE. ABE types are considered suitable for Class A, B, C & E fires. They are ***not*** effective on Class F fires.

BE type extinguishers are considered suitable for Class B, C & E fires, and may be used with limited effectiveness on Class F fires - (they are also considered effective for Class A fires).

CO_2 – red with a black band or label

Suitable for Class E fires, and have limited effectiveness for Class A, B & F fires.

Vaporising liquid – red with a yellow band or label

Suitable for Class A and Class E fires, and have limited effectiveness for Class B fires. They are ***not*** considered effective for Class F fires.

Wet chemical – red with an oatmeal band or label

Suitable for Class F and are also considered effective for most Class A fires. They are ***not*** considered effective for Class C fires, and are dangerous if used for electrically energised equipment.

Class D fires (involving combustible metals) will require special purpose sodium chloride or copper based dry chemical extinguishers. These are NOT currently available in departmental schools.

For more information, or if further guidance is required on Fire Safety requirements in Queensland schools, refer to the following useful links:

- DoE, PPR – Emergency planning
- DoE, OnePortal – Fire safety for schools
- DoE, CHW – Building fire safety checklist
- DoE, CHW – End of year clean-up – preventing fires during vacation

4. Personal protective equipment

Personal protective equipment (PPE) is designed to be worn by an individual to provide personal protection from an identified hazard. Approved PPE utilised in a typical ITD workspace might include: eye protection, welding helmets and goggles, protective shoes or steel-toe work boots (rubber soled for welding), hearing protection, hand protection, overalls, aprons, jackets and spats, hair restraints (e.g. hair net), dust masks, breathing apparatus and respirators, safety harnesses, and much more.

This protective equipment should only be required:

- 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).

The WHS Regulations, 44 – 47, includes specific requirements if PPE is to be used at the workplace, including that the equipment be:

- selected to minimise risk to health and safety
- suitable for the nature of the work and any hazard associated with the work
- maintained, repaired or replaced so it continues to minimise the risk
- used or worn by the worker, so far as is reasonably practicable.

Staff and students should wear, so far as reasonably able, appropriate, required PPE in accordance with any information, training or reasonable instruction.

For more information, or if further guidance is required on PPE for use in Queensland schools, refer to the following useful link:

- Workplace Health and Safety Queensland – Personal protective equipment

4.1 Guidelines for the selection of PPE

The basic requirement for successfully selecting the type of PPE for staff and students is to be aware of the hazards and risks in the practical workspace. Several types of PPE may be required to control multiple risks presented by the same tool or machine. For example using a power saw to cut wood presents risks to eyes (flying chips, dust), lungs (dust), whole of body (electrical), hands (cut), and ears (noise).

Listed below are the types of physical hazards and the associated potential or inherent risks that will require close consideration when selecting appropriate PPE:

Gravity	falling objects, slipping, tripping, climbing, carrying, lifting objects
Kinetic energy	cutting, crushing, pinching, flying, protruding or sharp objects
Mechanical energy	crushing, pinching, moving or projected debris
Sound (noise)	over exposure to loud noise, ringing in ears, temporary loss of hearing; chronic long-term hearing damage
Electrical	electrocution, electrical shock, sparks, burns, glare, welding arc UV ‘flash burns’ causing skin and eye damage
Thermal energy	blisters, burns, scalding, splashes, spills, sparks
Chemicals and hazardous materials	splashes, burns, skin and eye irritation, dermatitis, respiratory, asthma, toxic vapours, ingestion, poisoning.

4.2 Selection of PPE

Students need to be given instruction on the appropriate selection of each item of PPE. This includes an explanation of its function, why it is to be used, its proper use, and information on how to get a 'good fit' so as to make it as comfortable as possible.

Whatever type of PPE is selected, the items should conform to the relevant Australian Standards.

4.2.1 Foot protection

Relevant standard

- Australian Standards: AS/NZS 2210.5:2009 – Occupational protective footwear – Specification for occupational footwear.

Whilst for many ITD curriculum activities the selection of approved PPE is elementary, the definition and implementation regarding 'appropriate' footwear has from time to time presented challenges for many ITD departments. Managing PPE is further complicated when trying to consider local school uniform policies and the desire by students to follow fashion trends.

Footwear is a most important safety issue. Toes and feet can be injured during the course of many activities in ITD workshops. There is often a risk of:

- crushing, fractures and bruising from heavy falling objects, or kicking objects
- penetration wounds and cuts from sharp hand tools falling from work benches, etc.
- exposure to hot liquids and solids or hot sparks when welding
- burns from chemical spills.

Slipping, tripping or serious falls when footwear is poorly or improperly fitted.

Where potential or evident risk has been identified in a Curriculum Activity Risk Assessment, then the wearing of safe footwear is mandatory and hence, substantial footwear appropriate to that practical activity should be worn. Footwear such as thongs, open weave type shoes, or shoes with openings at toes or heels, platforms or high-heel shoes shall not be worn in areas which present hazardous situations and any risk of personal injury.

ITD teachers need to make judgements about the most appropriate footwear to be worn for each practical curriculum activity, in its particular environment, bearing in mind the materials being used, the processes being undertaken and the knowledge, experience and training of all those involved.

The uniform for each departmental school is agreed upon in consultation with the school community and it is the expectation that all staff support their school's uniform policy. However, the standards of footwear required for ITD practical activities should be incorporated into the school uniform policy. Teachers can set a positive example for students through their own appearance and attire. For example, ITD teachers should always model equivalent and appropriate work safe clothing and leather footwear in all practical workspaces and classrooms where students have been instructed to do likewise.

When departmental rules and expectations have been determined and CARA's completed, the following might be close to a compromise:

- Soft, open weave footwear *might* be appropriate to be worn in a computer graphics classroom
- Fully enclosed, more robust sports shoes *might* be considered the minimum appropriate when working on electronics projects in a practical ITD workspace. In this instance it would be assumed that 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, should be the minimum footwear considered appropriate to be worn in a general woodworking or light metalwork fabrication activity.

However, senior students engaged in engineering, metal fabrication and welding or other vocational education courses where specific workplace risks are **high** to **extreme**, will definitely be required to wear far more 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 entire 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.

Frequently asked questions regarding appropriate footwear for ITD

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

Answer: No. The PPE requirements in ITD workspaces should be non-negotiable. A parent signing a disclaimer provides no protection for the teacher or the department. The student and parent possibly will need to re-evaluate participating in this subject.

The PPE requirement should comply with current Curriculum Activity Risk Assessment (CARA) developed by the ITD departments and should be a condition of entry into any ITD workshop.

A teacher or principal who knowingly permits students to enter ITD workspaces without the necessary PPE could open themselves, and the department, to fines and prosecution.

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 ITD 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 CARA to come up with strategies to control the potential or evident risk posed. In this instance maybe the school is left with no alternative but to unfortunately exclude the student from further participation in this course of study.

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 should then be taken.

It is generally accepted that students not having the appropriate footwear on a particular day may enter a practical ITD workspace and do 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 ITD Head of Department and any pre-determined ITD non-compliance policy in regards 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 and the student should be looking at other subject areas where WHS requirements regarding appropriate PPE footwear is not an issue.

Managing safety in an ITD 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 maintained at all times.

Every teaching space and activity undertaken by students can present different risks. Considering risks locally is the best approach to determine how to best manage risk. Involving students in this process of risk management will help to not only reinforce the importance of safety but also help develop in student's personal responsibility for their own safety and the safety of others.

Further useful resources:

- DoE, CHW – Footwear and safety at work
- Workplace Health and Safety Queensland – Personal Protective Equipment

4.2.2 Eye, face and hair protection

Relevant Standard

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



Before purchasing approved protective equipment for the eyes and face, the following should be considered:

- 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
- personal preference of the wearer i.e. wrap around, tinted or clear
- 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
- glass has a higher abrasion and scratch resistance.

Goggles provide a more reliable seal to keep products out of the sensitive eye area. They are useful for protection against chemical splash, dust or vapour. Face shields are appropriate when the entire face need protection: for example, during activities where the worker may be welding or exposed to other burn types, or chemicals that are a skin irritant.

Further useful resources:

- DoE, CHW – Personal Protective Equipment (PPE)
- WHSQ – Personal Protective Equipment

Maintenance of safety glasses and goggles:

- Store correctly to minimise scratches. Scratched and dirty lenses will restrict vision.
- Visually check, clean and maintain regularly.
- Some schools might consider installing a lens cleaning station for their safety glasses in each room. These will include replaceable bottles of lens cleaning fluid and tissues.

Emergency face and eye wash station:

- Eye and face wash stations are an important part of workplace safety anywhere that hazardous materials are used or stored. They provide on-the-spot decontamination and allow staff and students to flush away hazardous substances that can cause injury.
- Many ITD departments are currently equipped with an eye wash station. These are usually a wall mounted stainless steel or ABS bowl style with push paddle tap and twin aerated diffusers.
- Eyewashes can be critical in the seconds after an accident. They are usually not used often, so it is important to regularly check that they are functioning properly so they are ready for those rare emergencies.

Protection for long hair:

- Loose hair poses a significant entanglement hazard around machinery. Any person with longer, uncontrolled, loose hair should not work or pass in close proximity to the moving parts of any machinery unless their hair is securely confined close to the head. This could be, for example, with a hair band, rubber band, a hair net or a close-fitting cap (worn backwards). Ponytails should also be tied up and contained so that they cannot fall forward, sideways or backwards into the moving, rotating parts of any machinery.

  Note: hair nets specifically are not mandatory in Qld ITD practical activities. What is mandatory is that when hazards and risks are identified, controls must be put in place to manage that hazard to reduce the risk of injury.

4.2.3 Hearing protection

Relevant Standard

- Australian Standards: AS/NZS 1269.3:2005 (R2016) – Occupational noise management

Noise level is measured in decibel units (dB). For example, the hum of a refrigerator motor operates at about 40 dB, normal conversation can be approximately 60 dB, and heavy city traffic or industrial workshop noise can be 85 dB and above. ITD departments in schools deserve special attention because of the excess noise levels that teachers and students can often be exposed to in many practical workshop curriculum activities. ITD departments need to clearly identify those activities or plant and equipment that might generate excessive noise levels, and then implement affirmative measures to help remove the exposure hazards and prevent the harmful effects.

Hearing can be damaged by short bursts of very loud noise, or even exposure to moderately loud noise levels over an extended period of time. Hearing damage can be temporary or, in serious cases, permanent. Symptoms of hearing damage can include:

- loss of hearing
- tinnitus or ringing in your head or ears
- difficulty understanding normal conversations, especially with background noise.

Hearing protection should be worn:

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

Before purchasing approved hearing protection:

Check the levels of noise that your plant, equipment and machinery produce. This can be matched against information in the user manual or directly from the manufacturer. Always discuss such issues with PPE suppliers for the most suitable hearing protection for your situation.

Earplugs:

Earplugs may be disposable or reusable and are easy to carry from job to job. They also have the advantage over earmuffs (much cooler) for work in hot, humid environments. They should be easily accessible and preferably stored within the practical workspace where they are to be normally used. Earplugs are too often stored in boxes located in locked storerooms at the other end of the facility. It is recommended that earplugs should NOT be worn if:

- the wearer has a pre-existing ear infection
- the earplugs are not being worn (fitted) properly.

Earmuffs:

When purchasing earmuffs ensure they have the Australian Standard approval marking and be rated at Class 2 – for noise exposures up to 95 dB. Earmuffs should be a snug but comfortable fit on the worker's head. They can be virtually useless if not fitted properly. Full earmuffs will provide the safe, more reliable alternative. It is also considered to be more advantageous to wear earmuffs instead of earplugs, if:

- noise exposure levels are high, or continuous over an extended period
- noise is of an impulsive nature such as sudden loud explosive sounds
- there is a need to remove and replace the hearing protection frequently
- users are likely to acquire dirty hands during their practical workshop activities
- users have a pre-existing ear infection.

Maintenance:

- Disposable earplugs should be thrown away after each use
- Reusable earplugs should be cleaned in detergent and water and allowed to dry completely before the next use
- If earplugs lose their softness, shrink or become distorted, they need to be replaced
- Ear muffs should to be inspected regularly for damage and require regular care and cleaning
- The cushions of the earmuff should be soft and supple not hard and cracked, to provide a firm but comfortable seal around the ear
- The cushions can be replaced when they become hardened and brittle (often due to perspiration) or torn and damaged, without the expense of buying new earmuffs
- The cushions and head band should be regularly wiped clean but need to be dry before the next use
- Earmuffs should be stored where they can be kept dry, clean and out of the sun as the band can become distorted when exposed to heat and humidity.

Further useful resources:

- DoE, CHW – Reviewing noisy environments In schools
- DoE, CHW – Noise induced hearing loss
- DoE, CHW – Hearing conservation program
- DoE, CHW – Managing Noise in Manual Arts/ITD Workshops
- WHSQ, Managing noise and preventing hearing loss at work Code of Practice 2011 (Qld)
- WHSQ – Personal Protective Equipment

4.2.4 Hand protection

Relevant Standard

- Australian Standards: AS/NZS 2161.1: 2016 – Occupational Protection Gloves - 1

Before purchasing approved protective gloves look for gloves most suitable for the various practical activities in ITD by considering the following:

- 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
- the extent of hand and arm protection required (the glove length)
- the level of manual dexterity required
- are the gloves made of suitable material to give the required protection? (e.g. PVC, latex, nitrile, rubber and leather.) Refer to the current Safety Data Sheet (SDS) for specific types of gloves as some may dissolve upon contact with some solvents and cause harm to the wearer
- leather welding gloves should preferably be made of split grey chrome-tanned cowhide with extended cuff to give a full 46cm glove. They should have a cotton lining and Kevlar stitching for strength, comfort and durability. They should be sound, dry, and used on both hands while welding or changing electrodes
- are the gloves of a suitable style and fit
- are they disposable (single use), or reusable.

Gloves should be closely inspected to detect potential weaknesses or defects as a result of manufacture or wear. Common signs of failure include:

- wearing away between the fingers
- seam failures
- cracking or bubbling of the material such as waterproofing agents. Cleaning should be undertaken as part of a regular program of maintenance. Refer to the manufacturer's instructions for any special cleaning procedures and/or frequency. Record the date of any issues, maintenance required and visual checks in a PPE Register

Any gloves with obvious faults should be replaced.

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

Further useful resources:

- DoE, CHW – Hand washing technique
- WHSQ – Personal Protective Equipment

4.2.5 Respiratory protection

Relevant standard


- Australian Standards: AS/NZS 1715:2009 – Selection, use and maintenance of respiratory protective equipment
- Australian Standards: AS/NZS 1716:2012 – Respiratory protection devices

A respirator enables inhaled air to be drawn through a filter that will remove the harmful substance. It purifies the air the person breathes. The type of filter required will depend on the composition of the contaminant.

There are three main types of air-purifying filters:

- particulate canisters: these filter out only thermally and/or mechanically generated particles (dust, mist, smoke, fume)
- gas filters: these filter out certain gases and vapours
- combination filters: these are used when particulate and gas hazards exist.

Before purchasing approved respiratory protection, look for devices most suitable for practical activities in ITD, by considering the following:

- Refer to the current manufacture's SDS in order to select the correct respirator with the appropriate filter for the job
- Disposable respirators, or dust face masks, have the advantage of requiring no maintenance. However, if they do need to be stored before use, they should be in a sealed container so they are not absorbing micro fine dust, vapours or fumes, etc. from the work environment
- Individuals that have facial hair will need to check with the manufacturer to ensure the respirator or dust face mask product will give the user adequate facial seal against leakage
- When working in a hot environment, respirators and dust face masks are available with an air valve to increase worker comfort.

Maintenance:

- With the exception of disposable dust face masks, respiratory protective equipment requires regular inspection and maintenance
- All filter respirators should be inspected at least once per month, even without regular use. They should also be cleaned after each student's use, and filter replaced if necessary. Each student should use a clean filter
- Record date of issue, maintenance and all visual checks in a PPE Register
- Face-pieces should be washed in warm water and detergent, rinsed and air dried
- Filter respirators with activated charcoal filters will continue to absorb contaminants in the air even when not being worn - after use ensure they are stored in a sealed container
- Disposable respirators cannot be cleaned and should be replaced at least daily, and also when breathing becomes noticeably more difficult indicating that the filter is becoming clogged
- All go or vapour filters need to be discarded six months after opening regardless of being used or not

Further Useful Resources:

- WHSQ – Personal Protective Equipment

4.2.6 Clothing (body) protection

Relevant standard

- Australian Standards: AS/NZS 6529:2006 – Protective clothing

The protective clothing required in many ITD curriculum activities might include: the customary, and commonly worn, cotton drill woodworking and painting aprons that add additional protection in “messy” situations, workshop overalls, and leather protective outer-clothing specifically designed for welding and heavy duty grinding applications.

Overalls (coveralls) are a one piece garment designed to fit loosely over the body to protect the worker and any clothing worn underneath from workplace trauma and dirt. Students undertaking practical ITD workshop lessons in mechanics, engineering, and welding, etc. will be required to provide and to wear protective overalls.

- A good pair of workshop overalls suitable for school should cover the entire body from neck-to-ankle with sleeves to the wrist
- When selecting and purchasing suitable overalls to wear at school, students should wear clothing similar to that normally worn to school to try on under the overalls
- Overalls should be made from sturdy, non-flammable cotton material which can withstand the rigors of the workshop environment and of a colour which will not show dirt readily
- Overalls should have a loose fit which permits a wide range of motion, but they should not bunch or gather. Working overalls are protective gear, not a style statement, but they should not sag or bag too much, as they could snag on equipment
- Students might keep their personal overalls (and work boots) in a designated clothing locker in the ITD Engineering workspace, typically wearing them over their day uniform and taking them off at the end of the lesson
- If it has been determined through a Curriculum Activity Risk Assessment (CARA) guideline that overalls are necessary PPE for a particular workshop activity, then they should be worn correctly at all times, during all practical lessons. Hot weather is never an excuse to relax safety requirements
- Should hazardous chemicals be spilled on the overalls, remove the clothing and wash the skin immediately and thoroughly. Contaminated overalls should be washed before re-using
- Direct exposure of the skin to hot welding sparks, spatter and Ultra Violate radiation is significantly minimised when wearing full length workshop overalls. Normally in such situations operators should also be wearing appropriate leather clothing accessories and steel-toe heavy duty RUBBER SOLE work boots to ensure maximum full body protection and insulation.

Leather welding clothing includes jackets, aprons, sleeves, chaps (pants) and spats:

- They are usually made from split grey chrome-tanned cowhide
- They offer very durable and distinctly increased protection from UV radiation, thermal protection from hot welding sparks and splatter and from cuts and abrasions when grinding
- All leather clothing should be stored carefully and maintained regularly to ensure prolonged life, comfort, durability and effectiveness.

For other welding related PPE also refer to Section 4.2.7 - *‘Welding Protection’*

Further Useful Resources:

- WHSQ – Personal Protective Equipment

4.2.7 Welding protection

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 6529:2006 – Protective clothing
- Australian Standards: AS/NZS 1716:2012 – Respiratory protective devices
- Australian Standards: AS/NZS 1269.3:2005 (R2016) – Occupational noise management
- Australian Standards: AS/NZS 2210.5: 2009 – Occupational protective footwear
- Australian Standards: AS/NZS 2161.1:2016 – Occupational protective gloves
- Australian Standards: AS 1674.2:2007(R2018) – Safety in welding and allied processes - electrical

The welding industry is rated number one among all industries for the highest number of eye injuries. It's no surprise welding can cause damage to your eyes if you do not use the proper personal protective equipment. 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 right PPE when welding.

But what about the rest of the body? Hearing, eyes, skin, neck, back, head, feet and the respiratory system are all at risk when performing both oxy and arc welding operations.

- Hearing: welding can generate noise at levels which cause hearing loss
- Eyes: unprotected eyes are exposed to hot metal, sparks, splatter and dangerous radiated light. Ultraviolet (UV) radiation causes inflammation of the cornea and can burn the retinas of the eyes. Infrared (IR) wavelengths cause severe discomfort and redness
- Skin: when welding, unprotected skin is exposed to hot metal, sparks and splatter, and when arc welding, to UV radiation. UV light can cause serve sunburn or cancer to unprotected skin. Electrocution could occur from poorly earthed or insulated structures
- 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, dripping molten metal and even cuts, crushing and fractures from heavy falling objects, kicking solid structures. Electrocution could occur through contact with poorly earthed or insulated damp concrete floors
- 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 as a result of the welding process.

So before purchasing approved protective equipment suitable for welding activities at school, all of the following should be considered:

- noise levels and hearing protecting: (also refer to Section 4.2.3; '*Hearing Protection*')
- ventilation and respiratory protection: (also refer to Section 4.2.5; '*Respiratory Protection*')

Note: 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 of these gases may cause inflammation and congestion of the respiratory tract. Exposures of just one (1) ppm for more than half an hour may result in headache and feelings of general discomfort or uneasiness.

Overalls for body protection *(refer to Section 4.2.6; 'Clothing (Body) Protection')*

Note: students might prefer to a wear long sleeve cotton shirt (fire-resistant, cotton, with no pockets) and work trousers (fire-resistant, heavy cotton and no cuffs).

Leather welding clothing for body protection *(refer to Section 4.2.6; 'Clothing (Body) Protection')*

Rubber soled heavy duty work boots for foot protection *(refer to Section 4.2.1; 'Foot Protection')*

Welding helmets, goggles and face shields for head, face and eye protection:

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 should be worn to prevent this exposure. Before purchasing approved protective welding helmets and goggles for student use in typical ITD welding activities, the following must be considered:

- 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 5.
- The various electric arc welding processes emit both IR and UV radiation and hence require a full face welding helmet with UV filter lenses. These helmets vary enormously and should 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 in reality, 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 should 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 actually 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 a 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.

To protect student bystanders and unexpected visitors to the welding area, especially in confined classroom workshop environments, transparent welding screens or curtains should 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. 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 welders helmets.

5. 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 the ITD departments of Queensland Schools 'Plant' refers to all workshop machines, hand held power tools, welding equipment, extractions systems, etc., and are 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.

Any of these items of plant and equipment may pose a risk to health and safety in a school environment. If the inherent or perceived risk level of any item is considered low, and there is only little chance of incident or serious injury when it is used, then control measures need only be managed through regular and considered departmental planning processes.

However, should the item of plant and equipment potentially or historically show evidence of inherent levels of risk considered **Medium, High or Extreme**, and there is significant likelihood of a serious to debilitating injury, then there is a mandatory need to complete the Plant and Equipment Risk Assessment process to determine if control measures are necessary before the equipment can be used by staff or students, for any purpose.

Many teachers have seen, first hand, evidence of the injuries that moving or rotating parts and pulleys, ejected materials or pinch and squash points on machines can inflict on individuals. Adequate safety guarding is therefore vital to prevent accidental contact between the operator and these mechanical hazards. Risks could include entanglement, cutting, crushing, or serious injuries such as amputations, scalping and fatality. Non-mechanical hazards include harmful emissions or fumes, dust, noise and electrocution.

Most new items of machinery will be adequately guarded according to the manufacturers' specifications and any relevant Australian Standards. However, some ITD resources in schools could be of an older design, perhaps would never pass an Annual WHS Assessment, and may require urgent upgrading or replacement.

In this section of the ITD Guidelines, information is provided, including:

Note: *machinery, plant and equipment topics referred to in other sections of this document include:*

- **Machinery hazard management and risk assessment**: *(refer to Section 2.2 - Risk Assessment Guidelines)*
- **Non-mechanical machinery hazards, risks and control measures:** (dust, fumes, noise etc. *refer to Section 3.4; 'Workspace Conditions')*
- **Workplace planning and machinery placement**: *(refer to Section 3.3 - 'Workplace Layout')*

5.1 Purchasing ITD machinery, plant and equipment

In our school environments the risk of injury is increased where young people are working with machinery, plant and equipment. Workplace Health and Safety Queensland (WHSQ) has identified that young workers (school students) are much more likely to be injured than older experienced workers. This is due to some of their inherent characteristics including high risk thresholds, feelings of invulnerability and general lack of experience. This increased level of risk requires that robust procedures are in place to ensure, as much as possible, the safety of all students in our ITD environments.

Schools need to demonstrate a comprehensive and systematic approach to the management of plant and equipment. ITD workplace should be able to show that:

- Authorised delegated staff only undertake plant and machinery procurement activities on behalf of the department
- The procurement and purchase of plant and equipment is managed to ensure health and safety risks are minimised and items that come on to the site have appropriate and robust safety features for their intended purpose
- Use of equipment is undertaken safely through the use of guarding and other design controls, provisions of instruction, training and supervision
- Proactive servicing and maintenance is completed to ensure the equipment is functioning correctly.

5.1.1 Procurement delegation

Heads of department (HODs) or subject coordinators would normally have the delegated authority to undertake procurement activities for the department. Such an authority is known as a procurement delegation and the staff member is known as a procurement officer. A procurement officer should have completed an appropriate level of training and hold current state government procurement certification.

If a teacher in authority with such a delegation vacates a position, the next appointee does not assume the delegation until they have obtained the appropriate delegation and training. It is not delegated directly to a position.

Procurement officers in schools have authority to approve purchases up to $250,000 depending on their level of training and certification. The table below shows some details:

Delegation authority purchase value	**Minimum competitive process required** *(if not on current SOA)*	**Procurement training or certification required**
$1 to $100	No quote required	DoE Internal Procurement Training ***or*** QGCPO Level 1 Certification.
$101 to $2,000	One (1) verbal quote	DoE Internal Procurement Training ***or*** QGCPO Level 1 Certification.
$2,001 to $5,000	Three (3) verbal quotes	DoE Internal Procurement Training ***or*** QGCPO Level 1 Certification.
$5,001 up to $20,000	Three (3) written quotes	DoE Internal Procurement Training ***or*** QGCPO Level 1 Certification.
$20,001 and $100,000	Preferably up to five (5) written quotes	DoE Internal Procurement Training ***or*** QGCPO Level 1 Certification.
Over $100,001 to $250,000	Open Tender	Only staff within the Corporate Procurement Branch or Capital Works and Infrastructure Management Branch - Level 3 Certification

5.1.2 DoE standing offers arrangements (SOAs)

A Standing Offer Arrangement (SOA) is the result of a tender process, conducted by the department seeking offers from suitably qualified suppliers to establish an arrangement for the supply and installation of selected products or equipment for use in Queensland state-owned educational facilities.

Products available on the department's current ITD SOA: 65255 have been evaluated as 'value for money' items of machinery, plant and equipment and the terms and conditions of the arrangement are written to protect all schools across the department. Once an SOA is in place, all suppliers on the arrangement are required to provide the specifically selected items or perform the services at an agreed price and within all of the agreed timeframes.

What can I buy under this arrangement?

This arrangement is for the supply and installation of ITD Industrial Machinery and is split into two parts as outlined below:

Part A – Supply, installation and commissioning (as required) of standard/traditional ITD equipment, e.g. Lathes, cold saws, planners.

Part B – Supply and installation (as required) of plant and equipment with computer-related technology (including emerging technologies) e.g. CNC Lathes/Routers.

- DoE SOA 65255: Suppliers, Product Descript ion's and Price Lists *(available on the DoE intranet)*

What is a Commissioning Checklist?

Any commissioning costs (where applicable) should be provided to schools at the time of quoting. An Equipment Commissioning Checklist will need to be completed by suppliers where schools have chosen 'commissioning' as a line item service. This checklist assists schools in identifying what general processes occur during the commissioning stage.

- Commissioning Checklist *(available on the DoE intranet)*

Who can use this arrangement?

In addition to Queensland state-owned educational facilities, this arrangement may be used by all Queensland non-state schools and Queensland school P&C Associations.

Is this arrangement mandatory?

Part A of this arrangement **is** mandatory for schools, but **not** for other institutes.

Part B is not mandatory.

Naturally, some ITD workshop plant and equipment items may not be included on the current SOA listings and schools will then need to follow the arrangements for "Purchasing Outside a DoE Standing Offer Arrangement *(refer to Section 5.1.3).*

When does this arrangement expire?

16 September 2019, with the possibility of a 12 month extension.

Note: For more information, or if further guidance is required on SOA procurement, contact:

DoE Infrastructure Procurement and Contract Management Unit Infrastructure Operations,
Education House, Brisbane.
Telephone: (07) 3034 4618

- DoE SOA 65255: – Industrial Machinery for ITD (Manual Arts) *(available on the DoE intranet)*
- ITD SOA 65255: Suppliers, Product Descriptions and Price Lists *(available on the DoE intranet)*
- DoE, OnePortal – Purchasing and Procurement Services *(available on the DoE intranet)*
- DoE, Policy and Procedure for Purchasing and Procurement
- DoE, Purchasing and Procurement – Terms and Conditions

5.1.3 Purchasing outside a DoE standing offer arrangement (SOA)

Where schools wish to purchase a product that is not listed on the arrangement or sold by one of the approved SOA suppliers they, along with the supplier, must complete a Risk Assessment Form detailing the machine they would like to purchase, reasons for not purchasing one of the approved products and confirming that the non-SOA product meets the department's requirements and standards. This process also applies to purchases of non-SOA products from SOA suppliers.

Failure to complete this approved Risk Assessment Form could create issues if schools are later audited.

- Risk Assessment Form for Purchasing ITD Equipment Outside the DoE SOA

Note: The risk assessment form, "Purchasing ITD machines/equipment outside the DoE – SOA", has been developed to ensure all health and safety risks are minimised in ITD practical workshops, with all fixed machinery having the appropriate, robust safety features for their intended purpose. It is important to understand that the following factors should be carefully considered:

Employees (Teachers) and Students:

- Who will come into contact with the equipment?
- How will work be carried out and completed?
- Based on the knowledge of existing machinery, plant and equipment, what improvements, if any, should the ITD department specify before procurement? (e.g. the fitment of zero voltage cut-out switches.)

Documentation and training

- What supporting documentation will accompany the proposed new machinery, plant and equipment?
- To what manufacturing standards has the equipment been designed, developed and produced – European CE®, etc.? Is this acceptable?
- What support is offered by suppliers – service, training, maintenance, etc.?
- What operating and maintenance information is supplied with the new equipment?
- Is the supplied information sufficient to provide the basis of a workplace training package?
- If the equipment is refurbished or second-hand, how do the risk controls compare with similar new machinery and equipment?
- Have you allowed extra resources to upgrade existing risk controls to reflect state recommendations and legislations?

Location

- Where is the proposed new equipment to be located, and how much space does it require?
- Is there enough room to access the equipment for servicing, maintenance, repair or cleaning?
- Do staff and students walk past or work in close proximity to the proposed equipment location?
- Is there enough light?
- Is there sufficient ventilation?
- If dust extraction is required what allowances have been made to connect either to an existing system or a new extractor?
- Will the new equipment require an upgrade of existing wiring? (e.g. single phase to 3 phase.)
- Is the floor of the workspace strong enough?

Operations and maintenance

- Will the proposed new equipment introduce more noise to the ITD workplace?
- What types of emissions does the equipment produce when operated or cleaned, such as noise, dust, fumes, light and heat?

- Is the new equipment robust enough to cope with an educational environment?
- Will the new equipment require electrical testing and tagging prior to initial use?

General

- Will the proposed new equipment fit through the door?
- Do staff understand that if they purchase machinery, plant and equipment outside Queensland, then they also take on the obligations of the importer and designer?
- Do staff understand the obligations of an importer and designer?
- What will be the ongoing costs such as maintenance, replacement life and redundancy?
- Are specialised tools and equipment required to adjust and use the equipment included?
- Is the new equipment compliant to all or any required Australian Standards?

5.1.4 Asset disposals and write-offs

Before the disposal process can be undertaken, written approval should be obtained from a Delegated Officer (e.g. school registrar or BSM) who can approve the write-off of a capital asset or items of machinery, plant and equipment. A detailed explanation of disposal, write-off, and transferee procedures is outlined in the following DoE policy and procedure:

- DoE, PPR – Equipment management for schools – disposal of equipment

Your school may approve several options for the disposal of surplus equipment, such as:

- transfers to another school
- disposal
- write-off.

The key principles for the disposal of any surplus in schools are:

- return is maximised
- cost of disposal is minimised
- disposal process is fair, equitable and open
- employees of the department are not advantaged.

Transfers to another school

The transfer of an item of equipment from one school to another is recorded in SMS. The school retains a signed hard copy of SMS Asset Disposal form and EQ13 for audit purposes.

- Equipment disposal/write-off form (EQ13)

A copy of the Asset ID form is forwarded to the new location with the item of equipment. In the case of capital assets (acquisition value is $5000 or greater), a copy of the signed EQ13 form is forwarded to Fixed Assets Team, Finance Branch for updating of department's central register.

Schools do not sell items to other state schools or departmental workplaces. Such items are usually transferred at no charge. Freight and installation charges for equipment are borne by the receiver.

Disposals

Several options are available to schools for the disposal of surplus assets. These include:

- sale by action
- sale by garage, jumble or car boot sale
- sale by inviting offers or tenders
- trade-in of equipment through retailers
- disposal by dumping
- disposal by scrapping.

Write-offs

Equipment being disposed of through write-off should be identified as having no further operational value or have been fully depreciated. If equipment is beyond economic repair and there is no residual value, then the item may be destroyed and dumped, or given to a scrap metal merchant. Care should be taken to ensure that the equipment number (Ed Quip No.) is totally obliterated prior to dumping or scrapping.

Equipment may be beyond economic repair if:

- too much money has been expended on repairs
- it's current value is less than repair quote – a replacement item can be purchased at a significantly lower cost
- the item is obsolete
- the item's estimated life has expired
- new technology is available which improves efficiency
- the item was missed at the last departmental stocktake and cannot be accounted for.

It must be remembered that departmental employees have no prior right to the acquisition of surplus equipment, materials or furniture over the public. Any employee wishing to acquire such material may bid at a public auction if applicable, or submit an offer after notification of sale.

For more information, or if further guidance is required regarding the disposal or write-off of ITD assets, refer to the following useful links:

- DoE, PPR – Equipment Management for Schools
- DoE, Equipment Management for Schools – Unauthorised use of equipment
- DoE, Equipment Management for Schools – Registering new equipment
- DoE, Form EQ13 – Equipment disposal/write-offs
- DoE, Guidelines for the annual school stocktake process

5.2 Responsibility for safe use of machinery

5.2.1 Schools responsibility

It is the responsibility of the school, through close consultation with the department and cooperation of the Principal and ITD Head of Department, to ensure that:

- Prior to purchasing, and as a condition of acceptance, all 'Plant and Equipment' is checked for compliance with Australian Standards, and that appropriate information is provided with the item, such as operating and maintenance instructions
- Modifications should not normally be made to ITD machinery, plant and equipment unless this includes the rectification of identified hazard control measures, such as improved safety guarding, for standard safer operation. Any modifications should comply with all relevant Australian Standards
- All machinery is correctly installed and connected to the power supply prior to operation
- Machines are fitted with appropriate guarding and waste/dust extraction equipment, and with all safety cut-off micro-switches and emergency stop mechanisms where necessary
- All machines and equipment are regularly serviced and maintained in a safe operating condition
- 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 machinery in a fixed position should have a clearly delineated "safe operational zone" in the form of 80mm wide yellow safety lines
- All operational risks associated with any plant and equipment have been identified, assessed and controlled (and documented in a Plant & Equipment Risk Assessment – P&ERA)
- Safe operating procedures (SOPs) or instructions are fitted to or near all fixed machines and near where portable equipment is stored.
- All operators are trained in the use of particular machines and are physically capable of handling them.
- Training should include the following:
  - the correct method of use
  - known hazards which arise in the course of normal work
  - hazards arising from bad practices, inattention and misuse
  - the need to wear all necessary PPE, i.e. foot, hand, eye, hearing and respiratory protection
  - the need to ensure that dust/waste and fume extraction equipment is functioning correctly
- any inexperienced operators should always be directly supervised
- all operators should avoid working alone with potentially hazardous equipment.

5.2.2 Teachers responsibility

It is the responsibility of the ITD teaching staff to ensure safe work practices are adopted, in particular that:

- Students do not use machinery and equipment unless they have been trained and judged competent in its safe use. (refer also to Section 1.5.2; '*Student Induction to Workplace Safety and Training – Student Induction Register*')
- Teachers should refer to the 'Student use of machinery, plant and equipment' *(Section 5.3; 'Machinery, Plant and Equipment', page 96 - 99).* This is a comprehensive index of items of machines, equipment, tools and processes with guidelines for recommendations for ITD teachers regarding which student groups should or could be permitted to be involved with, or be allowed access to. The list also includes items which are restricted to ITD teachers only, or to senior students under direct ITD teacher supervision
- Teachers should provide formal instruction and demonstration in the safe operation of all phases of hand tools, power tools and machinery, manufacturing and fabrication processes
- Workshop hand and power tool safety, and the requirement for appropriate PPE to be worn will then require regular, repetitive, informal re-enforced for all students
- Teachers are usually expected to complete (lesson by lesson) a full-size demonstration for each of their class group projects. The teacher 'demo' should accurately reflect step-by-step project development, all intended design concepts, and clearly display exemplar manufacturing and fabrication techniques and processes
- When working in situations or areas which are potentially hazardous, all students, teachers and all support staff should wear all necessary PPE i.e. correct footwear, safety spectacles, hearing protection and any other equipment or clothing supplied
- Teaching staff should always visually check all electrical equipment for safety compliance prior to any student use.
- The 'safe work zone' areas around each fixed machine are to be clear of debris such as off cuts, sawdust or shavings. Slip, trip and fall hazards should be removed.
- Dust, waste and fume extraction systems are operating as necessary.
- Safety guards fitted to machines as standard safety operational equipment should always in place.
- Teaching staff from outside the ITD faculty area should gain approval from the Head of Department, subject coordinator or a senior ITD teacher before using any ITD facilities, equipment and machinery.

For more information and guidance on the responsibilities for safe use of ITD plant and equipment in Queensland schools, refer to the following useful links:

- DoE, PPR – Equipment management for schools
- DoE, Equipment Management for Schools – Unauthorised use of equipment
- DoE, Equipment Management for Schools – Registering new equipment
- DoE, Form EQ13 – Equipment disposal/write-offs
- DoE, PPR – OneSchool stocktake checklist

Some relevant Australian Standards:

- AS 4024.1: 2014 (Series) – Safety of machinery
- AS/NZS 60745.2.23:2013 – Hand-held motor-operated electric tools
- AS 4024.3101: 2008 (R2018) – Safety of metal cutting machines

5.2.3 Working safely with machinery, plant and equipment

Before any ITD staff, students or others operate any fixed or portable power tools, equipment or machinery in any ITD workshop, particular care should be taken to ensure they are fully conversant with four basic safety considerations – i.e. the designed function of the machine, the safe operating procedures, the concept of a safe working environment and, and the designed safety control functions of the machine.

1. Designed function

- The capabilities of the machine.
- The fact that fixed machines are generally far more powerful than smaller portable, hand held equipment.
- Starting and stopping procedures.
- Operation of guards and safety devices, especially emergency stop mechanisms, and the need for ensuring they are kept in good condition, properly mounted, and correctly adjusted.
- How to recognise, as far as possible, faults which may occur in a machine, guard or safety device; How to recognise those of a minor nature, and the need for reporting to the person in charge those faults which are beyond the user's authority or competence to rectify.

2. Safe, standard operation

(refer also to Section 5.6: 'Safe operating procedures')

- Machines should not be operated unless all shields, grilles and safety guards are provided and are properly in place.
- Ensure that machines come to rest before making adjustments or during the manual removal of waste or blockages.
- Don't use bare hands or fingers to clear choked cutters.
- Never attempt to lubricate or adjust machinery which is turned on or in motion.
- Always turn off the power when a machine is no longer being used.
- Know the hazards and associated risks which arise in the course of normal work.
- Be aware of hazards that arise from bad practices, inattention and misuse.
- Know the dangers that arise when more than one person at a time operates a machine.
- Where machines are fitted with table or feed controls, always select the neutral position before the machine is started.
- Wear all appropriate PPE i.e. foot, eye and hearing protectors and/or respirators when there are dangers of dust, flying chips or harmful noise.
- Take care that work gloves do not become caught in moving parts.
- Ensure that dust and fume extraction equipment is functioning correctly.
- Do not reach over a saw or other cutting tools for any purpose.
- Watch for sparks in open pockets and cuffs of clothing when welding.
- Don't wear jewellery that can snare in moving parts of machinery.
- Always clean down the machinery after use – DO NOT use compressed air.

3. Safe working environment

(refer also to Section 3.4: 'Workspace conditions')

- The machine and work area should be kept free of an accumulation of materials, hand tools, trade waste, oil, grease, sawdust and obstructions of any kind
- Keep a proper footing and balance at all times
- Observe yellow safety lines and the parameters of the "safe operational zone" for each fixed machine to maintain a safe distance from others when working
- Sufficient space should be 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 him or herself, or any other person
- Any person who is required or permitted to work, move or pass in close proximity to the moving parts of any machinery should not wear any clothing or accessories likely to become easily entangled in those moving parts
- Any person with unconfined, loose, long flowing hair should not work or pass in close proximity to the moving parts of any machinery unless their hair is securely confined close to the head. This could be a hair band, rubber band, hair net or a close-fitting cap (worn backwards). Ponytails should also be tied up and contained so that they cannot fall forward, sideways or backwards into the moving parts of a machine.

  ***Note:** hair nets are **not** mandatory in schools. What **is mandatory** in all departmental workplaces is that when hazards and risks are identified, controls must be put in place to manage that hazard to reduce the risk of injury.*

Because all schools are required to provide access to students with special needs, HODs might consider isolating powered workshop machinery with a key-operated isolating lock to all electrical switch panels in each room.

4. Designed safety controls and machinery guards

(refer also to Section 3.6.3: 'Safety Switching and Electrical Isolation Devices')

Wherever practicable, controls for a power-driven fixed machine should be located in visible positions where they can be readily and conveniently reached by the operator and in particular:

- Starting controls should be designed and located to minimise the risk of inadvertent, mistaken or incorrect starting
- Start buttons should be shrouded or recessed and coloured green
- Lockable magnetic control switchgear is recommended. This will also immediately cut power to the machine on loss of current to the workshop
- Stopping controls should be readily and safely accessible to the operator. This should be particularly addressed if the operator is a student with special needs
- Stop buttons should protrude in both initial and operating positions, should be easy to locate, be coloured red and clearly marked "Stop", either on the button or as near to it as practicable
- On some fixed machines, such as the Drill Press, a large, knee access emergency stop button should be fitted
- Where a machine is designed to be operated or attended by more than one person, the multiple controls should be of the "stop and lock-off" type so the machine cannot be restarted after a stop control has been used, unless the stop control is reset

- The hazardous working parts of power-driven machinery and equipment should be safeguarded in accordance with the appropriate requirements of relevant standards issued by Standards Australia (as listed below)
- Where designed safeguards, such as hinged pulley covers and maintenance access doors can be inadvertently opened during normal machinery operation, a Safety Micro Switch should be fitted to immediately isolate power supply to the motor.

For more information, or if further guidance is required on working safely with ITD plant and equipment in Queensland schools, refer to the following useful links:

- DoE, PPR – Equipment management for schools

Some Relevant Australian Standards:

- AS 60204.1-2005 – General safety of machinery

5.3 Student use of machinery, plant and equipment

The department offers guidelines and ***recommendations only*** as to which ITD student groups might be permitted to be allowed access to specific machinery, plant and equipment items and processes commonly used in ITD practical curriculum activities. For example, it should be noted that access to some items of **Extreme** risk plant and machinery might be best restricted to ***ITD teacher only*** or to competent, mature, senior students under close one-on-one ITD teacher supervision.

Note: "Close one-on-one ITD teacher supervision" means*: '...with a trained (qualified) ITD teacher in the immediate vicinity, observing, tutoring and monitoring the individual student involved in the practical activity or process - at all times.'*

All items of ITD 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 currently available online. It should be noted, however, that these risk assessment documents do not necessarily restrict access or usage by specific student groups or year levels. They are designed to assess the risk levels inherent for each individual item when used in a specific way, (*refer also to Section 2.2.2).*

The **'Student Usage Control Index'** *(refer below, Section 5.3.1)* has been categorised into four levels of recommended control for ITD student access and safe use.

These levels of recommendation have been evaluated based on the significant inherent risks associated with each item of ITD machinery, plant, equipment or workshop process, and the likelihood of any student accidents or injuries being sustained as a result of their access and usage under normal ITD practical workshop conditions.

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

- LEVEL 1: Junior years
  - Industrial technology and design education students in years 7 and 8 with limited exposure and experience.
- LEVEL 2: Middle years
  - Industrial technology and design education students in years 8 and 9 with regular exposure and proven levels of competence and experience.
  - **PLUS** any inexperienced and insufficiently skilled senior students in years 10, 11 and 12 where individual assessments indicate 'unsatisfactory progress'.
- LEVEL 3: Senior years
  - QCAA students (i.e. Technology studies and Engineering Technology), Building Construction Skills, Industrial Skills, etc.), and VET students in years 10, 11 and 12 with regular workshop exposure and with proven levels of individual competence, experience and skill levels.
- LEVEL 4: RESTRICTED
  - **Limited** to ITD teachers or Level 3 students working under close one-on-one supervision by a qualified ITD teacher

Note: ultimately individual schools will make their own evaluations and rational, informed duty-of-care decisions regarding which students in their school might be safely permitted to access specific ITD machinery, plant and equipment or processes under their normal ITD workshop conditions. Access by an individual student can and should be **restricted**, if a Plant and Equipment Risk Assessment indicates that it is in the interest of that individual student or others in the class group to do so.

5.3.1 Student Usage Control Index

Student Usage Control Index

Workshop management guidelines and measured recommendations are offered in this index to help ITD teachers maintain control over student access and safe usage for machinery, plant, equipment and processes common in ITD practical curriculum activities.

Level 1 – Junior years **Level 2** – Middle years **Level 3** – Senior years

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, Magnabend®)	✓	✓	✓	
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, MatCam® 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			✓	
Panel saw/surface planer/spindle moulder/mortiser				✓

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)		✓	✓	
CNC laser cutter/engraver	✓	✓	✓	
CNC mill and lathe (e.g. Denford® Turn 270 Pro)		✓	✓	
CNC plasma cutter			✓	✓
CNC router (e.g. Denford® Compact 1000)		✓	✓	
CNC 3D printer/rapid prototyping	✓	✓	✓	
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 a masonry disc			✓	
○ 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, CNC (or lathe, e.g. Denford ® *Compact 1000*)	✓	✓	✓	
Router, laminate trimmer		✓	✓	
Router, palm		✓	✓	
Router, plunge			✓	
Router table (fixed or sliding – fitted with correct router)			✓	

Sander, belt		✓	✓	
Sander, orbital (random orbit)	✓	✓	✓	
Sander, sheet	✓	✓	✓	
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	✓	✓	✓	

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)		✓	✓	
Metal casting (foundry work)			✓	✓
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)	✓	✓	✓	

5.4 Service maintenance and responsibilities

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

As of June 31, 2013 the Queensland Government Department of Housing and Public Works (QBuild) and their Project Services businesses merged to form Building and Asset Services (BAS). DoE central office has partnered with BAS to manage the service maintenance program delivered to schools. The centrally managed service maintenance program covers both statutory and recommended maintenance requirements.

Schools should refer to the Plant and equipment reference guide (service maintenance) to identify assets included in the centrally managed Service Maintenance program. Where schools identify new, disposed or updated items of equipment, schools should notify 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 plant and equipment maintenance funded by schools, principals have the choice: to use BAS (formerly known as QBuild) to deliver their planned and routine breakdown servicing and maintenance, or to independently source local contractors to deliver such services via a 'Direct to Market' (D2M) option. D2M schools also receive a routine breakdown maintenance allocation funded from the DoE annual maintenance budget.

Schools will select a program of planned maintenance works within the limits of their available school maintenance budget. Annual, routine servicing and maintenance requirements for ITD fixed machinery, plant and equipment will then require the follow action:

- BAS schools – School principals will prioritise selected maintenance tasks in consultation with the Facility Infrastructure Advisor and BAS – and then approve selected tasks in OneSchool;
- D2M schools – School principals will prioritise selected maintenance tasks in consultation with their facility account manager – they will create work requests, raise purchase orders through OneSchool, and then engage local contractors.

For more information, or if further guidance is required on Service Maintenance in Queensland schools, refer to the following useful links:

- DoE, Service Maintenance
- DoE, School Maintenance – frequently asked questions
- DoE, Distribution of school maintenance funds – fact sheet
- DoE, Policy and Procedure Register – Equipment Management for Schools

5.5 Equipment maintenance records (EMRs)

The *Work Health and Safety Act 2011* (Qld) outlines obligations to manage risks. These obligations extend to managing inherent risks associated with machinery, plant and equipment use in schools. The Plant Code of Practice (part of the framework of health and safety legislation) provides more detailed information on how to address specific issues related to the use of plant and equipment. Within the current Code, aspects of record keeping 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.

Auditors and WHSQ officers will expect schools to produce all EMRs including any service, maintenance or repair documentation in the event of safety audit reviews or following departmental investigations of any serious injury or incident involving the use of school machinery, plant and equipment.

Three EMR pages are provided 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
- **Random equipment checklist:** date, tick checked, any follow-up action required
- **End of semester and annual checklist:** date, tick checked, any actions required.

All EMR documents are provided in MS Word format. Select from the list at the following departmental website:

- DoE, Creating Healthier Workplaces – Equipment and machinery resources

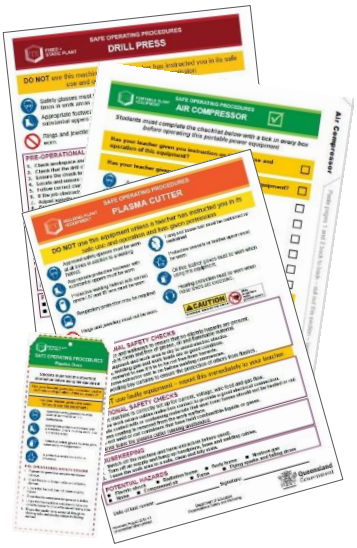
Schools may have already developed forms and procedures for managing their fixed or non-portable machinery, plant and equipment. The EMR form layout provided by the department in itself is not mandatory, but forms a baseline of information for the establishment or review of a school system.

Note: The department is currently developing an EMR Application for hand-held devices such as IPhones or Tablets. This App is designed to significantly simplify the collating, checking, recording and sharing all your ITD equipment and machinery maintenance data. Schools will be advised when this product becomes available.

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

- DoE, CHW, Equipment and machinery resources (SOPs, EMRs & P&ERAs)
- DoE, Fact sheet – Managing plant and equipment in ITD
- DoE, Safety and hazard alerts
- DoE, Fact sheet – Using SOPs and EMRs in your school

5.6 Safe operating procedures (SOPs)



Safe operating procedures (SOPs) are ***mandatory*** documents that provide teachers and students with a table of directions that are a consistent and structured approach for the safe use of all ITD machinery, plant and equipment in schools.

An extensive index of SOP documents for the more common ITD machinery, plant and equipment found in most EQ school is currently available for download (in MS Word format for editing if required) at the following departmental website:

- DoE, Equipment and machinery resources (SOPs and EMRs)

1. SOPs for **fixed** or stationery ITD machinery, plant and equipment have been available for some time in '**A4 poster**' format:
   - All fixed machinery SOPs are to be signed and dated by the HOD, laminated and displayed prominently, close to the equipment where they can be seen readily by students and supervising teachers.
2. 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 – a little time consuming; however it should prove very useful as a portable resource.
   - 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. This format also requires laminating and trimming to shape.
   - An A4 size '**poster**' format that is very similar to the suite of fixed SOPs that have been used in schools for many years – they will also require laminating and could be displayed adjacent to where the portable power tools or machines is usually stored or used.
3. SOPs for '**hazardous chemicals**' are written procedures explaining how to work safely with chemicals in departmental workplaces. The generic Chemicals SOP template can be found at:
   - DoE, PPR – 'Generic SOP template for chemicals in DoE workplaces'

How schools utilise the Health and Safety information and structured content of SOPs will depend on local circumstances and individual school preference. Remember, however, they are ***mandatory*** documents for all ITD departments in all EQ schools and, as such, should be displayed prominently close by to items of machinery, plant and equipment where they can be seen readily by all users and supervising staff.

There is also a responsibility of ensuring that your SOPs are reviewed on an ongoing basis. This needs to be done at least once a year or as changes are made to your ITD plant and equipment inventory, work processes or your evolving curriculum requirements.

For more information, or if further guidance is required on SOPs and EMRs in Queensland schools, refer to the following useful links:

- DoE, CHW, Hazards in schools – Equipment and machinery resources
- DoE, CHW – Using SOPs & EMRs in your school fact sheet
- DoE, CHW – Managing plant and equipment in ITD
- DoE, CHW – Safety and hazard alerts

5.7 Battery powered tools and equipment

Battery powered or cordless power tools and equipment have improved over the years and are a great choice. With lithium-ion batteries, rechargeable power tools are lighter, stronger and more versatile than ever. There are a number of advantages to these versatile tools, and a number of safety considerations that need to be addressed:

- Lithium-ion batteries hold a charge better and last longer than nickel-cadmium batteries.
- Cordless power tools are more portable and convenient. They are usually not as versatile or as powerful as 240v powered alternatives, however, they can be used in more areas without the inconvenience of distance from an AC power outlet or generator. This generally makes them safer when being used by students – no electrical cords to trip over, get tangled in, or to accidentally cut into. Note, however, that most cordless power tools could still potentially be a hazardous machine if not used properly.
- Schools regularly have a number of batteries on charge ready for use in multiple tools that can run on the same battery size and type – i.e. hand drills, orbital sanders, edge-trim routers, circular saws, reciprocating saws, jigsaws, brad nailers, impact drivers and hand vacuum cleaners.
- Not all chargers are equally efficient, so schools are advised to shop for the most energy-efficient models. However, do not use a different charger aside from the prescribed one that comes with the tool. Incompatible chargers or adaptors can greatly damage not only the battery but sometimes the entire device. Incompatible chargers or adaptors have also been known to cause fires.
- Never use the cordless power tool in damp or watery places. Even if the cordless tool is not connected to an electric socket, it is still electrically powered when it is running on battery. This is called dry current or DC power. Any device that runs on electric current is very sensitive to water based materials. It might develop short circuit problems after getting wet or damp accidentally.
- Never use cordless tools in places near explosive gases. Even battery powered tools emit heat or at times, produce sparks, while being used. This heat or spark may trigger any volatile gases to explode.
- Always work in a safe environment. Naturally, all necessary PPE must be provided and worn. If the operator is working with an assistant, make sure that they too are taking the same precautionary measures.

For more information, or if further guidance is required on battery-powered tools and equipment for use in Queensland schools, refer to the following useful links:

- DoE, CHW, Equipment and machinery resources (SOPs, EMRs & P&ERAs)
- DoE, CHW, Hazards in schools – Equipment and machinery
- DoE, CHW – Managing plant and equipment in ITD
- DoE, CHW – Safety and hazard alerts
- DoE, CHW – Using SOPs and EMRs in your school

5.8 Hand tools

Hand tools can be classified as non-powered tools and include anything from measuring tools, hammers and chisels to spanners or hand saws. The greatest hazards posed by hand tools result from misuse by students and improper maintenance by ITD staff. Some examples include:

- Using a screwdriver as a chisel may cause the tip of the screwdriver to break and fly, possibly hitting someone in the eye.
- If a wooden handle on a tool such as a hammer or a bossing mallet is loose, splintered, or cracked, the head of the tool may fly off and strike those nearby. Students should be instructed in the routine procedure of checking the condition of the tools before use
- Impact tools such as cold chisels, centre punches or drift pins with an excessively worn or mushroomed heads need to be ground back, or dressed, to the correct shape to prevent the curled edges from shattering on impact, sending sharp fragments flying.

As part of the process of safety self-regulation, all teachers engaging in activities involving the use of hand tools should individually identify the hazards, assess their significance and manage the potential risks. Always consider the following:

- Teachers are responsible for the serviceable and safe condition of hand tools and equipment used by in ITD. Chisels should be sharp to work correctly and efficiently. Dull tools can be more hazardous than sharp ones. Students should be cautioned that saw blades, chisels, or other sharp tools be directed away from aisle areas and other students in close proximity.
- Appropriate personal protective equipment (PPE), e.g. safety goggles, leather shoes and gloves should be worn due to hazards that may be encountered while using most hand tools.
- Hand tools used within the facility need to be returned to a designated area after they are used. Store all hand tools neatly and safely so they do not create a hazard, e.g. falling, tripping or stubbing.
- The level of theft of hand tools within the facility is difficult to control when they are left scattered around the room, on floors, in project storage cupboards and lost behind machinery. Always endeavour to account for all hand tools at the end of every lesson. It is suggested that a hand tool register be developed to assist in accounting for tools in each room and peg boards or shadow boards be provided. Teachers can do a quick visual check and immediately identify all hand tools that are misplaced or lost.
- Around flammable substances, sparks produced by iron and steel hand tools can be a hazardous ignition source. Where this hazard exists, spark-resistant tools made from brass, plastic, aluminium, or wood will provide a much higher degree of safety.

5.9 Compressed air, pneumatic tools and equipment

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 compressors are commonly used in ITD departments by teachers and students, ranging from small portable types to the larger capacity fixed machinery.

As part of the process of risk management, all teachers involved in activities incorporating the use of any compressed-air pneumatic tools and equipment in ITD should initially identify the associated hazards, assess their significance and manage the potential risks by means of a Plant and Equipment Risk Assessment (P&ERA). Control measures requiring teacher consideration are:

- Ventilate the workspace with open doors or windows and turn on the dust extractor
- Safety glasses and appropriate fully enclosed footwear that protects against falling sharp tools, equipment or project materials should be worn by all persons
- Where the noise level of the air-operated device and the frequency of use demand it, appropriate ear protection should be worn during operation. Noise levels output should be kept below 85 dB
- Air pressure in compressors and pipelines should not exceed the manufacturer's specifications
- Air pressures should be regulated to the minimum pressure that will allow the appropriate functioning of the equipment being operated
- Compressors should be fitted with functioning relief valves and a suitable regulator
- All air hoses should be fitted with self-sealing fittings to prevent personal damage from an open air hose
- Any leaking air lines should be fixed as soon as they are detected
- Tank inspection for large air-compressor unit with a cylinder capacity of 26 cubic feet or greater required every six months. Certification reports should be filed and available at the school
- Any required maintenance on the air-compressor unit, manifolds and air lines, and all air tools should be carried out to manufacturer’s standards
- Compressor units are to be located clear of access and egress of all walkways and pathways
- It is strongly recommended that all spray-painting activities be conducted in a purpose built and well-ventilated booth
- Careless use of compressed air to blow away dirt or dust from the body, clothing or machinery, should 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, known medically as an embolism. This is a dangerous medical condition.

For more information, or if further guidance is required on compressed air, and pneumatic powered tools and equipment for use in Queensland schools, refer to the following useful links:

- DoE, CHW, Equipment and machinery resources (SOPs, EMRs & P&ERAs)
- DoE, CHW, Hazards in schools – Equipment and machinery
- DoE, CHW – Managing plant and equipment in ITD
- DoE, CHW – Safety and hazard alerts
- DoE, CHW – Using SOPs and EMRs in your school

5.9.1 Safe use of nailing tools in schools

This specific safety guideline highlights the **High** and **Extreme** risk hazards present when using nailing tools, such as nail guns and stapling tools, and provides examples of their correct and safe usage. The information provided is designed to help ITD teachers meet their duty of care obligations under the *Work Health and Safety Act 2011* (Qld).

Nail guns have often replaced hammers as tools of choice amongst builders. There are many types of portable hand-held nail guns used throughout industry and, to a much lesser degree, regularly utilised in Vocational Education and Training (VET) courses conducted in most Queensland Secondary schools and colleges. They are powered by either:

- electromagnetism
- compressed air – pneumatic
- highly flammable gases – such as butane or propane
- powder actuated – requiring an explosive charge.

The compressed air/pneumatic models have become the most commonly used form.

Investigations have identified that occurrences of serious nail gun incidents are increasing, not only within Queensland, but throughout Australia and other countries. The main cause for many of these incidents is associated with the use of **contact trip actuation** (also known as bump-fire, bounce-fire or simultaneous discharge) type nail guns.

Nail guns are significantly prone to unintentional firing when users accidentally make contact with the gun's muzzle while handling the equipment or when moving from one location to another with their finger engaged on the tool's trigger mechanism.

The contact trip actuation method of operation allows nails to be driven or fired by holding the trigger in the firing position, then bringing the muzzle into contact with any surface that provides enough resistance to counteract the spring compression forces of the muzzle assembly.

Primarily, due to the likelihood of repetitive strain considerations for tradespersons using these tools regularly, many designers have adopted relatively low intensity spring compression units within the muzzle assemblies, therefore providing little protection against unintentional discharge by unsuspecting, inexperienced school students.

Today, nail gun penetration injuries have increased throughout the industry to dangerously high levels. Reports clearly show that a significant number of these incidents are a direct result of the gun's muzzle being unintentionally struck into a part of the body while the user has hold of the tool's trigger switch. These incidents resulted in people being left partially or permanently disabled, blinded, and in some cases fatally injured.

High and extreme risk hazards to be particularly aware of in schools are:

- ITD teachers, students and others can accidentally place themselves into positions where they are directly exposed to the projectile path of a nail gun.
- As it currently stands, the safety of nail gun operations is mainly dependent upon the skill, knowledge, aptitude, maturity and 'safe work' attitude of the user.
- The nail gun is effectively a firearm which can release steel projectiles in excess of 130 mm in length.
- Contact trip actuation (bump-fire, bounce-fire or simultaneous discharge) type nail guns are much more prone to unintentional firing through accidental contact with the machine's muzzle when handling the equipment from one position to another.

Control or prevention measures:

- Bump-fire nail guns (including those fitted with switchable levers that allow the gun to be used in another mode) should not be used:
    - in restricted and tight spaced areas where the gun's actuation muzzle is at high risk of being bumped
    - where other students are likely to come within the firing path of the nail gun or there is a foreseeable risk of them being struck by a flying nail e.g. by ricochet or deflection.
- Nail guns should be maintained to ensure correct operation of the actuation mechanism. If any problems occur, the tools should be repaired by a competent person (i.e. an authorised agent) or be replaced.
- A safer design of operation is found within sequential actuation type nail guns, which allow for only one single driving operation via trigger, after the muzzle of the tool has been applied to the driving location.
- All teachers and students who use nail guns should be fully trained in their safe use. Training is to address the safe operation of the nail gun, personal protective equipment (PPE) requirements and any other specific directions as stated in the manufacturer's manual.
- Due to the increasing number of serious nail gun penetration injuries taking place throughout the building and construction industry, Workplace Health and Safety Queensland considers that bump-fire type nail guns should only be used within this industry under the strictest of controls. Nail guns with safer actuation mechanisms are preferred.
- Specific safety rules should include:
    - establishing an appropriate exclusion zone around the nailing operation
    - placing appropriate workplace safety signage to alert people that a nailing tool is in use
    - re-assigning students not directly involved in the nailing work away from the area where the nailing operation is taking place (where possible)
    - ensuring teachers, students and other workers (located in or near the exclusion zone) wear appropriate eye and hearing protection and any additional specified PPE.

For more information, or if further guidance is required on compressed air, and gas powered tools and equipment for use in Queensland schools, refer to the following useful links:

- WHSQ – Safe use of nail guns
- DoE, CHW, Equipment and machinery resources (SOPs, EMRs & P&ERAs)
- DoE, CHW, Hazards in schools – Equipment and machinery
- DoE, CHW – Managing plant and equipment in ITD
- DoE, CHW – Safety and hazard alerts
- DoE, CHW – Using SOPs and EMRs in your school
- WHSQ – Managing risks of plant in the workplace – Code of practice 2013

5.10 Welding processes and equipment

This is not a technical manual, nor is it a recommendation to use particular brands of PPE clothing or welding equipment. This is, however, a general guideline for safe-work procedures and practices when welding and gas-cutting in the ITD workplace environment. All guideline advice is intended for ITD teachers, staff and students, and anyone else who uses welding equipment in the schools ITD workshop.

It is the responsibility of the school to ensure that all operators are adequately trained, and that they understand and use the correct operating techniques. Equally, it is the responsibility of every operator to use only the correct operating techniques.

5.10.1 Oxy/acetylene – fuel gas welding, cutting and brazing

- There must be a safe working system in place for the performance of welding activities. This system must address the inherent oxy-welding safety risks including extreme heat, infra-red radiation and volatile, explosive and toxic gases.
- Effective control measures should include ways of preventing or minimising these risks, including well designed oxy-welding bays and workshop layout that allows provision for sufficient teacher supervision, enabling student observation to be maintained at all times. This will vary depending on the maturity and responsibility of the students.
- Walkways and access around welding bays should be left free of all obstructions.
- Provision for quenching hot metals should be made available and be very close at hand.
- Operating instructions should be prominently displayed for the safe ‘Opening and Shut-down’ procedures of all gas supply cylinders and manifolds.
- To prevent the accidental play of a welding flame onto the gas cylinders, it is important to locate the oxygen and acetylene cylinders on the storage trolley, and behind the operator.
- 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.
- 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. should be available and in good repair. Watch for sparks in open pockets and cuffs of clothing when welding.
- Adequate facilities should be provided for the delivery of full gas cylinders and the return of empties. Gas cylinders should be stored away from exposure to excessive heat, on a readily moveable vertical hand trolley and secured in position by means of a safety chain or comparable device.
- Acetylene cylinders should be secured in an upright position prior to and during use. Acetylene is packaged in a cylinder filled with Diatomaceous Earth. The acetylene is dissolved in acetone and the solution is then pumped into the cylinder. If the cylinder is placed on its side and then set upright again, it takes some time for the system to re-equilibrate and for the acetone to drain out of the dip tube in the valve. If welding is done during this period, the operator may get ‘spitting’ as the weld will be high in carbon due to the presence of acetone.
- Be aware of flashbacks. A flashback is the burning back of the flame into the tip, torch, or hose. It is often accompanied by a hissing or squealing sound with a smoky or sharp-pointed flame. When this occurs the flame should be extinguished immediately by closing the oxygen valve and then the acetylene valve. The occurrence of a flashback indicates that something is radically wrong with the procedure or with the equipment. A qualified gas fitter or QBuild should be called to check the equipment and or procedures before resuming.

- Oxy acetylene torches, hoses, gas lines, regulators and flashback arresters should be inspected annually under the departmental Plant and Equipment Service Maintenance Program. This is the responsibility of the department.
- Storage of disconnected replacement oxygen and acetylene bottles should be arranged to keep the two gases separated by several metres. Consider not holding any more full gas cylinders in storage than is absolutely necessary for your requirements.
- Stored cylinders, not connected for use, should remain capped.
- Teachers should never convey or move gas cylinders without the aid of the storage hand trolley, with the cylinder still securely fastened. If possible, arrange for the gas supplier or delivery agent to deliver all gas cylinders to the nearest point-of-use, thus minimising unnecessary handling.
- Oil and grease should never come into contact with oxy/acetylene welding equipment. These substances may ignite spontaneously when in contact with oxygen.

5.10.2 Electric arc welding – MMAW, MIG and TIG

- The primary hazards associated with electric arc welding are electric shock, burns from hot material, radiant energy from ultraviolet and infra-red rays, toxic fumes, fires and explosions.
- Effective control measures must include ways of preventing or minimising all inherent risks, including well designed welding bays and workshop layout that allow provision for sufficient teacher supervision, enabling student observation to be maintained at all times. This will vary depending on the maturity and responsibility of the students.
- Radiated light waves produced by the electric arc will seriously damage eyes. Ultraviolet (UV) radiation causes inflammation of the cornea and can burn the retinas of the eyes. Infra-red (IR) wavelengths cause severe discomfort and redness.
- Because of the harmful radiation generated, electric arc welding should be carried out in its own room or in a separate bay adequately screened from any person not taking part in the actual welding process. The walls of the welding bay should be non-reflecting (black).
- To protect student bystanders and any unexpected visitors to the welding area, especially in confined classroom workshop environments, transparent welding screens or curtains should 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 dangerous 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 welders' helmets.
- Over-exposure to ultraviolet radiation can also cause skin cancer, so the proper full body protection should always be worn. Leather welding clothing includes gauntlet gloves, jackets, aprons, sleeves, chaps (pants) and spats. They are usually made from split grey chrome-tanned cowhide and offer very durable and distinctly increased protection from UV radiation, thermal protection from hot welding sparks and splatter, and from cuts and abrasions when grinding. Watch for sparks in open pockets and cuffs of clothing when welding.
- Cables should be correctly insulated to avoid any dangers of electric shock. All hoses should be checked periodically to correct slow leaks of argon, argoshield, helium, etc.
- 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 creates a toxic atmosphere. During inert-gas-shielded arc welding some ozone, oxides of nitrogen, fluoride and silicone, as well as prolific quantities of carbon dioxide are given off. These are highly toxic, irritant gases, which can cause

inflammation and congestion of the respiratory tract after both short and long term exposure. A one ppm exposure for more than half an hour often results in headache and malaise.

- Earthing of electric arc welding equipment should be done by bolting the earth lead to the welding table. This prevents the inadvertent connection of the earth to the case of the welding unit.
- All operators should be suitably insulated from electrical welding tables, from damp concrete floors and from any exposed parts of the work piece by either rubber soled work boots, rubber floor matting, wooden slatted duckboards or some other means
- Any water on the floor should be investigated and removed immediately
- Fire is one of the biggest safety issues when plasma cutting. The plasma arc blows out hot metal and sparks, especially during the initial piercing of the metal. Whatever the setup, remember to always have an appropriate fire extinguisher nearby during the cutting operation
- Plasma cutting or Oxy-cutting any metal produces fumes and gases, and breathing them can create health hazards. Welding workspaces should be well ventilated at all times with an exhaust hood or fume extraction system. When cutting coated metals such as galvanized or cadmium plated steels, grind off the coating from the cutting area where possible
- Plasma arc cutting systems use compressed gases, typically compressed air or bottled nitrogen. Air compressors, gas lines, hoses and regulators should be inspected and maintained regularly
- A plasma cutting arc, like any electric arc, gives off a broad spectrum of electromagnetic radiation, which extends all the way from Infrared light (IR), through the visible spectrum, and into the UV range. The most intense visible plasma arc light is in the “blue light” range and this can be potentially very damaging to the retina. There is usually no resulting discomfort or pain, and the only way to know is when eyesight starts to degrade
- Safety glasses with **yellow lenses** are recommended to block all potentially damaging blue light, and a secondary shield between the operator and the cutting torch, perhaps a welding curtain or dark plastic shield, could shade the operator from the most damaging radiation.

For more information, or if further guidance is required on welding processes and equipment for use in Queensland schools, refer to the following useful links:

- DoE, CHW, Equipment and machinery resources (SOPs, EMRs & P&ERAs)
- DoE, CHW, Hazards in schools – Equipment and machinery
- DoE, CHW – Managing plant and equipment in ITD
- DoE, CHW – Safety and hazard alerts
- DoE, CHW – Using SOPs and EMRs in your school
- WHSQ – Welding

Relevant Australian Standards:

- AS 1674.2:2007 (R2018) – Safety in electrical welding and allied processes, *part 2.*
- AS 60974.1: 2006 – Arc welding equipment
- AS 2717.1: 1996 – Welding electrodes
- AS 4603:1999 (R2016) – Flashback arresters
- AS 4267: 1995 (R2016) – Oxy/acetylene pressure regulators

6. Chemicals and hazardous substances

It should be acknowledged that any chemicals and hazardous substances utilised in ITD can cause adverse health effects such as acute poisoning, asthma, skin rashes, allergies, sensitisation, cancer and many other long term chronic diseases from misuse or over exposure.

The purpose of these guidelines is to assist ITD departmental staff to adopt safe practices for the management of all chemicals and to help prevent or minimise the risk of injury or illness to teachers, students and others (such as visitors and volunteers) from exposure to chemicals, particularly hazardous materials and dangerous goods.

For detailed departmental information and guidance on using chemicals and hazardous substances in ITD workplaces, refer to the following DoE links:

- DoE, Creating Healthier Workplaces – Chemicals and Hazardous Substances
- DoE, PPR – Managing Risks with Chemicals in DoE Workplaces
- DoE – Guideline for Managing Risks with Chemicals in DoE Workplaces

6.1 Legislative requirements for chemicals in schools

State and federal legislation imposes obligations on all ITD staff irrespective of the quantities and types of chemical substances that may be used in schools. All departmental workplaces have the same responsibility to safely utilise and manage their chemical inventory. However, extra vigilance must be exercised when managing any hazardous chemicals and/or dangerous goods. Effective management is best achieved if schools comply with all relevant departmental legislative requirements.

In Queensland there is a complex range of legislation, codes of practice and related standards for the management of chemical substances in schools. For more detailed departmental information and guidance on legislative requirements, refer to the following links:

- DoE, Creating Healthier Workplaces – Chemicals and Hazardous Substances
- DoE, PPR – Managing Risks with Chemicals in DoE Workplaces

6.2 Management of chemicals and hazardous materials

ITD Heads of Department, subject coordinators or supervisors, all ITD teachers and ancillary staff have an obligation to ensure that the health and safety of themselves, students and others, is not affected by the conduct of work-related activities involving any chemicals or hazardous materials undertaken in schools. For all departmental workplaces, including schools, there are several mandatory requirements for managing chemicals and hazardous substances:

- Consider how the substance fits into the workshop process or the proposed curriculum activity:
  - How will the chemical or hazardous material used?
  - Where should it be stored?
  - Will teachers or students be adversely affected by exposure to the substance?
- Endeavour to use non-hazardous substances in preference to any product that might impose a potential risk to personal health or the environment
- Ensure any necessary risk assessments are completed, approved and recorded for all hazardous materials to manage occupational risks in accordance with the processes outlined in the procedure
- Consider all necessary control measures and appropriate signage to manage the risks

- Deny access by unauthorised persons (particularly students) to chemicals and hazardous materials stored in any ITD workspace and storage areas
- Ensure all current Safety Data Sheets (SDS) are understood by all teachers prior to their use of a substance and keep the SDS close to where the substance is being stored and/or used
- Ensure all SDS are up-to-date (minimum every 5 years) and are readily accessible, both within the workplace and to all emergency services
- Ensure that a Hazardous Chemicals Manifest and Register is maintained, recording details of all such products commonly used in ITD, all current SDS and their location
- Ensure all teachers are adequately trained in the safe use of chemicals and hazardous materials that they may use
- All departmental schools will have an emergency management plan that outlines the procedures to deal with all identified emergencies likely to occur regarding chemicals and hazardous materials (e.g. spills, fires, inadequate ventilation)
- Provide a structurally sound, secure, well ventilated and fire resistant storage facility
- Investigate the compatibility, or the adverse effects, of different chemicals and hazardous materials being stored together in the same confines
- Ensure that all chemical and hazardous materials containers are appropriately labelled with relevant safety information. Chemicals are not to be stored in unlabelled containers or containers such as drinking bottles
- Provide and maintain safety equipment or personal protective equipment (PPE) that is suitable for use with chemicals and hazardous materials
- Ensure that adequate Fire Safety facilities are immediately and conveniently available.

6.2.1 Safety data sheets (SDS)

A safety data sheet (SDS) is a structured document that provides important information about a specific chemical.

SDS provide the necessary information to safely manage the risk from chemical exposure. A current SDS must be made available for quick reference at the point of use of the relevant chemical. Access to a current SDS can be provided in several ways including online SDS databases, or a hard copy provided by the supplier or manufacturer of the chemical.

All ITD staff should be instructed in how to read and interpret an SDS.

ITD departmental HODs or relevant ITD subject coordinators should:

- Obtain a current manufacturer's SDS for a chemical or hazardous material from the product supplier. **Note**: A ChemWatch online SDS is considered by law as an 'advisory document' only and not always recognised as a legal SDS for the product.
- Establish a Hazardous Chemicals Manifest and Register containing a list of all chemicals and hazardous materials used at the workplace, including copies of all current SDS.
- Keep a separate copy of the SDS close to where the substance is normally used.
- Ensure all staff are aware of the location and content of the register and of all SDS.
- Ensure that the current SDS for each substance is no more than five years old.

Schools can request individual SDS directly from the supplier or manufacturer of a particular product. Many manufacturers' SDS are available online and can be easily found by an internet search. Currently EQ state schools have an online subscription to ChemWatch® - ChemGold III®. ChemWatch is recommended by the

department as a useful and functional website for chemical management, risk assessment, labelling, training guidelines, etc. However, it must be recognised that a ChemWatch SDS is an **advisory** document only and not a legally recognised SDS for the chemical product.

For more information, or if further guidance is required on SDS requirements in Queensland schools, refer to the department's Guideline for Managing Risks with Chemicals in DoE Workplaces.

6.2.2 ChemWatch® – Chemical management system and SDS database

ChemWatch GoldFFX® is a well-known example of an online chemical risk management and Safety Data Sheet (SDS) database system providing 'real-time' online guidance and product support. This valuable resource is only available to registered industry workplaces, institutions, universities and schools, etc., with easy accessibility through the ChemWatch® website. All departmental workplaces are eligible to register their location and apply for their DoE user ID and individual school password.

With registration, schools will have access to a comprehensive database of either copies of original manufacturers' SDS or customised ChemWatch® SDS designed to meet the needs of subscribers, and all drawn from a comprehensive library collection of over 6 million. SDS's are subject to constant updating by manufacturers and when this occurs, the updates are instantly added to the ChemWatch Gold FFX® database**.**

Ideally however, all schools should obtain the manufacturer's current Safety Data Sheets (SDS) for their product supplier's. ChemWatch® SDS are an **advisory** document only and **not** a legally recognised SDS unless they are exactly the same as the manufacturer's original.

To access ChemWatch GoldFFX®, schools will first need to register their location to obtain their individual departmental password.

- ChemWatch® Registration Instructions

If another department or faculty in your school already has a departmental user ID and individual school password for ChemWatch®, then this registration will apply for all other departments.

For more detailed departmental information and guidance on ChemWatch GoldFFX®, refer to the following links:

- DoE, CHW – Chemicals and Hazardous Substances
- ChemWatch® Login for EQ Schools
- DoE, Fact Sheet – ChemWatch Gold FFX® Frequently Asked Questions
- DoE – Guideline for Managing Risks with Chemicals in DoE Workplaces

6.2.3 Ordering and purchasing of chemicals

Prior to ordering or purchasing a chemical product for the first time, teachers should assess the potentially hazardous or toxic nature of a particular substance. Refer to any school approved hazardous chemicals list such as a 'Chemical Safety Pre-purchase Checklist', the manufacturer's original product SDS, or ChemWatch®.

- Choose the safest chemical for the application
- Consult with your staff as to who may be required to handle the substance.
- **Do not purchase** any chemicals prohibited or not recommended by Queensland legislation or the department. A number of chemicals and hazardous materials are prohibited from use because of their identified major inherent risk to teachers, students and others.
- For ITD staff and students, prohibited materials or chemicals substances will include:
    - materials containing asbestos
    - CCA treated timber
    - creosote
    - potassium chlorate
    - benzene
    - carbon tetrachloride.
- Staff responsible for purchasing **any** chemicals substances for ITD should be familiar with the department's hazardous materials list – *(refer to Section 6.2.8; 'Chemicals Presenting an Uncertain or Unpredictable Risk')*. These chemical substances pose unacceptable, unpredictable and potentially major health risks and all departmental workplaces (including all schools) should consider very carefully whether the relevance of a particular curriculum activity or machinery operation and maintenance program involving these substances is sufficient to warrant them being stocked. In such cases, minimum quantities should be obtained, stored and used. Such substances include heavy metals and their salts, very strong oxidising agents, chlorides, very caustic or corrosive acids, toxic agents, explosive compounds, carcinogens and halogens.
- If a newly acquired chemical substance is suspected to be within the classifications of hazardous or dangerous, immediately complete a risk assessment to determine its suitability for use within the ITD department.
- Any identified controls should be put in place prior to the purchase of a new chemical.
- Ensure that all newly acquired substances are appropriately labelled according to legislation. Refer to ChemWatch® for all appropriate labelling *(refer also to Section 6.2.6; 'Decanting and Re-labelling of Chemicals')*
- Ensure that copies of all new and current SDS are placed with the schools Hazardous Chemicals Manifest and Register and that all relevant product details are recorded.

6.2.4 Transportation and storage of chemicals

The safe transportation and storage of chemicals is a requirement in all departmental workplaces.

Specified dangerous goods are grouped under the Australian Dangerous Goods Code and classified into nine specific categories. Dangerous Goods signage should be used for the safe transportation and storage of all inherently hazardous or dangerous substances *(refer also to Section 3.5; 'Safety Signage').*

Class 1

Explosives

Class 2.1

Flammable Gases

Class 2.2

Non Flammable, Non Toxic gases

Class 2.3

Toxic Gases

Class 3

Flammable Liquids

Class 4.1

Flammable Solids

Class 4.2

Spontaneously Combustible

Class 4.3

Dangerous when Wet

Class 5.1

Oxidising Agents

Class 5.2

Organic Peroxides

Class 6.1(a)

Poisons – Toxic to Human Health

Class 6.1(b)

Harmful to Human Health

Class 6.2

Infectious Substance – Biohazard

Class 7

Radioactive Materials

Class 8

Corrosive Substances

Class 9

Miscellaneous Hazardous Goods

The Australian Dangerous Goods Code (ADG7.3: 2014) continues to be recommended for the transport and storage of hazardous or dangerous goods signage. With the adoption of the national Work Health and Safety (WHS) Regulation 2011 (Qld), a new system of chemical classification and hazard communication, the Globally Harmonised System of Classification and Labelling of Chemicals (GHS) is now in effect for product labelling of chemicals.

For more detailed departmental information, regulations and guidance on the transportation and storage of chemicals in schools, refer to the Guideline for Managing Risks with Chemicals in DoE Workplaces.

What is the HAZCHEM Code?

All departmental workplaces, including all schools, where dangerous chemicals or hazardous substances **above threshold quantities** are stored, e.g. LP Gas in cylinders – 500L or Flammable Liquids – 1000L, should display the appropriate HAZCHEM placards at the front gate of their premises.

Details of these threshold quantities are available from the Work Health and Safety Regulations 2011 (Qld), Chapter 7, Part 7.1, Table 328.

The HAZCHEM Code is a three digit, alphanumeric code, usually displayed as a product label, a transportation placard or volatile storeroom signage that provides initial emergency response information. The following HAZCHEM placard is an example only.

For more detailed departmental information and guidance on HAZCHEM codes, refer to the following links:

- DoE, CHW – Chemicals and hazardous substances
- DoE, PPR – Managing risks with chemicals in DoE workplaces

6.2.5 Hazardous chemicals manifest and register

A manifest and register of hazardous chemicals present within all schools should be prepared and kept up-to-date (WHS Regulation 2011, Part 7.1: S346). This register should be readily accessible to all staff and cleaners involved in the using, handling or storing of hazardous chemicals. This will involve faculty areas such as ITD, Science, Art and Lifestyle Management, cleaners' storerooms, and the grounds staff gardening and agricultural chemicals.

For more information, or if further guidance is required on the 'Hazardous chemicals register and manifest' for Queensland schools, refer to the following useful links:

- DoE, PPR – Managing risks with chemicals in DoE workplaces

6.2.6 Decanting and re-labelling of chemicals

A container that has had chemicals decanted into it must be labelled if the contents are not used immediately. A container that is repeatedly used for decanting as part of normal work procedures or processes requires a permanent label with all the general labelling information attached to the container. Permanently labelled containers must not be used to contain any other substances or mixtures than those specified on the label. When decanting a chemical substance into another container, always consider the following:

- only decant a chemical if it is necessary to do so
- choose a container that you know will not react with the chemical
- never decant any chemical substances into empty food or drink containers
- the new container should be labelled in clear and legible English
- labels should not simply be written on jars, bottles and tins with a marker pen
- label all chemical substances with the correct product identifiers

For more detailed departmental information and guidance on the decanting and re-labelling of all chemicals and hazardous materials commonly used in Queensland schools, refer to the Guideline for managing risks with chemicals in DoE workplaces.

6.2.7 Disposal of chemicals and hazardous materials

Always refer to your safety data sheets (SDS) for manufacturer's guidelines, advice and recommendations on waste disposal methods. Items which should be identified as regulated waste in ITD departments might include:

- any out-dated, unused or unwanted paints, chemicals, oils or solvents etc. that have been accumulating in storerooms
- all contaminated or unhygienic products
- contaminated workplace waste materials, e.g. soluble oils or fine particle MDF dust
- any waste that is thought to contain asbestos material
- any accumulated chemicals and hazardous materials that cannot be identified.

Always ensure that:

- there is no cross-contamination with other substances or contamination of equipment
- adequate personal protective equipment (PPE) is available and is correctly used
- the quantities of chemicals held on site are kept to a minimum to reduce the associated risks
- arrangements are made for collection by an approved waste disposal contractor.

Note: when a decision is made to dispose of water soluble, non-toxic chemicals to the sewer, flush thoroughly with sufficient water to ensure no trace of chemical remains in traps and sinks.

Oils, oil drums, gas cylinders and batteries should be disposed of in a responsible manner. Used oil is a recyclable resource and should be managed carefully to protect the environment. Nickel cadmium (NiCad) batteries contain cadmium, which is potentially carcinogenic and should not be placed in general waste bins. Oil drums and gas cylinders should not be reused for another purpose. Contact the original supplier or local landfill operator to determine the best method of disposal. Empty gas cylinders should be segregated from full gas cylinders and should be returned to the supplier.

There are some particular chemical waste substances which are extremely hazardous to the environment and to human health. There are specialist waste removal companies in most areas that will remove unwanted chemicals and hazardous waste. Contact them directly or seek guidance and advice from local government waste management authority about the best way to have such waste removed from schools.

Note: For more detailed departmental information and guidance on the disposal of chemicals and hazardous waste materials in schools, refer to the Guideline for managing risks with chemicals in DoE workplaces.

6.2.8 Chemicals presenting an uncertain or unpredictable risk

It has been determined that some chemicals previously used in ITD activities may present an uncertain or unpredictable risk. Many are now considered too hazardous for use by inexperienced teachers, students and others in departmental workplaces. They should be stored and handled according to the information provided in the safety data sheet (SDS) and only used by very experienced and competent teachers and staff. They are generally ***not*** suitable for use by ***any*** students in schools. It is recommended that these substances are eliminated from departmental workplaces and substituted with less reactive, less toxic and more stable compounds.

The more common substances are listed, however for more detailed departmental information and guidance on chemicals that may present an uncertain or unpredictable risk in schools, refer to the following DoE link:

- DoE, CHW – Chemicals and Hazardous Substances

Chemical	Characteristics and associated health hazards
Ammonium Chlorate	Violently explosive
Aniline (Phenylamine)	Extremely toxic, carcinogenic
Arsenic compounds	Extremely toxic, carcinogenic
Beryllium salts	Highly toxic and carcinogenic
Carbon Disulphide	Very low flash point, extremely flammable, highly volatile, very toxic. Use for spray painting requires permission from the Regulator (WHS Reg 2011 S380-384, Schedule 10).
Cadmium compounds	Highly toxic
Chromic Acid and Chromium (VI) Oxide compounds	Highly toxic and carcinogenic. Hexavalent compounds are known to be carcinogenic.
Ethylene Dichloride	May cause cancer, low flash point, extremely flammable, may form explosive compounds
Epoxy Resins (uncured)	Toxic, respiratory and skin sensitise, possibly carcinogenic
Formaldehyde	Skin irritant, carcinogen
Gun Wash (Liquid Hydrocarbons)	Highly flammable, possibly carcinogenic, toxic
Carbon Tetrachloride	Extremely toxic and suspected carcinogens
Hardite	Extremely toxic, carcinogenic
Hydrofluoric Acid	Extremely toxic. Very hazardous.
Lead & all Lead compounds	Highly toxic, cumulative effects from prolonged exposure
MEKP (Methyl ethyl ketone peroxide)	Shock sensitive, special storage and use requirements. Experienced users only
Mercury compounds	Highly toxic
Methylene Chloride	Possible carcinogen, highly toxic
Toluene	Highly flammable, highly toxic, possible carcinogen
Tolidine	Highly toxic, carcinogen
Trichloromethane	Extremely toxic and suspected carcinogens
Vinyl Chloride	Restricted carcinogen. Any use requires permission for use by the Regulator WHS Reg. 2011 S380-384, Schedule 10.
Xylene	Toxic
Zinc Chloride	Toxic

6.2.9 Managing risks with chemicals and hazardous materials

All chemicals that are designated as a hazardous material must have an assessment of the risk of exposure to ITD staff and students in schools. The chemical risk assessment process is fully explained in Section 2.2.3 of this guideline, *'Chemicals and Hazardous Materials Risk Assessment'*.

Note: the perceived risk levels – **low, medium, high and uncertain** – attributed to a particular substance in a chemical risk assessment conclusion should, however, depend on the nature and complexity of the activity or operation, and the SDS hazard information data available.

Overall risk level conclusion			Action required/approval
Conclusion 1	☐	**Risks are not significant now, and not likely to increase in the future** **(*i.e.* risks are low).**	☑ Comply with all requirements of the label and current SDS. ☑ Comply with the standard operating procedure for the substance(s). ☑ Manage and document through your regular planning processes and/or person(s) using the chemicals should approve and sign the risk assessment.
Select 1 – if you are using a concentration considered less than hazardous or if precautions are required and it is unlikely that the use of the chemical(s) will adversely affect the health of persons at the workplace and the risk is not likely to increase in the future e.g. you are using concentrations that are too small to constitute a risk, even if controls fail; or the operation strictly conforms to information on the label and SDS.			
Conclusion 2	☐	**Risks are significant but effectively controlled, and could increase in the future** **(*i.e.* risks are medium to high).**	☑ Comply with all requirements of the label and current SDS. ☑ Comply with the standard operating procedure for the substance(s). ☑ Implement the identified controls to minimise the chances of higher exposure occurring. ☑ Determine and implement additional measures for regaining control if a high risk event occurs despite the precautions already taken. Parental consent may be required. ☑ Document controls in planning documents and/or complete this Chemical Use Curriculum Activity Risk Assessment. ☑ The Principal or delegated Deputy Principal or Head of Program (i.e. HOD, HOSES, HOC) to review and approve the risk assessment.
Select 2 – if you are satisfied that adequate controls are in place. Where serious health effects could result if the control measures fail or deteriorate. This usually results from the use of toxic hazardous chemicals or where the potential exposure is HIGH. Risks, while presently adequately controlled, could increase in the future.			
Conclusion 3	☐	**Risks are significant now and not effectively controlled** **(*i.e.* risks are extreme).**	☑ **The activity must not proceed**. Alternatives to undertaking the activity must be found. ☑ Obtain additional information or expert advice to reach a conclusion of 1 or 2. ☑ Comply with all requirements of the current SDS. ☑ Comply with the standard operating procedure for the substance(s). ☑ Implement sufficient controls to ensure the safe use of the material. ☑ The Principal or delegated Deputy Principal is required to review and approve the revised risk assessment prior to conducting this activity.
Select 3 – if the use of a chemical is likely to constitute a significant risk and further investigation may be necessary (e.g. there are persistent or widespread complaints of illness, discomfort, irritation or excessive odour, hazardous chemicals are splashed, control measures are broken, defective or badly maintained, for example a poorly maintained extraction system which no longer draws a hazardous chemical away from the work area, recognised safe work practices are not being observed)			
Conclusion 4	☐	**Uncertain about risks.** **There is not enough information, or there is uncertainty about the degree or extent of exposure.** **DO NOT PROCEED.**	☑ **The activity must not proceed**. Alternatives to undertaking the activity must be found. ☑ Obtain additional information or expert advice to reach a conclusion of 1 or 2. ☑ In the meanwhile, implement work practices to ensure safety
Select 4 – if **no** SDS is available, if labelling is inadequate, if the level of exposure cannot be estimated with confidence or further investigation is necessary. Obtain additional information from other sources, such as suppliers, occupational health and safety consultants and industry or trade associations. Meanwhile, implement good work practices to minimise exposure.			

6.2.10 ITD chemicals and hazardous materials for particular consideration

- Asbestos
- Fibreglass
- MEKP
- Chemical solvents
- Lead
- Wood dust and toxic timbers ... (refer to Section 6.3; *'Wood Dust and Toxic Timbers'*)

For more information, or if further guidance is required on Workplace Health and Safety and Hazard Alerts issued by the department for EQ schools, refer to the following useful links:

- DoE, CHW – Safety and Hazard Alerts
- WHSQ – Storing Incompatible Dangerous Goods
- WHSQ – Hazardous Chemicals
- WHSQ – Storage and Handling Systems
- WorkSafe Qld. – Managing Risks of Hazardous Chemicals in the Workplace – Code of Practice 2013

Asbestos

Note: *Staff should refer to the current manufacturer's SDS for complete and up-to-date advice.*

It is generally recognised that asbestos materials become more hazardous when disturbed or damaged in some way, so public awareness is important for teachers and students.

- **The department has a management plan to totally eradicate all remaining asbestos materials from older Queensland school buildings.**
- Asbestos may continue to be accidentally uncovered in old insulation materials, pipe lagging, ceiling tiles, floor coverings and possibly in some older types of equipment such as the lining of ovens.
- All newly identified asbestos discoveries will be clearly labelled, professionally sealed, safety removed and disposed of.
- If any staff member suspects that asbestos material is likely to be present, they should not, under any circumstances, undertake work that might disturb it, damage it or create any dust. If they believe damage has occurred, they should evacuate the area and immediately alert the HOD, the Principal and HSA.

For more information, or if further guidance is required specifically on the management of asbestos in Queensland schools, refer to the following useful link:

- DoE, Asbestos management in department-owned facilities

Fibreglass

Note: *staff should refer to the current manufacturer's SDS for complete and up-to-date advice.*

Fibreglass is a form of synthetic or man-made mineral fibre. Others include Rockwool® and ceramic fibre. It is commonly used as either glass wool, such as batts for insulation or woven as a cloth and mixed with a polyester resin as used in the manufacture of products such as surfboards and boats. Particular precautions should be taken when handling this product:

- Some of the fibres used in insulation are fine enough to be breathed deep into the lungs and they can cause irritation to the eyes, nose, throat and skin.

- Like all fibreglass products, woven filament fibreglass cloth should be handled with caution. Particular care should be taken when cutting, sanding or grinding as high levels of irritant dust can be generated. Extraction ventilation or the wearing of respirators may be necessary.
- Always wear safety goggles or face shield, a 3M® N95 mask and PVC gloves while measuring and laying-up sections of resined cloth.
- Because fibreglass contains fine silicate fibres very similar to asbestos, it has been called "The Asbestos of the 21st Century". The first connection between fibreglass fibres and pulmonary disease was reported by Walter J. Siebert who investigated the health of workers with the cooperation of Owens Corning in 1941. However, the International Agency for Research on Cancer (IARC) changed its classification in November 2001:

Note: *fibreglass is now not classifiable as carcinogenic to humans and is no longer considered "possibly carcinogenic to humans".*

Modern 'Biosoluble' 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 'Biosoluble' type.

Styrene vapours from polyester resins used in fibreglass products are however a more serious hazard, and may cause both short-term irritation and long-term effects to the nervous system.

Epoxy resins sometimes used in the manufacture of fibreglass products can cause contact dermatitis and burns. Cured resins are generally non-toxic.

Methyl ethyl ketone peroxide (MEKP)

Note: *staff should refer to the current manufacturer's SDS for complete and up-to-date advice.*

MEKP is commonly used as a catalyst for curing polyester resins such as fibreglass-reinforced plastics projects. MEKP is considered a 'hazardous material' by Standards Australia and should only be used in the presence of a person who is conversant 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 should be taken when handling this product:

- Storage should be in its original container, with tamper-proof lid and bearing a 'Poison' label.
- MEKP must 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)
- Wear appropriate PPE as per the current SDS
- There should be no metal contamination. In case of an accidental rupture, MEKP should be contained in a ceramic vessel
- Do not mix resins and MEKP catalyst in metal containers or tins. Use only paper containers and wooden stirrers or strips of acrylic for mixing
- Do not mix the contents of different containers of MEKP
- Do not store MEKP in the flammables cabinet
- Mixing should only be carried out by teachers, in a well-ventilated area and near a readily available supply of water. Eyewash facilities should also be available. Ketone peroxides which have been splashed on the skin should be washed off immediately with soap and water, as these substances can cause eczema-type skin conditions which do not heal well

- If MEKP is swallowed, drink copious quantities of milk or water. A doctor should be consulted immediately
- Do not use a syringe for dispensing MEKP. Always use a graduated reagent-type plastic bottle and disposable medical pipette
- Do not return surplus MEKP to the original storage container
- Small spillages of MEKP should be absorbed in dry sand. Spillages of 1ml or more require the room to be evacuated, a staff member with an organic vapour respirator to clean-up and the room ventilated for 12 hours
- Disposal is best attempted by mixing small quantities of MEKP with a polyester resin, thus activating and hardening the mix. When cool, dispose of the result in landfill
- After handling or dispensing MEKP, thoroughly wash hands with soap and water.

Chemical solvents

Note: *staff should refer to the current manufacturer's SDS for complete and up-to-date advice.*

Solvents are chemicals that dissolve other substances. They are often used as cleaners or degreasers, and as ingredients in most paints, inks, glue and varnishes. Many solvents are poisonous when swallowed (often from contact with food or fingers), breathed in as vapour or absorbed through direct contact with the skin. They can impair memory and cause headaches, dizziness, weakness or tiredness, mood changes or nausea. Exposure to high levels of some solvents can cause liver damage, unconsciousness or severe, chronic illnesses such as cancer. In general, particular precautions should be taken when handling these products.

- Storage of all chemical solvents should be in a ventilated 'volatile storage' room.
- Storage of any chemical solvent should be in its original container, with tamper-proof lid and bearing a 'poison' label.
- Always wear appropriate PPE as per the current SDS.
- In the event of a chemical solvents spill, refer to ChemWatch® for the latest information on the particular chemical agent.
- As a general rule, carefully mop up spilled solvents with clean rags or by spreading absorbent material such as sawdust or dry sand.
- Remove contaminated material as soon as possible. Material contaminated with solvents should be removed from the work area and stored in a place where evaporation of the solvents may safely take place.
- When solvents are disposed of improperly, such as in the garbage, on the ground or down the drain – the hazardous chemicals may contaminate lakes, rivers, streams and groundwater. Many chemicals found in landfills may contaminate the underground water table, but solvents are a primary concern.

Some chemical solvents commonly used in ITD include:

Paint thinners	acetone, toluene, xylene, mineral spirits, petroleum, Stoddard solvent (white spirit), turpentine, etc.
Paint strippers	acetone, ethyl acetate, toluene, ethylene dichloride, xylene, naphtha
Degreasers	acetone, mineral spirits, ethyl acetate, ethylene dichloride, naphtha, petroleum, Stoddard solvent (white spirit), turpentine, etc.
Acrylic cements	methylene chloride, ethylene dichloride

Lead

Lead is a metal obtained from mining lead ore, which is used in a number of forms including pure metal, alloys (mixtures of metals) and as lead compounds. It has many uses including vehicle batteries, soft solder, paint pigments and as a stabiliser to protect plastic from sun damage.

Exposure to lead has long been known to have an extremely toxic effect on the human body. Lead particles can be inhaled through dust or fumes or swallowed through eating contaminated food or smoking with contaminated fingers. The health effects of lead exposure will vary depending on the amount of lead present and the length of exposure.

Hazard control measures are necessary in ITD electronics workstations to minimise the exposure of teachers and students to the possible risks associated with soft soldering activities – both in relation to the lead content of the solder and the problems related to the flux fumes.

Note: Demand for lead-free solder alloys is increasing and as a result of legislation designed to protect manufacturing workers, consumers and the environment, lead-free soft soldering produces are now required in all departmental schools.

Wood dust and toxic timbers

(refer to the Section below - 6.3 - Wood dust and toxic timbers)

6.3 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 micro fine dust particulates released can very easily be inhaled. Teachers, staff and students are at persistent risk of breathing in large amounts of 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.

6.3.1 Health concerns and symptoms

There are health concerns associated with many products used in schools - even naturally occurring products like the timbers commonly used in ITD. In particular, the processing of these timbers and the volumes of wood dust that can result pose the majority of health concerns. Studies show that wood dust particulates should never be considered as merely ‘nuisance dust’. Exposure can actually be very harmful to our health. 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. They are more abundant in hardwoods and Australian native hardwoods such as the Acacia's 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.

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)
- Glues and adhesives (such as formaldehyde) - *(refer to Section 6.3.5 for more details)*
- Resin binders, sealants and waterproofing compounds
- Pesticides and preservatives (CCA, ACQ, Cu Az, LOSP or PEC) – *(refer to 6.3.4 for more details)*;
- Paints, lacquers, varnishes and strippers.

Some of these substances will often cause skin, eye and lung irritations, allergic reactions, and asthma. Schools should be aware of the health hazards with these substances. ITD departments should always provide and wear the appropriate personal protective equipment (PPE) such as safety goggles, gloves, and a respirator.

6.3.2 Toxic timber species and your health

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 WHS risks, there are two timber species that have been classified as totally unsuitable and should NOT be used in Queensland schools for ITD woodworking:

Oleander or Rose Laurel (Nerium oleander)

Western Red Cedar (Thuja plicata)

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 should be worked and sanded only when wearing a dusk mask or 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.

It must also be remembered that any 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 must be observant and aware that these unforeseen chemical hazards may be present.

Toxic timbers index

Note: The following '**toxic timbers index**' is an evaluation of the more commonly used Australian and imported timber species known to be potentially toxic (for various reasons), together with their known associated adverse health effects on humans. ITD teacher may find this information offers an insight into the potential health risks posed by some of the timbers that are commonly used in departmental schools.

This information offered is based on public domain data and is believed to be reliable and relevant in Queensland.

Commonly used timbers to be aware of and associated health hazards

Some of the potential health hazards associated with timbers used in Industrial Technology & Design in Queensland State High Schools.

(Note: this information is based on public domain data only and is believed to be reliable. In Australia all wood dust is now classified as carcinogenic (liable to cause cancer) This list has been compiled to give ITD teachers an insight into the potential health hazards posed by some of the timbers that are commonly used)

Species	Origin	Problem	Potency	Reported associated health hazards
Alder, Rose (Atherton Pencil Cedar) *Caldcluvia australiensis*	Australian native Nth. Queensland	Dust	☠	Skin irritations, dermatitis and rhinitis
Ash, Alpine (Mountain Ash) *Eucalyptus regnans*	Australian native	Dust, wood	☠	**Sensitizer**, irritation to nose, throat and eyes and skin, dermatitis
Ash, Crows (Australian Teak) *Flindersia australia*	Australian native, New Guinea	Dust, wood	☠☠	**Sensitizer**, skin irritations and dermatitis
Beech, Brown (European Beech) *Fagus sylvatica*	Europe	Dust, leaves, bark	☠☠	**Sensitizer**, nasal cancer, skin irritations and dermatitis
Beech, Myrtle *Nothofagus cunninghamii*	Australian native	Dust, leaves, bark	☠☠	**Sensitizer**, irritation to mucous membranes, irritation to eyes and throat and difficulty breathing. Fungus found in bark
Beech, White (Beech, Grey Teak) *Gmelina leichhardtii*	Northern NSW, Southern Qld.	Dust, leaves, bark	☠☠	**Sensitizer**, nasal cancer, skin irritations and dermatitis. Greasy when woodturning
Black Bean (Morton Bay Chestnut) *Castanospermum australe*	Australian native East Coast	Dust	☠☠☠	**Sensitizer**, Skin irritations and dermatitis, itchiness, irritation of mucous membranes
Blackwood (Black Wattle, Mudgerabah) *Acacia melanoxylon*	Australian native, Tasmania	Dust, wood, bark	☠☠☠	**Sensitizer**, irritations and contact dermatitis, bronchial asthma, dust causes irritation to eyes, nose and throat *(The tree's twigs and its bark are used to poison fish as a way of fishing)*
Boxwood (European Boxwood) *Buxus sempervirens*	U.K. Europe, S.E. Asia, Morocco	Dust, wood	☠☠	**Sensitizer**, irritations and dermatitis, asthma, dust causes irritation to eyes, nose and throat
Brazilwood *Caesalpinia echinata*	South America	Dust, wood	☠☠	**Sensitizer**, headaches, nausea, painful swelling of limbs and visual disturbances

Species	Origin	Problem	Potency	Reported associated health hazards
Brigalow (Spearwood) *Acacia harpophylla*	Australian native East Coast	Dust	☠☠☠	**Sensitizer**, skin irritations and dermatitis
Cedar, Mackay (Red Siris) *Albizia Toona*	Australian native Coastal Qld	Dust	☠☠	**Sensitizer**, skin irritations and dermatitis, nose bleed, conjunctivitis, giddiness
Cedar, Port Orford (Lawson's Cypress) *Chamaecyparis lawsoniana*	USA, Canada, plantations in New Zealand, Australia & Europe	Dust	☠☠☠	**Sensitizer**, dermatitis, violent ear ache giddiness, stomach cramps, bronchitis, irritation of mucous membranes
Cedar, Red (Cedar) *Toona ciliata*	Australian native, New Guinea, Philippines	Dust, wood	☠☠	**Sensitizer**, violent headache, giddiness, stomach cramps, asthma, bronchitis, dermatitis, irritation of mucous membranes
Cedar, Sth. American *Cedrela* spp.	Southern America	Dust, wood, bark, sap	☠☠☠	**Sensitizer**, dermatitis, asthma, nasal cancer, irritation to nose and throat. Sap may cause blistering of skin and inflammation of eyelids
Cedar, Western Red (Canadian Red Cedar) *Thuja plicata*	North America	Dust, wood, bark, leaves	☠☠☠☠	**Sensitizer**, skin irritations and dermatitis, asthma, effects central nervous system (rarely) nasopharyngeal cancer (nasal cancer) **(NOT to be used in Queensland schools for woodworking)**
Cedar, White (Chinaberry) *Melia azedarach*	India, China, Australia	Dust, wood, bark, leaves	☠☠☠	**Sensitizer**, fruits and leaves are highly poisonous. Skin irritations, dermatitis headache, congestion of lungs, nausea, fainting
Camphor Laurel *Cinnamomum camphora*	China, Japan, Australia (mainly the toxic hybrids of northern NSW)	Dust, wood	☠☠	**Sensitizer**, serious skin-rash complaints and dermatitis, irritation to eyes and throat and difficulty breathing
Cashew *Anacardium occidentale*	Australian native, New Guinea	Dust, wood, bark, sap	☠☠	**Sensitizer**, sap causes blisters, wood dust cause skin irritations and dermatitis, itchiness.
Coolibah *Eucalyptus microtheca*	Australian native	Dust, wood bark	☠☠	**Sensitizer**, bark and wood dust may cause skin irritation and dermatitis
Dead Finish (Needle Wattle) *Acacia tetragonophylla*	Australian native	Dust, wood, thorns	☠☠	Wood splinters and thorns cause skin irritations. Dust causes dermatitis
Douglas Fir (Oregon) *Pseudotsuga menziesii*	USA, Canada, plantations in New Zealand, Australia, New Guinea & Europe	Dust, leaves, bark	☠☠	**Sensitizer**, skin irritations and dermatitis, nasal cancer, irritation to eyes and throat
Ebony (all dark coloured species) *Diospyros spp.*	Africa, Malagasy, Ceylon, S.E. Asia, Hawaii	Dust, wood	☠☠	**Sensitizer**, skin irritations, acute dermatitis, sneezing, conjunctivitis
Elm, European *Ulmus* spp.	Europe	Dust, wood	☠☠	**Sensitizer**, skin irritations and dermatitis, nasal cancer

Species	Origin	Problem	Potency	Reported associated health hazards
Gaboon (Okoumé) *Aucoumea klaineana*	Equatorial Africa	Dust	☠☠	**Sensitizer**, itchy skin, irritation to eyes and nose
Greenheart (Bebeeru) *Chlorocardium rodiei*	South America, Guiana	Dust, wood	☠☠☠☠	**Sensitizer,** causing headache, wheezing, shortness of breath, disturbance of vision, diarrhoea
Gum, Blue (Blue Gum, Yellow Gum) *Eucalyptus leucoxylon*	Australian native Sth. Australia	Dust	☠☠	**Sensitizer**, skin irritations and dermatitis, itchiness, irritation of mucous membranes
Gum, Grey Box (Grey Box) *Eucalyptus microcarpa*	Australia native	Dust	☠☠☠	**Sensitizer**, skin irritations and dermatitis, nasal irritation and temporary spasmodic rhinorrhea
Gum, Spotted (Spotted Iron Gum) *Eucalyptus maculata*	Australian native, South America, Africa & Europe	Dust	☠☠☠	**Sensitizer**, skin irritations and dermatitis, nasal irritation and temporary spasmodic rhinorrhea
Gum, Tasmanian Blue (Southern Blue Gum) *Eucalyptus globulus*	Australian native	Dust, wood	☠☠	**Sensitizer**, skin irritations and dermatitis, itchiness, irritation of mucous membranes
Gum, Yellow (Sth Aust. Blue Gum) *Eucalyptus leucoxylon*	Australian native South Australia	Dust	☠☠	**Sensitizer**, skin irritations and dermatitis, itchiness, irritation of mucous membranes
Iroko (African Teak) *Milaca excelsa*	Tropical West & East Africa	Dust, wood	☠☠☠☠	**A direct toxin and sensitizer**, causing dermatitis, furunculosis, oedema of eyelids, respiratory difficulties, pneumonia, alveolitis, giddiness
Ironwood, Cooktown *Erythrophleum chlorostachys*	Australian native	Dust, wood, bark, leaves	☠☠☠	**Sensitizer**, nausea, headaches, asthma, skin irritations and dermatitis, foliage contains toxic levels of alkaloids
Jarrah *Eucalyptus marginata*	Australian native	Dust	☠☠	**Sensitizer**, irritation to nose, throat and eyes
Keruing *Dipterocarpus spp.*	South East Asia, Andaman Islands	Dust	☠☠	**Sensitizer**, skin irritations and dermatitis
Kwila (Merbau, Vesi) *Intsia bijuga*	Australia, New Guinea, Pacific Islands, South East Asia	Dust	☠	**Sensitizer**, skin irritations and dermatitis, rhinitis
Lignum Vitae *Guaiacum*	West Indies, Central & northern South America	Dust, bark, sap	☠☠	**Sensitizer**, skin irritations and dermatitis
Mahogany, African *Khaya ivorensis*	West Africa	Dust	☠☠☠	**Sensitizer**, irritation to the mucous membranes, skin irritations, dermatitis, nasal cancer
Mahogany, American *Swietenia macrophylla*	Central America, northern South America, Mexico, Fiji	Dust	☠☠	**Sensitizer**, skin irritations, giddiness, vomiting, furunculosis

Species	Origin	Problem	Potency	Reported associated health hazards
Mahogany, Miva (Red Bean) *Dysoxylum muelleri*	Australian native	Dust	☠☠☠	**Sensitizer**, exceedingly irritating causing eczema, congestion of lungs, eye infections, irritation of mucous membranes, headache, nose bleed, loss of appetite. Effects increase with more seasoned wood
Maple, Queensland (Maple) *Flindersia brayleyana*	Nth Queensland rainforests	Dust	☠☠	**Sensitizer**, skin irritations to back of hands and between fingers, eczema and acute exfoliative dermatitis
Messmate (Messmate Stringybark) *Eucalyptus obliqua*	Australian native, plantation in Africa, Europe and Sth America	Dust	☠☠	**Sensitizer**, skin irritations and dermatitis, asthma, sneezing
Meranti (Red, White & Yellow) *All Shorea spp.*	Sth East Asia	Dust	☠☠	Dermatitis, irritation to nose, throat and eyes
Merbau (Kwila, Vesi) *Intsia bijuga*	Australia, New Guinea, Pacific Islands, South East Asia	Dust	☠	**Sensitizer**, skin irritations and dermatitis, rhinitis
Milky Mangrove *Excoecaria agalioche*	Australian native, South East Asia, Pacific	Dust, wood bark, sap	☠☠☠	Sap is poisonous and may cause severe irritation to eyes, even temporary blindness, headache, burning of throat, and rapid blistering of skin
Mulga *Acacia aneura*	Australian native	Dust, leaves wood, bark	☠☠☠	**Sensitizer**, wood contains a virulent poisonous principle, used for spear heads by Indigenous Australians. Dust may cause irritation to mucous membranes, headache, vomiting
Myrtle, Beech *Nothofagus cunninghamii*	Australian native Vic, Tasmania	Dust, leaves, bark	☠☠	**Sensitizer**, irritation to mucous membranes, irritation to eyes and throat and difficulty breathing. Fungus found in bark
Myrtle, Oregon (Bay Laurel) *Umbellularia californica*	Oregon, California USA	Dust, wood	☠☠	**Sensitizer**, nausea, headaches, asthma, skin irritations and dermatitis
Needlewood *Schima wallichii*	India, Oceania, S.E. Asia	Dust, bark	☠☠	Dust and bark can cause severe skin irritations
Oak, European (most European species) *Quercus spp.*	Europe, Japan, China	Dust, leaves wood, bark	☠☠	**Sensitizer**, nasal cancer, dermatitis, sneezing, irritation to eyes and throat and difficulty breathing
Oak, Beef (Desert Beefwood) *Grevilea striata*	Australian native WA., NT., Qld., NSW	Dust, wood	☠☠☠	**Sensitizer**, irritation to mucous membranes, skin irritation and dermatitis, asthma, dust causes irritation to eyes, nose and throat
Oak, Northern Silky (Bull Oak, Qld Oak) *Cardwellia sublimis*	Nth Qld, Townsville	Dust, wood	☠☠☠	**Sensitizer**, green timber may cause dermatitis
Oak, Red Silky (Red Beef Oak, Queensland Waratah) *Stenocarpus salignus*	Australian native Tropical NSW, Qld	Dust	☠☠☠	**Sensitizer**, irritation to mucous membranes, skin irritation and dermatitis

Species	Origin	Problem	Potency	Reported associated health hazards
Oak, Silky (Southern Silky Oak, Silver Oak) *Grevillea robusta*	Australian native, New Caledonia	Dust, wood, bark, sap	☠☠☠	**Sensitizer**, sap may cause blistering of skin, inflammation of eyelids. Wood contains an allergen which may cause dermatitis. Flowers and fruit contain toxic hydrogen cyanide.
Obeche *Triplochiton scleroxylon*	West Africa	Dust, wood	☠☠☠	**Sensitizer**, asthma, sneezing, congestion of the lungs
Oleander (Rose Laurel) *Nerium oleander*	Southern Europe, Asia, China, Northern Africa Mediterranean, Australia	Dust, leaves wood, bark latex gum	☠☠☠☠☠	**A direct toxin and sensitizer**, latex is poisonous if turned green. Smoke toxic if burned. Causes vomiting, diarrhoea, dizziness, breathing difficulties, skin irritations and dermatitis. **(NOT to be used In Queensland schools for woodworking)**
Oregon (Douglas Fir) *Pseudotsuga menziesii*	USA, Canada, plantations in New Zealand, Aust. & Europe	Dust, leaves bark	☠☠☠	**Sensitizer**, skin irritations and dermatitis, nasal cancer, irritation to eyes and throat
Padauk (Sandalwood, Coralwood, *Pterocarpus soyauxii*	Central West Africa,	Dust, wood	☠	**Sensitizer**, nausea, headaches, asthma, skin irritations and dermatitis
Pine, N.Z. White (Kahikatea, kahika) *Dacrycarpus dacrydioides*	New Zealand	Dust, wood	☠	**Sensitizer**, dermatitis, irritation to nose and throat
Pine, Northern Cypress (Blue Pine) *Callitris intratropica*	Australian native	Dust, wood	☠☠☠	**Sensitizer**, skin irritations and dermatitis, swelling of eyelids, asthma, irritation of nose and throat, nasal cancer, furunculosis
Pine, White Baltic (Norway spruce) *Picea abies*	Europe	Dust	☠☠	**Sensitizer**, asthma, Irritation to nose and throat
Pine, White Cypress (Cypress Pine) *Callitris glauca*	Australian native	Dust, wood	☠☠☠	**Sensitizer**, skin irritations and dermatitis, swelling of eyelids, asthma, irritation of nose and throat, nasal cancer, furunculosis
Purpleheart *Peltogyne spp.*	Central & South America	Dust	☠☠	Nausea, headaches
Poplar *Populus spp.*	North America, Europe, East Asia	Dust, wood	☠☠	**Sensitizer**, asthma, dermatitis, bronchitis
Rengas *Gluta spp.*	South East Asia, New Guinea	Dust, leaves bark, wood, sap	☠☠	**Sensitizer**, bark, sap and wood dust irritating to skin, causing dermatitis, blistering and chronic skin ulcers
Rimu (New Zealand Red Pine) *Dacrydium cupressinum*	New Zealand	Dust	☠☠	**Sensitizer**, irritation to nose, eyes
Rose Butternut (Nth. Qld. Bollygum) *Blepharocarya depauperata*	Australian native Nth. Queensland	Dust	☠☠	**Sensitizer**, skin irritations and dermatitis, conjunctivitis

Species	Origin	Problem	Potency	Reported associated health hazards
Rosewood, Indian (Black Rosewood, Blackwood) *Dalbergia latifolia*	South East Asia, India, New Guinea	Dust, wood	☠☠☠☠	**Sensitizer**, causing skin irritations and dermatitis, asthma, irritation to eyes and throat and difficulty breathing
Rosewood, New Guinea (Malay Padauk) *Pterocarpus indicus*	New Guinea, Nth Australia, S.E. Asia	Dust, wood	☠☠	**Sensitizer**, nausea, headaches, asthma, skin irritations and dermatitis
Rosewood, Thailand *Dalbergia cochinchinensis*	Cambodia, Laos, Thailand	Dust, wood	☠☠	**Sensitizer**, skin irritations and dermatitis, conjunctivitis. Contains methoxydalbergione
Sapale (Sapelli, Aboudikro) *Entandrophragma cylindricum*	West Africa	Dust, wood	☠☠	**Sensitizer**, skin irritation, sneezing
Satinwood (East Indian Satinwood) *Chloroxylon swietenia*	India, Pakistan, Ceylon	Dust, wood	☠☠☠	Dermatitis, headache, swelling of scrotum, irritation of mucous membranes, irritation to eyes and throat and difficulty breathing
Satinwood (Thorny Yellowwood) *Zanthoxylum brachyacanthum*	Australian native	Dust, wood bark, thorns	☠☠☠	Lesions made by thorns and splinters take a long time to heal. Dust causes dermatitis, cramp, eye and throat irritation, disturbance of vision
Spruce (European Spruce) *Picea abies or Picea excelsa*	Nth Scandinavia, Russia, Europe, Japan	Dust, wood	☠☠	**Sensitizer**, asthma, Irritation to nose and throat
Sumac (Staghorn Sumac & others) *Rhus typhina & Rhus Vernix spp.*	Asia, South America, Europe	Dust, wood, bark	☠☠	**Sensitizer**, bark causes blisters, dust may cause skin irritations and dermatitis
Teak, Asian (Indian Teak) *Tectona grandis*	South East Asia, plantations in most tropical regions	Dust, wood	☠☠☠	**Sensitizer**, skin irritations and dermatitis, conjunctivitis, over sensitivity to light, swelling of hands, forearms and scrotum, irritation to throat and nose, pneumonia, alveolitis, nausea
Teak, Australian (Crows Ash) *Flindersia australia*	Australian native, New Guinea	Dust, wood	☠☠	**Sensitizer**, skin irritations and dermatitis
Teak, Iroko (African Teak) *Milaca excelsa*	Tropical West & East Africa	Dust, wood	☠☠☠☠	**A direct toxin and sensitizer**. causing dermatitis, furunculosis, oedema of eyelids, respiratory difficulties, pneumonia, alveolitis, giddiness
Turpentine *Syncarpia glomulifera*	Australian native, Hawaii	Dust, wood bark	☠☠	**Sensitizer**, skin irritations and dermatitis, mild swelling. Identified by Work Safe Australia and NOHSC as concerning because of direct skin absorption of chemical irritants
Walnut, African *Lovoa trichilioides*	West Africa, Angola	Dust, wood	☠☠	**Sensitizer**, skin irritations and dermatitis, itchiness, irritation of mucous membranes
Walnut, Australian (Poison Walnut) *Cryptocarya pleurosperma*	Australian native	Dust, wood, bark, sap	☠☠☠	**Sensitizer**, bark and sap very irritating to skin. Dust may cause breathing problems, vomiting, giddiness, dermatitis
Walnut, European (English Walnut) *Juglans regia*	England, Europe and Asia Minor	Dust, wood	☠☠	**Sensitizer**, skin irritations and dermatitis, nasal cancer.

Species	Origin	Problem	Potency	Reported associated health hazards
Wenge *Millettia laurentii*	Equatorial Africa	Dust, wood,	☠☠☠	**Sensitizer**, dust causes dermatitis similar to the effects of poison ivy and is an irritant to the eyes, respiratory problems, giddiness, drowsiness, and abdominal cramps. Splinters are septic, similar to those of greenheart
Western Red Cedar (Canadian Red Cedar) *Thuja plicata*	North America	Dust, wood, bark, leaves	☠☠☠☠	**Sensitizer**, skin irritations and dermatitis, asthma, effects central nervous system (rarely) nasopharyngeal cancer (nasal cancer) **(NOT to be used in Queensland schools for woodworking)**
White Handlewood (Prickly Fig) *Streblus brunonianus*	Australian native	Dust, wood bark, sap	☠☠	**Sensitizer**, sap very irritant to eye, dust causes dermatitis, abdominal pains, nausea
Yew *Taxus baccata*	UK, Europe, N.W. Africa, Asia Minor	Dust, wood bark, leaves, fruits	☠☠☠☠☠	**A direct toxin and sensitizer**, Skin irritations and dermatitis, headache, congestion of lungs, nausea, fainting, irritation of alimentary tract, visual disturbances

6.3.3 Permissible exposure limit (PEL) for wood dust

This is a measure of air quality or airborne dust concentration in a particular workspace. Air quality should be tested by a qualified examiner using a real-time monitor *(e.g. Casella Microdust Pro®),* and is recorded as 'milligrams of wood dust per cubic metre of air, and at 25°C, as a time weighted average' (calculated over a normal working day).

Safe Work Australia's (SWA) Workplace exposure standards for airborne contaminants outlines the set exposure limits for Australia, as a guidance standard for safer air quality. Hardwood and softwood species have differing Permissible Exposure Limits (PEL) for their associated airborne wood dust particulates. The limits recommend inhalable wood dust levels should not be allowed to exceed more than 5 mg/m^3 for softwoods and 1.0 mg/m^3 for some hardwoods such as oaks, mahogany, beech, and eucalypts. This differential is because some hardwoods are listed as having more severe health hazards associated with them than do most softwoods. In Australia, Western Red Cedar and Oleander have been placed in a particular category as allergic species of wood and as such should never be used for ITD curriculum activities or production projects in any Queensland schools. In fact, in Australia all wood dust is now classified as carcinogenic – Group 1 (liable to cause cancer).

Wood dust is also listed as a sensitiser and the Exposure Standard is regularly under review by SWA. In the interests of maintaining a safe working environment, it is recommended that workplace exposures to all wood dust should not exceed 1.0 mg/m^3.

Note: the Permissible Exposure Limit (PEL) for Western Red Cedar is now 0.5 mg/m^3

It may be unsafe for staff and students to be exposed to even very small amounts of wood dust if you already have asthma or certain other medical conditions. The only reliable way to know one's exposure level is to measure the amount of dust in the air while you are working. This is known as air monitoring. Remember, teachers can't accurately evaluate exposure just by looking at the amount of dust around. Much of the fine dust particulates are almost invisible. Staff and students might have a dangerously high exposure without noticing any immediate breathing trouble.

6.3.4 CCA treated timber

Apart from the effects of the wood itself, the risks posed by the use of chemicals in wood treatment, preservation and finishing should not be overlooked. A typical example is Copper Chrome Arsenate (CCA) – or treated pine e.g. Koppers Arch® products, Permapine® etc. CCA treated timber is commonly used on pine timbers for outdoor structures such as playgrounds, decks, garden furniture, picnic tables, exterior seating and handrails. Other uses that come into less contact with students include fencing, retaining walls and pergolas, etc.

These very toxic timber treatments are used as protection from rotting and fungal attack, termites or other wood boring insects. The process has been registered and used for over 60 years worldwide. However, the Australian Pesticides and Veterinary Medicines Authority released a report in March 2005, recommending that CCA treated timbers are **no longer to be used** in any structures where the public (particularly children) are likely to come into frequent contact.

Refer to Australian Standards AS 1604.1: 2012 Specification for preservative treatment: sawn and round timber for regulations and restrictions.

The department has subsequently decided to prohibit the use of CCA treated timbers (for new structures only) in all state schools. To ensure student safety, alternative products will need to be considered. Staff should never burn any existing CCA treated timbers and be extra cautious with any CCA treated sawdust. Remember to always wear gloves, wash hands with soap after exposure and avoid contact with food.

At present, other unrestricted toxic timber preservatives to be aware of include:

- Alkaline Copper Quaternary (ACQ)
- Copper Azole (CuAz)
- Light Organic Solvent Preservative (LOSP)
- Pigment Emulsified Creosote (PEC).

6.3.5 Formaldehyde Adhesives in MDF and Plywood

Another hazard to be aware of is the adhesives used in the manufacture of wood panels such as medium density fibreboards (MDF), plywoods and laminated veneers. Formaldehyde-based adhesives in particular emit small amounts of formaldehyde vapour into the air. However, research has shown that MDF, plywood and laminated veneers manufactured in Australia, and regulated by our strict manufacturing codes, (including AS/NZS 1859.2), have far less free formaldehyde likely to off-gas as harmful emissions than do the same products manufactured overseas. Therefore, by sourcing locally produced MDF or plywood and by restricted or substituting the product in any future ITD workshop projects, the amount of formaldehyde emissions will generally remain well below the Australian exposure standard of 1.0 part per million (ppm).

The eyes, nose and throat can be irritated by formaldehyde vapours at levels as low as 1.0 ppm. Levels of 5.0 ppm or more can severely irritate the lungs, eyes and nose. Formaldehyde solutions can destroy the human skin's natural protective oils, and frequent or prolonged skin contact with these solutions can cause severe dryness, flaking, cracking, and dermatitis. Direct skin contact can also cause allergic reactions such as redness, itching, hives, and blisters.

The International Agency for Research on Cancer (IARC) notes that whilst more research is required, formaldehyde-based adhesives are a probable carcinogen and a strong sensitiser or an allergen that could cause allergic reactions such as severe asthma.

6.3.6 Managing the risks and control measures

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 ITD workspace. This will maintain maximum control over dust concentration levels throughout the facility
- Provide and always wear correct PPE such as a good dust mask or respirator as per Australian Standards AS/NZS 1715: 2009 and AS/NZS 1716: 2012. PPE should be used when necessary, and usually as a final control procedure when other safety measures do not give enough protection. A long sleeve shirt will help protect the skin
- 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 accidents
- Avoid using compressed air when cleaning machinery. This will simply put more dust into the air. Instead use wet clean-up methods such as wiping surfaces with a wet rag, or have the ITD 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.

7. Appendices

7.1 ITD activity information sheets

The following information sheets relate to the use of various machines and equipment during an Industrial Technology and Design curriculum activity.

INFORMATION SHEET

CNC Technologies

ITD Activity - Risk and Control Measures

INDUSTRIAL TECHNOLOGY + DESIGN

This Information sheet relates to student participation in the use of various CNC machines and equipment during an ITD curriculum activity. 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 very safe to use as they 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 should not 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 should then 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 complied with all safety recommendations. For example, some plastics vapours have the potential to be highly toxic and dangerous to our respiratory system.
- Common-sense applies to the use of all workshop machines including CNC machines. It is essential that students receive adequate instruction and training before permission is given to use any CNC machinery or equipment.
- Suitable fire protection should 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 must 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.

INFORMATION SHEET

Compressed Air Equipment

ITD Activity - Risk and Control Measures

INDUSTRIAL TECHNOLOGY + DESIGN

This Information sheet relates to student participation in use of Compressed Air Equipment during an ITD curriculum activity. 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 in ITD departments by staff and students, ranging from small portable types to the larger capacity fixed unit.

Special considerations

- As part of the process of risk management, all teachers involved in the planning and delivery of curriculum activities incorporating the use of any compressed air pneumatic tools and equipment in ITD should initially identify the associated hazards, assess their significance and manage the potential risks by means of a Plant and Equipment Risk Assessment.
- It is recommended that the use of the air compressor should be restricted to students in year 10 and above.

Suggested control measures

- Air pressures should be regulated to the minimum pressure that will allow the appropriate functioning of the equipment being operated.
- Compressors should be fitted with functioning relief valves and a suitable regulator.
- Measured pressures in the tank, pipelines and hoses should not exceed the manufacturer's specifications.
- All air hoses should 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 required every six months. Certification reports should be filed and available at the school.
- Any leaking air lines should 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 should be worn during operation. Noise level output should 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.
- Workspaces should be ventilated adequately whenever smaller, portable air compressor units are being used.
- 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 must be fitted to, or displayed near, the air compressor unit.
- Maintenance on the air compressor, manifolds, air lines, hoses and all air tools should 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 should be worn, as required.

Careless use of compressed air to blow away dirt or dust from the body, clothing or machinery, should 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, known medically as an embolism. This is a dangerous medical condition.

INFORMATION SHEET

Electric Arc Welding

ITD Activity - Risk and Control Measures

INDUSTRIAL TECHNOLOGY + DESIGN

This Information sheet relates to student participation in Electric Arc Welding as an ITD curriculum activity. 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

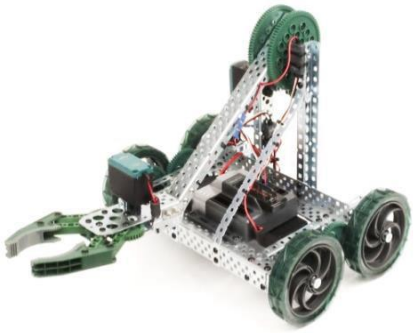
- As part of the process of risk management, all teachers involved in the planning and delivery of curriculum activities incorporating the use of any electric arc welding or cutting process in ITD should initially identify the associated hazards, assess their significance and manage potential risks by means of a Plant and Equipment Risk Assessment.
- It is recommended that the use of any electric or gas welding equipment should be restricted to students in year 10 and above.

Suggested control measures

- Effective control measures should include ways of preventing or minimising all inherent risks, including well designed welding bays and workshop layout that allow provision for sufficient teacher supervision. This 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 should 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 must 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 should be designed to be suitable for the particular welding process - with filter shades between 8 and 13.
- All operators should 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 should be correctly insulated to avoid any dangers of electric shock. All hoses should be checked periodically to correct slow leaks of Argon, Argoshield, Helium, etc.
- Earthing of electric arc welding equipment should 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.
- Any water on the floor should be investigated and removed immediately.

INFORMATION SHEET
Electronics
ITD Activity - Risk and Control Measures

INDUSTRIAL TECHNOLOGY + DESIGN



This information sheet relates to student participation in the use of Electrics and Electronics during an ITD curriculum activity. 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 to 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

- As part of the process of risk management, all teachers involved in the planning and delivery of curriculum activities incorporating the use of electronic componentry and soldering irons in ITD should initially identify the associated hazards, assess their significance and manage the potential risks by means of a 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 should be installed to any workshop power circuit used for soldering irons. Where available, double-insulated soldering irons should 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 should 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.
- Demand for lead-free solder alloys is increasing and as a result of legislation designed to protect manufacturing workers, consumers and the environment, lead-free soft soldering produces are now required in all departmental schools.
- Safe Operating Procedures (SOPs) or instructions must 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 ITD 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.

INFORMATION SHEET

Fibre-reinforced Plastics

ITD Activity - Risk and Control Measures

INDUSTRIAL TECHNOLOGY + DESIGN

This Information sheet relates to students working with Fibre-reinforced plastics as an ITD curriculum activity. '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 should only 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 should be taken when handling this product.
- **Note:** Schools should 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 should be handled with caution. Particular care should 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 should 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 must 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 flammables cabinet.
- Safe Operating Procedures (SOPs) or instructions must be fitted to, or displayed near, fibreglassing workrooms.
- Mixing of resins and catalysts should only be carried out by teachers, in a well-ventilated area and near a readily available supply of water. Eyewash facilities should also be available.
- After handling fibreglass, resins and MEKP, etc. hands should 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. Always wear an approved filtration respiratory mask, such as the 3M® N95.
- Closely supervise and monitor all students during any fibre glassing activities in an ITD workspace.

INFORMATION SHEET

Fixed Machinery

ITD Activity - Risk and Control Measures

INDUSTRIAL TECHNOLOGY + DESIGN

This Information sheet relates to student operating fixed machinery, plant and equipment during an ITD curriculum activity. '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

- As part of the process of risk management, all teachers involved in the planning and delivery of curriculum activities incorporating the use of any fixed machinery, plant and equipment in ITD should initially identify the associated hazards, assess their significance and manage potential risks by means of a Plant and Equipment Risk Assessment.

Suggested control measures

- All fixed machinery must be correctly installed, connected to the power supply and commissioned prior to operation. Heavy machinery designed to be operated in a securely fixed position must 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 should be 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 him or herself, or any other person.
- Dust extraction systems should be working efficiently and maintained where required.
- No machinery and equipment should expose students and staff to hazards due to excessive noise, toxic fumes or other factors, (i.e. no noise levels over 85 dB for more than eight hours).
- All fixed machines are to have clearly defined 'safe work zone' floor boundaries marked with 80 mm wide bright yellow delineation lines.
- Safe Operating Procedures (SOPs) or instructions must be fitted to, or displayed near, all fixed machines.
- Ensure that all staff and students are competently trained in the safe use of particular machinery and their competency is regularly observed and recorded.
- All machinery repair maintenance must be up-to-date and accurately recorded.
- Modifications should not normally be made to ITD machinery, plant and equipment unless this includes the rectification of identified hazard control measures, such as improved safety guarding, for standard safer operation. Any modifications should comply with all relevant Australian Standards.
- The machine and work area should 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 work boots and clothing, hearing protection, etc.
- Closely supervise and monitor all students using any fixed machinery in an ITD workspace.

INFORMATION SHEET

Mechanics

ITD Activity - Risk and Control Measures

INDUSTRIAL TECHNOLOGY + DESIGN

This Information sheet relates to student participation in Mechanics as an ITD curriculum activity. 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

- As part of the process of risk management, all teachers involved in the planning and delivery of curriculum activities incorporating the use of motor mechanics tools and equipment in ITD should initially identify the associated hazards, assess their significance and manage the potential risks by means of a Plant and Equipment Risk Assessment.
- Teachers may be required to complete the ITD CARAs – Maintaining a Practical ITD Workspace and ITD Activity.

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 should 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.
- Dust and volatile fume extraction systems should be working efficiently and maintained as required.
- 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.
- Ensure that all staff and students are competently trained in the safe use of all hand tools, power tools and machinery. Their competency should be regularly observed and recorded.
- No machinery and equipment should expose students and staff to hazards due to excessive noise, toxic fumes or other factors, (i.e. no noise levels over 85 dB for more than eight hours).
- Safe Operating Procedures (SOPs) or instructions must be clearly displayed in all mechanics workshops.
- Mechanics work area should be kept free of an accumulation of materials, hand tools, trade waste, oil, grease, sawdust and obstructions of any kind.
- All machinery repair maintenance must be up-to-date and accurately recorded.
- Modifications should not normally be made to ITD machinery, plant and equipment unless this includes the rectification of identified hazard control measures, such as improved safety guarding, for standard safer operation. Any modifications should comply with all relevant Australian Standards.
- 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 Motor Mechanics courses will be required to wear far more substantial personal protection such as steel-cap safety boots and overalls.
- Closely supervise and monitor all students using motor mechanics tools and machinery in an ITD workspace.

INFORMATION SHEET

Metal Casting

ITD Activity - Risk and Control Measures

INDUSTRIAL TECHNOLOGY + DESIGN

This Information sheet relates to student participation in metal casting during an ITD curriculum activity. Metal casting refers to activities using the group of metals whose melting points fall below 1100°C and which, when molten (using a small micro-furnace) can be transferred into a specially prepared mould and allowed to cool and solidify. The casting can then be removed from the mould and surface finished or machined as required.

Forms of metal casting not covered in this information sheet include: die casting, drop forging and metal extrusion.

Special considerations

- As part of the process of risk management, all teachers involved in the planning and delivery of curriculum activities incorporating the use of metal casting process in ITD should initially identify the associated hazards, assess their significance and manage potential risks by means of a Plant and Equipment Risk Assessment.
- It is recommended that the use of micro-furnace metal casting equipment should be restricted to students in Year 10 and above.

Suggested control measures

- Ensure that students not directly involved in furnace charging, slag removal, casting and other processes associated with this activity, remain well clear of the furnace, moulds and the students participating in the activity. Fire extinguishers and fire blankets should be within close proximity to the metal casting area.
- The furnace and metal casting area should be kept free of an accumulation of materials, hand tools, trade waste, oil, grease, sawdust and obstructions of any kind.
- The micro-furnace located very close to where the pouring and moulding process is located.
- Operators of the furnace and crucibles should be given adequate instruction in the safe operation of the equipment.
- Safe Operating Procedures (SOPs) or instructions must be clearly displayed in all metal casting areas.
- All metal casting activities must have clearly defined ‘safe work zone’ floor boundaries marked with 80 mm wide bright yellow delineation lines.
- All chemicals and sand additives should be clearly marked and stored appropriately.
- Fumes from molten metals when superheated to temperatures up to 1100°C may contain gaseous compounds which can be toxic and harmful if inhaled. Fume extraction systems should be working efficiently where required.
- Be aware that contact of any fluids with the hot, molten metal or the casting mould should be prevented as it will explode when molten metal comes in contact with it.
- All micro-furnace repair maintenance must be up-to-date and accurately recorded.
- Ensure that appropriate personal protective equipment (PPE) is available and correctly used. Leather or Kevlar gloves of the longer 'gauntlet' style should be worn at all times, as well as a full apron and/or coat and face shield. The wearing of synthetic clothing materials should be avoided during metal casting activities.
  Closely supervise and monitor all students involved in metal casting activities in an ITD workspace.

INFORMATION SHEET
Metalworking
ITD Activity - Risk and Control Measures

This Information sheet relates to student participation in metalworking as an ITD curriculum activity. 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

- As part of the process of risk management, all teachers involved in the planning and delivery of curriculum activities incorporating the use of metalworking tools and equipment in ITD should initially identify the associated hazards, assess their significance and manage the potential risks by means of a Plant and Equipment Risk Assessment.
- Teachers may be required to complete the ITD CARAs – Maintaining a Practical ITD Workspace and ITD Activity.

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 should 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;
- Dust extraction systems should be working efficiently where required.
- All fixed machines are to have clearly defined 'safe work zone' floor boundaries marked with 80 mm wide bright yellow delineation lines.
- Ensure that all staff and students are competently trained in the safe use of all hand tools, power tools and machinery. Their competency should be regularly observed and recorded.
- No machinery and equipment should expose students and staff to hazards due to excessive noise, toxic fumes or other factors, (i.e. no noise levels over 85 dB for more than eight hours).
- Safe Operating Procedures (SOPs) or instructions must be clearly displayed in all metalworking rooms.
- Practical workspaces should 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 must be up-to-date and accurately recorded.
- Modifications should not normally be made to ITD machinery, plant and equipment unless this includes the rectification of identified hazard control measures, such as improved safety guarding, for standard safer operation. Any modifications should comply with all relevant Australian Standards.
- 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.
- Closely supervise and monitor all students using metalworking tools and machinery in an ITD workspace.

INFORMATION SHEET

Oxy Welding/Cutting

ITD Activity - Risk and Control Measures

INDUSTRIAL TECHNOLOGY + DESIGN

This Information sheet relates to student participation in Oxy-Acetylene gas welding, brazing, bronze welding, heating and shaping or gas cutting as an ITD 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

- As part of the process of risk management, all teachers involved in the planning and delivery of curriculum activities incorporating the use of any oxy-acetylene welding or cutting equipment in ITD should initially identify the associated hazards, assess their significance and manage the potential risks by means of a Plant and Equipment Risk Assessment.
- It is recommended that the use of the oxy welding should be restricted to students in year 10 and above.

Suggested control measures

- There should be a safe working system in place for the performance of all oxy welding activities. This should address 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.
- 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 should be left free of all obstructions.
- Provision for quenching hot metals should be made available and be very close at hand.
- Safe Operating Procedures (SOPs) or instructions must 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 should be inspected annually under the departmental 'Plant and Equipment Service Maintenance Program'.
- Gas cylinders that are connected and in use should be on a wheeled hand trolley and secured in position by means of a safety chain. Stored cylinders, not connected for use, should remain capped.
- Acetylene cylinders should be secured in an upright position prior to and during use.
- Oil and grease should never 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. should 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 an ITD workspace.

INFORMATION SHEET

Portable Power Tools

ITD Activity - Risk and Control Measures

This Information sheet relates to student participation in the use of hand held Portable Power Tools during an ITD curriculum activity. 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

- As part of the process of risk management, all teachers involved in the planning and delivery of curriculum activities incorporating the use of any electric arc welding or cutting process in ITD should initially identify the associated hazards, assess their significance and manage potential risks by means of a Plant and Equipment Risk Assessment.

Suggested control measures

- All corded 240v portable power tools and equipment must be regularly 'tested and tagged'.
- 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 area should 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 must be fitted as tags, and/or displayed as A4 posters, near all portable power tools work stations.
- Ensure that all staff and students are competently trained in the safe use of portable power tools and their competency is regularly observed and recorded.
- No power tools should expose students and staff to hazards due to excessive noise, toxic fumes or other factors,
- (i.e. no noise levels over 85 dB for more than eight hours).
- All power tool repair and maintenance must 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.

INFORMATION SHEET

Power Generating Equipment

ITD Activity - Risk and Control Measures

INDUSTRIAL TECHNOLOGY + DESIGN

This Information sheet relates to student use of portable power generating equipment during an ITD curriculum activity. 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

- As part of the process of risk management, all teachers involved in the planning and delivery of curriculum activities incorporating the use of portable power generating equipment in ITD should initially identify the associated hazards, assess their significance and manage the potential risks by means of a Plant and Equipment Risk Assessment.
- All portable power generating equipment should be used in accordance with the manufacturer's operating manual.
- Adhere to the DoE – Guide to Managing Electrical Safety in Schools
- All power generators should be electrically inspected to make sure that they are safe and well maintained.
- An Earth Leakage Circuit Breaker (ELCB) or Residual Current Device (RCD) unit should be used with all, or connected to, all devices being powered by portable generators in schools.
- Where available, double-insulated appliances or tools should be used in preference to earthed appliances.
- It is recommended that the use of a portable power generator should 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.
- Ensure the generating equipment is used in a well-ventilated area so that fumes do not build up to hazardous levels.
- 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 must 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.
- 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.
- Provide well ventilated operational location for the generator, preferably outside of the building.
- 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.

INFORMATION SHEET

Soft Soldering

ITD Activity - Risk and Control Measures

This Information sheet relates to student participation in soft soldering as an ITD curriculum activity. 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

- As part of the process of risk management, all teachers involved in the planning and delivery of curriculum activities incorporating the use of electronic componentry and soldering irons in ITD should initially identify the associated hazards, assess their significance and manage the potential risks by means of a 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 should be installed to any workshop power circuit used for soldering irons. Where available, double-insulated soldering irons should 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 should 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 must 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.
- Demand for lead-free solder alloys is increasing and as a result of legislation designed to protect manufacturing workers, consumers and the environment, lead-free soft soldering products are now required in 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 ITD 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.

INFORMATION SHEET

Spray Painting

ITD Activity - Risk and Control Measures

This Information sheet relates to student participation in spray painting during an ITD curriculum activity. 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 should 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.
- Always avoid the use of 2-pack paints containing isocyanate compounds such as toluene diisocyanate. HODs need to understand the added 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 should 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 should be inspected, cleaned and/or changed as required. Regularly clean the spray booth to prevent paint build-up.
- Any possible sources of ignition should be identified and isolated, including naked flames or static electricity, in areas around any spray painting activity.
- All lights and switches in spray booths should be spark proof.
- Safe Operating Procedures (SOPs) or instructions must be fitted to, or displayed near, all spray painting booths.
- Suitable fire protection, including extinguishers should 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.
- 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.

INFORMATION SHEET

Thermoforming Plastics

ITD Activity - Risk and Control Measures

INDUSTRIAL TECHNOLOGY + DESIGN

This Information sheet relates to student working with thermoforming plastics as an ITD curriculum activity. The term '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

- As part of the process of risk management, all teachers involved in the planning and delivery of curriculum activities incorporating the use of any thermoforming plastics equipment in ITD should initially identify the associated hazards, assess their significance and manage potential risks by means of a 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 should 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 should 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 must be displayed near all thermoforming work stations.
- Ensure that all staff and students are competently trained in the safe use of all thermoforming machinery and their competency is regularly observed and recorded.
- All machinery repair maintenance must be up-to-date and accurately recorded.
- Plastics thermoforming work areas should 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.

INFORMATION SHEET
Woodworking
ITD Activity - Risk and Control Measures

INDUSTRIAL TECHNOLOGY + DESIGN

This Information sheet relates to student participation in woodworking during an ITD curriculum activity. 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.

Special considerations

- As part of the process of risk management, all teachers involved in the planning and delivery of curriculum activities incorporating the use of woodworking tools and equipment in ITD should initially identify the associated hazards, assess their significance and manage the potential risks by means of a Plant and Equipment Risk Assessment.
- Teacher may be require to complete the ITD CARAs – Maintaining a Practical ITD Workspace and ITD Activity.

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 should 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.
- No machinery and equipment should expose students and staff to hazards due to excessive noise, toxic fumes or other factors, (i.e. no noise levels over 85 dB for more than eight hours).
- Ensure that all staff and students are competently trained in the safe use of all hand tools, power tools and machinery. Their competency should be regularly observed and recorded.
- Safe Operating Procedures (SOPs) or instructions must be clearly displayed in all woodworking rooms.
- Practical workspaces should 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 must be up-to-date and accurately recorded.
- Ensure that appropriate personal protective equipment (PPE) is available and correctly used – i.e. safety glasses, protective footwear and clothing, hearing protection, etc.
- Closely supervise and monitor all students using woodworking tools and machinery in an ITD workspace.