

# MSAENV272B

2015



Participate in environmentally sustainable work practices



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**Manufacturing Skills Australia Courses**

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### **Aims of the Competency Unit:**

This competency covers the outcomes required to effectively measure current resource use and carry out improvements including those reducing negative environmental impacts of work practices.

This competency applies to operators/team members who are required to follow procedures so as to work in an environmentally sustainable manner. This ensures regulatory compliance and also aims at minimising environmental risks and maximises the environmental performance of the process and the organisation.

It includes:

- Resources used
- Potential environmental hazards
- Improving environmental performance (within scope of competency and authority).

This competency applies to all sectors of the manufacturing industry and members of its value chain. It may also be applied to all sections of an organisation, including office, warehouse etc. This unit will need to be appropriately contextualised as it is applied across an organisation and across different industry sectors.

Environmental and resource efficiency issues include minimisation of environmental risks and maximisation of opportunities to improve business environmental performance and to promote more efficient production and consumption of natural resources.

### **Unit Hours:**

20 Hours

### **Prerequisites:**

### **Assessment:**

No formal competency test is required on the completion of the unit; the student should be able to be assessed as "Competent" or "Not Competent Yet" based on the work submitted in the Skill Practice Exercises.

**Elements and Performance Criteria**

- |   |     |   |
|---|-----|---|
| 1. Identify current resource use and environmental issues                         | 1.1 | Identify workplace environmental and resource efficiency issues.                    |
|   | 1.2 | Identify resources used in own work role.   |
|   | 1.3 | Measure and record current usage of resources using appropriate techniques.         |
|   | 1.4 | Identify and report workplace environmental hazards to appropriate personnel.       |
| 2. Comply with environmental regulations.   | 2.1 | Follow procedures to ensure compliance.   |
|   | 2.2 | Report environmental incidents to appropriate personnel.                            |
| 3. Seek opportunities to improve environmental practices and resource efficiency. | 3.1 | Follow enterprise plans to improve environmental practices and resource efficiency. |
|   | 3.2 | Make suggestions for improvements to workplace practices in own work area.          |

### **Required Skills and Knowledge**

#### ***Required skills include:***

Required skills include the ability to:

- report as required by procedures
- follow procedures and instructions and respond to change
- ask questions and seek clarifications relating to work requirements

Reading and writing is required in order to interpret required procedures and complete required workplace forms/reports.

Numeracy is required to interpret numeric workplace information, readings and measurements, handle data as required and complete numeric components of workplace forms/reports.

#### ***Required knowledge includes:***

Competency includes sufficient knowledge to:

- have a basic understanding of sustainability
- know the environmental hazards/risks, resource use and inefficiencies associated with own workplace (at an appropriate level)
- know the relevant environmental and resource efficiency systems and procedures for own work area
- know the impact of laws and regulations to a level relevant to the work context

**Lesson Program:**

This is a 20 hour unit and is divided into the following program.

<b>Topic</b>	<b>Skill Practice Exercise</b>
Topic 1 – Work Practice & Minimisation of Waste:	MSAENV272-SP-0101
Topic 2 – Efficient Use of Energy and Resources:	MSAENV272-SP-0201
Topic 3 – Resource & Waste Management:	MSAENV272-SP-0301
Topic 4 – Managing Hazardous Chemicals:	MSAENV272-SP-0401
Topic 5 – Reduce Emissions & Water Use:	MSAENV272-SP-0501

**Competency Test:**

No final competency test is required to complete the unit. Competency will be achieved when ALL Skill Practice Exercises have been answered to the teacher/facilitator's satisfaction.



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## Topic 1 – Work Practice & Minimisation of Waste:

### **Environmental Sustainability:**

Environmental sustainability involves making decisions and taking action that are in the interests of protecting the natural world, with particular emphasis on preserving the capability of the environment to support human life. It is an important topic at the present time, as people are realising the full impact that businesses and individuals can have on the environment.

Environmental sustainability is about making responsible decisions that will reduce a business' negative impact on the environment. It is not simply about reducing the amount of waste produced or using less energy, but is concerned with developing processes that will lead to businesses becoming completely sustainable in the future.

Currently, environmental sustainability is a topical issue that receives plenty of attention from the media and from different governmental departments. This is a result of the amount of research going into assessing the impact that human activity can have on the environment. Although the long term implications of this serious issue are not yet fully understood, it is generally agreed that the risk is high enough to merit an immediate response. Businesses are expected to lead in the area of environmental sustainability as they are considered to be the biggest contributors and are also in a position where they can make a significant difference.

Businesses can potentially cause damage to all areas of the environment. Some of the common environmental concerns include:

- damaging rainforests and woodlands through logging and agricultural clearing
- polluting and over-fishing of oceans, rivers and lakes
- polluting the atmosphere through the burning of fossil fuels
- damaging prime agricultural and cultivated land through the use of unsustainable farming practices

For much of the past, most businesses have acted with little regard or concern for the negative impact they have on the environment. Many large and small organisations are guilty of significantly polluting the environment and engaging in practices that are simply not sustainable. However, there are now an increasing number of businesses that are committed to reducing their damaging impact and even working towards having a positive influence on environmental sustainability.

Environmental sustainability forces businesses to look beyond making short term gains and look at the long term impact they are having on the natural world. You need to consider not only the immediate impact your actions have on the environment, but the long term implications as well. For example, when manufacturing a product, you need to look at the environmental impact of the products entire lifecycle, from development to disposal before finalising your designs.

### **Work Practices:**

Work practices are an action performed by workers to prevent or reduce emissions of air toxics. Such actions can include vacuuming up dust, opening containers only when necessary, and keeping employees updated on housekeeping measures.

Work practices also govern any informal practice or custom which governs or influences the way employees behave at work. Work practices are ways of structuring that are things one must do, or ways in which something is done; they are not implemented by technologies, but are usually conceived by intelligent humans, though not necessarily. In contrast technologies are things that one can usually buy.

Examples of work practices include

- processes
- patterns

- decision
- benchmarks

The principles surrounding work practices are not only restricted to the work place but to our personal lives and in the classroom. While at college, students should:

1. Be well behaved and respect others learning. A student should contribute to a positive and productive classroom environment by:
  - Listening attentively and following teacher's instructions.
  - Treating teachers and other students with respect.
  - Demonstrating a positive and productive work attitude.
  - Speaking when appropriate.
  - Respecting others' personal values and property.
  - Demonstrating a courteous and polite manner towards others
2. Use class time effectively by focusing on their learning and consistently does the best they can:
  - Coming to class ready to start work.
  - Remaining focused on the task at hand.
  - Settling down to the work quickly once the task is explained.
  - Seeking help or asking clarifying questions when unsure of how to proceed.
  - Using time productively when waiting for assistance
3. Improve the understanding through listening carefully, asking questions and contributing to discussions. Student listens carefully and asks questions or participates in discussions in ways that will improve their learning by:
  - Listening attentively to instructions and to other students' views.
  - Participating in class and group discussions in a productive manner.
  - Discussing ideas and work with peers.
  - Asking questions when needed to improve their understanding of tasks and skills.
4. Work cooperatively. Students behave in ways that contribute to a cooperative class atmosphere, working well with others formally or informally as required by:
  - Participating in class in a way that contributes to positive learning and interactions.
  - Working well in student selected groups and in teacher selected groups.
  - Listening to others, respecting other opinions as well as expressing own opinions in an appropriate manner.
5. Work independently. A student should be able to work on their own in a productive and self-regulated manner by:
  - Using own skills and initiative to attempt a task independently
  - Working in a focused way when the learning mode involves 'solo' activities
  - Following instructions/processes to complete tasks independently.
6. Is punctual with deadlines. The student should complete all requirements of the work to the set standard and within the set timeframe by:
  - Completing classwork within the set time frame.
  - Completing and submitting assessment tasks and homework tasks by the due date.
7. Brings correct books and equipment to class. Students brings the necessary books or equipment needed for learning in every subject by:
  - Bringing diary, pens, paper, textbooks and workbooks required.
  - Bringing any additional items requested by teacher.
  - Netbooks should be charged and ready to use.
8. Acts on feedback. Each student improves the quality of their work, and if needed their behaviour, based on feedback from teacher by:

- Listening to oral feedback, reading written feedback, and demonstrating an improvement in their work based on this feedback.
- Improving organisational skills and/or behaviour in the classroom based on discussion with the teacher.
- Incorporating the improvements suggested by a teacher into new work and/or behaviour.

### **What is Environmentally Sustainable Work Practices?**

Environmentally sustainable work practices are those which reduce harm on the environment and reduce wastage of resources.

All employees can help protect the environment by reducing, re-using and recycling.

#### Reduce

- Use goods which stop waste being generated.
- Reduce waste by choosing products that have minimal packaging and can be used productively and then recycled.

#### Re-use

- Re-use containers, packaging or waste products, wherever possible.

#### Recycle

- Recycle waste material into useable products, wherever possible.

#### For waste that can't be avoided, reused or recycled

- Treat the waste to make it less harmful or reduce the volume of the harmful component.
- Dispose of the waste safely.

#### Strategies to be implemented by the Manager and Supervisors

- Consider sustainability issues when making planning and managing decisions.
- Promote and encourage environmental awareness to ensure employees are aware of their environmental responsibilities.
- Aim to continually improve environmental performance by identifying and addressing environmental risk.
- Make resources available to implement environmental risk management procedures

#### Employees' responsibilities

- Identify and manage environmental risks associated with work activities to minimise their impact on the environment.
- Use the Employee Feedback Form to put forward suggestions.

#### Managing safety risks

- Employees
- Be aware of workplace health and safety policies and ensure procedures are followed.
- Notify the Workplace Health and Safety Officer of specific risks or hazards by completing an Employee Feedback Form.
- A safety risk assessment must be undertaken by the Workplace Health and Safety Officer at least once a year using the Workplace Safety Checklist.

#### Environmental purchasing guidelines

- Become informed about the environmental impacts of products purchased. Search for environmentally-friendly products.
- Choose products with less packaging.
- Choose products with recyclable or reusable packaging.
- Re-use plastic bags and all types of containers if possible.
- Buy quality goods that will last.

- Buy recycled goods which have already saved resources and raw materials, and help reduce the overall quantity of waste.

#### Paper wastage

- Buy and use recycled paper where possible.
- Make double-sided copies when printing and photocopying, wherever possible.
- Use the blank side of used paper for notepaper before recycling.
- Re-use envelopes for internal mail.

#### Disposal of waste

- Place the following in recycle bins, depending on recycling facilities available in your community.
  - paper
  - aluminium
  - glass
  - steel
- Follow the guidelines for the disposal of these materials to minimise the impact on the environment.

#### Energy

- Use these strategies to minimise energy wastage:
- Maintain air-conditioning at a constant temperature of 23-24°C.
- Close blinds or curtains to minimise heat build-up.
- Maintain only security lighting after business hours.
- Switch off equipment overnight wherever possible.
- Repair malfunctioning utilities (e.g. leaking taps) as soon as possible.

### **Minimisation of Waste, Through Implementation Waste Management:**

A waste hierarchy is a list of approaches to managing waste, arranged in order of preference. Image Figure 1.1 is a common graphical representation of the Hierarchy, with the least preferred option for managing waste, disposal, located at the bottom and the most preferred option, avoidance and minimisation, located at the top. The Waste Hierarchy is widely used as a simple communication tool to remind those who generate or manage waste that:

- Strategies which try to avoid products becoming waste are generally preferable to...
- Strategies which seek to find a use for waste, which are in turn generally preferable to...
- Strategies for disposal, which should be used as a last resort



Figure 1.1

### **Waste Avoidance and Minimisation:**

#### **Waste Minimisation:**

Waste minimisation is aimed at reducing the production of waste through education and improved production process rather than aiming to increase technology to improve treatment of waste. The idea of minimisation is not centred on technological advances, it can be viewed a method of managing existing resources and technology in order to maximise the efficiency of available resource use. Minimising waste generation has the potential to reduce costs or increase profits by maximising the use of resources and by reducing the amount of waste to be disposed of the cost of waste management is also decreased.

Waste minimisation is perhaps the most important element of the Waste Hierarchy and also the one which presents the toughest challenges. Unfortunately, in spite of growing awareness in the community about the need to reduce waste, waste generation rates have continued to rise in line with growth in our standard of living. A recent study of attitudes to wasteful consumption made the disturbing finding that young people are both more likely to engage in wasteful consumption and less likely to feel guilty about such behaviour (Hamilton et al, 2005).

Examples of avoidance techniques include:

**Consideration for individuals**

- Buying goods in bulk;
- Reconsidering superfluous purchases;
- Purchasing products in materials/packaging that is readily recycled;
- Use of alternatives, e.g. landscaping that creates mulched gardens in place of lawns; and
- Use of composting and vermiculture practices

**Consideration for industry**

- Change in product design to reduce materials consumption;
- Using crates instead of pallets to avoid the need for shrink wrap;
- Incorporate Eco-Design technology into production processes;
- Adoption of Cleaner Production practices that ensure avoidance through efficiency measures; and
- Conduct regular audits and monitoring of waste reduction/resource recovery practices.

**Considerations for Local Government**

- Encourage community 'avoidance' activities, e.g. promote competitions rewarding initiative in this area of resource recovery;
- Lead by example, e.g. display mulched gardens throughout the municipality; and
- Provide facilities and infrastructure to assist industry, business and the community to undertake resource recovery practices, e.g. kerbside recycling and resource exchange registers.

**Re Use:**

Reuse can be defined as recovering value from a discarded item without reprocessing or remanufacture (Waste Management Board, 2004). Typically this will involve an item being reused in its original function or similar. Importantly, the definition of reuse does not preclude relatively minor pre-treatments like washing, reconditioning or painting.

**Reuse vs Recycling**

Reuse is given priority over recycling within the Waste Hierarchy because it is assumed to provide greater savings in resource consumption. In other words, reusing an item for its original purpose generally consumes fewer resources than sending the item back to a manufacturer to be converted into the raw materials for the manufacture of a new version of the same item. The assumption that reuse is better than recycling has been challenged on many occasions by industry groups including the packaging industry - see for example FEFCO, 2003.

**What can be reused?**

Many materials can be reused with very little or no processing instead of being disposed of to landfill. Reuse benefits the environment by reducing the need to harvest new resources for each new product, and as a consequence of this the overall cost of production may be significantly reduced. Many waste products have the potential to be reused enabling cost savings from landfill avoidance and from not having to make and use new products.

**Examples of reuse in initiatives include:**

- Product reuse - retreading tyres, recovery of demolition materials, reuse of plastic bags, second hand clothing, reconditioning and repair of furniture and appliances;

- Materials reuse – Liquid paper board for seedlings planters, bottles, scrap paper for notes/phone messages;
- Durable packaging - e.g. milk crates, bread trays, string or calico shopping bags.

Formal resource exchange networks are growing in popularity throughout Australia. The 'Industrial Waste Exchange' has been established in Western Australia with the objective of facilitating the reuse, recycling and reprocessing of materials through the provision of information registers, introducing the source of materials to people/industries searching for those particular materials. The IWE also facilitates the shift away from seeing redundant materials as waste to seeing them as a resource and a commodity in an industrial sense. Similar networks have been established in other States and around the world.

**Positive effects associated with reuse**

- More effective use of resources
- Employment opportunities in the service and repair industries
- Support for charity based stores
- Better protection of products as durable packaging is more robust
- Changes in attitudes towards disposable products

**Recycling:**

Recycling occurs when materials from waste streams are broken down into raw materials and reprocessed either into the same product (closed loop) or a new product (open loop). The term covers a wide range of activities required to turn used materials into new products; these activities include collection, sorting, reprocessing and manufacture. There are many materials that are capable of being recycled, and technology is advancing to allow the recycling of more materials. It is rare for a product to be made of 100% recycled material because of health concerns, production and technical restraints and the fact that most materials have a limit on the number of times they can be recycled.

The benefits of recycling do not lie solely in diversion of waste away from disposal but, more importantly, in the reduction of the amount of virgin resources that need to be harvested and processed for the manufacture of new products. A recent national study into kerbside recycling has shown that the avoided environmental cost of production generated by kerbside recycling is 20 times greater than the environmental cost of collection and disposal of the material (NPCC, 2001), refuting the claim that recycling is more harmful to the environment than the extraction of virgin resources and production of materials from them.

**Categories of recyclables**

In Australia the main categories of recyclables are: paper, PET and HDPE plastics, liquid paperboard, aluminium and steel cans, and glass bottles and food containers. Waste oil and car batteries are also recycled in many communities. There are many more materials that are recyclable than materials that are actually recycled. The reason for this is that quite often the recycled product has no established market or the market is not viable due to low commodity prices, and it is therefore not economically viable for these products to be recycled, examples of this are that some types of plastic and crushed glass. Distance to market is another restriction to recycling in Australian communities as transportation costs may eliminate the economic viability and environmental benefit of the program.

**Recycling:**

The majority of Local Governments throughout Australian metropolitan areas provide residents with a kerbside recycling service with many of the larger regional centres also provide kerbside recycling programs. Drop off centres, where centralised collection bins are provided for the public to drop off recyclable materials, are common. In 2009, over 91% of Australian households used municipal kerbside recycling to recycle waste, an increase from 87% in 2006.



The recycling activities of households grew extensively between 1996 and 2009. In 1996, 91% of Australian households said they practised some form of waste recycling and/or reuse activity. In 2009, almost all Australian households (98%) reported that they recycled waste and 86% reported that they reused waste. Items commonly reused or recycled by households included paper, cardboard or newspapers (95%), plastic bottles (94%), glass (93%) and plastic bags (90%).

The total volume of waste generated in Australia nearly doubled from 22.7 million tonnes in 1996-97 to 43.8 million tonnes in 2006-07.

### **Recovery:**

Recovery is a difficult term to define and is perhaps not especially useful without being qualified. Recovery is often used as a catch-all phrase covering recycling, composting and incineration. Within Australia at least, it is more common to use the term Recovery as shorthand for Resource Recovery. Resource Recovery involves turning discarded materials into some kind of useful resource by chemically transforming those materials, typically into either energy or compost. The most common examples of Resource Recovery involve the treatment of organic/carboniferous materials or energy from waste through thermal, chemical, or biological means. It can be contrasted with the concept of Materials Recovery, which covers processes that capture and use the materials in their existing chemical state.

Consider the following illustration of the difference between a recycling process and a Resource Recovery process when applied to a common household item newspaper. Newspaper is constituted mainly of filaments of cellulose - essentially tiny wood fibres. Old newspaper can be recycled by wetting and teasing the fibres apart to create a pulp. This pulp can then be used as a direct input in the manufacture of new paper. On the other hand, old newspapers can be recovered through a Resource Recovery process which destroys the cellulose and converts it into carbon dioxide, water, energy and a number of other products.

Generally, there are two main groups of Resource Recovery processes to be considered, Biological and Thermal.

Biological processes include:

- Open Composting;
- Enclosed composting;
- Vermicomposting; and
- Anaerobic digestion.

Thermal processes include:

- Incineration; and
- Pyrolysis / Gasification

### **Disposal:**

#### **Waste Volumes and Contribution**

Waste Management as a professional field originally developed with a focus on removing unwanted material from the proximity of people and settlements. With a predominantly public health perspective, waste managers were traditionally interested in the disposal of the waste. Whilst there is now a general move towards the recovery of resources from waste, disposal is still the most common final destination for many types of waste, including municipal waste. The methods of disposing of waste range from the very basic to the elaborate; however, there are still two main categories of disposal, namely burial (landfilling) or burning (incineration).

#### **Disposal or Resource Recovery?**

The line between disposal and resource recovery is sometimes blurred by the fact that both landfills and incinerators can be established or modified to enable at least the recovery of energy (and potentially the recovery of materials). Methane extraction has become common at large, modern landfill sites; this gas can be burnt for heating or

electricity generation and its recovery substantially reduces the greenhouse contribution from decaying putrescible waste. Similarly, incinerators can be used to generate heat and/or electricity. The mining of old landfill sites for metals and minerals was first proposed and put into practice more than 50 years ago (Strange, 2005). There are a number of more recent examples of landfill mining around the world and several proposals currently under consideration to trial this approach here in Australia (Geoscience News, 2003)

**Skill Practice Exercises:**

*Skill Practice Exercise MSAENV272-SP-0101.*

Investigate the workplace practices that could be implemented in your classroom or workplace to improve learning then produce a 250 word report on recommendations to improve the work practices.