KS5 Engineering

Course Structure

- BTEC Engineering – Extended Certificate
- 360 Guided Learning Hours (equivalent to 1 A-Level)
- 4 Units across 2 years
- 2 Externally Assessed Units
  - Unit 1 – 2hr Formal Exam
  - Unit 3 – 6hr Assessment under Exam Conditions
- 2 Internally Assessed Units
  - Unit 2 & Unit 9 Controlled Assessment

Units

Unit 1
Engineering Principles
Unit 2
Delivery of Engineering Processes as a Team
Unit 3
Engineering Product Design and Manufacture
Unit 9
Work Experience in the Engineering Sector

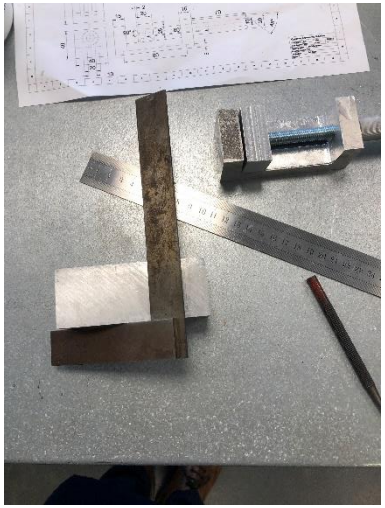
What do we do?

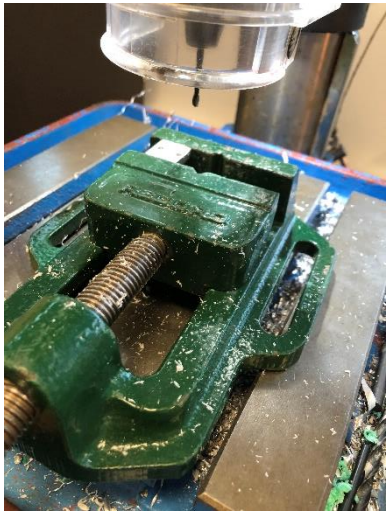
Unit 1
Learning to apply key mathematic and physics principles to engineering problems.
Unit 2
Planning and manufacturing an engineering product as a manufacturing team.
Unit 3
Identifying the key criteria for successful engineering design and producing appropriate design solutions and planning.
Unit 9
Carrying out a period of work experience at a chosen company to gain industry specific skills and experience.

Career Links

- University courses in any field of Engineering
- Apprenticeships in any field of Engineering

E.g. Mechanical, Civil, Biomedical, Marine, Automotive, Aerospace, Agricultural, Catering, Communications, Aeronautical…

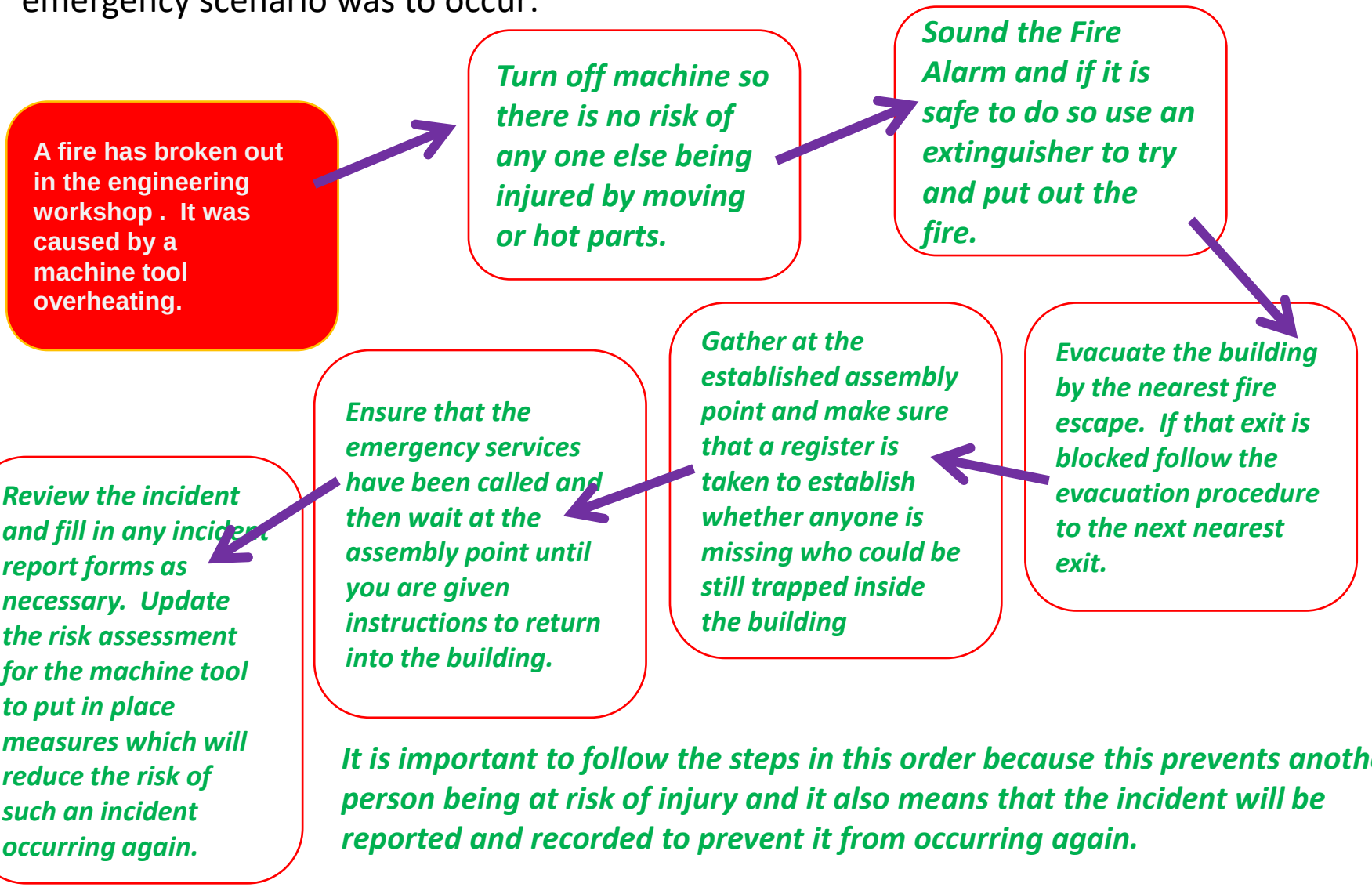




Manufacturing as a Team
ENGINEERING (BTEC – Level 3).

Accident and Emergency Procedures

Complete a flow chart to show the procedures which should be followed if this emergency scenario was to occur:



It is important to follow the steps in this order because this prevents another person being at risk of injury and it also means that the incident will be reported and recorded to prevent it from occurring again.

•How a fire alarm would be raised

HeatSensors

Smoke Detectors

Break Glass

•What it would sound like

Continuous undulating siren tone

•Escape routes and muster points

•The evacuation procedure and the routines for reporting the fire

Explain what these images show in your own words. Why do we all meet on the MUGA? Safe/Outdoors /big enough for every one

•Location and provision of First Aid

Mrs Briggs (Medical Room)

Mr Wood (DT Office)

•Any possible changes to the accident and emergency procedure document following the incident (i.e. contents, purpose, legal requirements, improvements etc)

Update risk assessment to cover any unforseen hazards and make sure that the document is legally sound.

WHAT TO DO IN AN EMERGENCY

Need a first Aider?
This is someone who will help if you are injured or sick

See Mr Wood or Mrs Briggs!

First Aid boxes are kept in the Medical Room (Mrs Briggs) and the DT Office (Mr Wood)

What does a fire warden do?

Fire Warden:
Someone who makes sure people leave the building and follow procedures if there is a fire

OURS IS MISS LARKWORTHY

Types of Fire Extinguisher

Water	*For paper, wood, textiles or furnishings*
Dry Powder	*smaller fires; particularly those that will involve electrical equipment. Thus, they are utilised in kitchens, schools and offices. Not ideal for enclosed spaces.*
Foam	*foam extinguishers are commonly employed in situations where flammable solvents, oils or petrol are involved. Foam is additionally useful for items such as carpets or soft furnishings that may continue to smoulder for some time. The foam is not toxic and will help to prevent a fire from reigniting.*
Wet Chemical	*Wet chemical extinguishers utilise a combination of pressurised water and different salts. Wet chemical varieties are particularly useful on fat or oil in a kitchen and can also be used on the aforementioned Class A fires (wood, paper or textiles).*
Carbon Dioxide (CO2)	*For fires that are caused by oils, solvents, fats and electrical equipment but the item may reignite after the gas leaves the immediate area.*

IF THERE IS A FIRE…

Set off the fire alarm
This is someone who will help if you are injured or sick

It is an undulating siren

There are 3 ways to do this:

Break Glass *– smash the glass on the wall to set off the alarm*

Heat Sensor *– if a sensor gets to hot it will set off the alarm*

Smoke Sensor *- if there is smoke in the room then it will set off the alarm*

Use the map in each room to leave by the nearest escape route

Follow the escape policy.

We assemble on the MUGA. It is a good assembly point because it is big enough for everyone to line up and it is away from all the buildings so we are not near hazards.

If there is an incident then afterwards we have to check and update the risk assessment so it can't happen again.

Your responsibilities

1. to take reasonable care of your own health and safety
2. If possible to avoid wearing jewellery or loose clothing if operating machinery
3. If you have long hair, or wear a headscarf, make sure it's tucked out of the way as it could get caught in machinery
4. To take reasonable care not to put other people - fellow employees and members of the public - at risk by what you do or don't do in the course of your work
5. To co-operate with your employer, making sure you get proper training and you understand and follow the company's health and safety policies
6. Not to interfere with or misuse anything that's been provided for your health, safety or welfare
7. to report any injuries, strains or illnesses you suffer as a result of doing your job, your employer may need to change the way you work
8. To tell your employer if something happens that might affect your ability to work, like becoming pregnant or suffering an injury. Because your employer has a legal responsibility for your health and safety, they may need to suspend you while they find a solution to the issue or problem, but you will normally be paid if this happens
9. If you drive or operate machinery, you have a responsibility to tell your employer if you take medication that makes you drowsy. If you have, they should temporarily move you to another job if they have one for you to do.

Why it is important to follow these responsibilities

It is important that both employers and employees adhere to these responsibilities to keep the workplace a safe and positive environment to work in. It is important that their is transparency about health and safety issues and that workers feel able to voice concerns and be correctly protected when in the workplace. It is also important that employees follow their responsibilities to make sure that no unnecessary risks are being taken.
If both parties enter into this agreement honestly and openly then the workplace should be safeguarded, as far as is practicable, against incidents which could cause harm.

Working in the Engineering workshop

Your employer's responsibilities

To listen to any health and safety concerns you might have

To provide any personal protective and safety equipment required free of charge

As far as possible, to have control any risks to your health and safety properly

To allow you to stop work and leave your work area, without being disciplined if you have reasonable concerns about your safety

Not to discipline you if contact the Health and Safety Executive or your local authority, if your employer won't listen to your concerns

To provide appropriate paid leave and rest from work.

To allow you rest breaks during the working day

Relevant legislation

The legislation which outlines these responsibilities is the Health and Safety at Work Act (1974). This act is legally binding and any employer or employee found to not be adhering to the act can be prosecuted in a court of law.
Further information about what constitutes a hazard and risk management can be found on the HSE website www.HSE.gov.uk. This website also contains information about the handling of dangerous substances (COSHH) and the appropriate wearing of PPE (Personal Protective Equipment at work regulations 2002).
Information about the reporting and recording of incidents can also be found on the website (RIDDOR) as can appropriate documentation for carrying out risk assessment.

<u>Scene 1</u> A member of staff is working on the grinder and does not have their tie tucked in safely.	<u>Scene 2</u> A member of staff gets their tie caught in the grinder and it starts to tighten. They shout for help.	<u>Scene 3</u> Another member of staff turns off the machine and the supervisor calls for a first aider.	<u>Scene 4</u> The supervisor evacuates the workshop.
			
<u>Scene 5</u> The first aider arrives and calls for an ambulance.	<u>Scene 6</u> The ambulance arrives and the member of staff is taken to hospital for treatment.	<u>Scene 7</u> An incident report is filled in to record the injury.	<u>Scene 8</u> The risk assessment for the grinder is updated and all members of staff are retrained before it is used again.
			

PPE

Head

We would wear a hard hard or helmet to protect our heads from injury. We would wear this PPE on a construction site.

Eyes

We would wear goggles We would wear them on the pillar drill to stop debris from going into our eyes

Lungs

We would wear a dust mask. This would be worn when working with fumes or dust. We might wear this is we were spray painting.

Hands and Arms

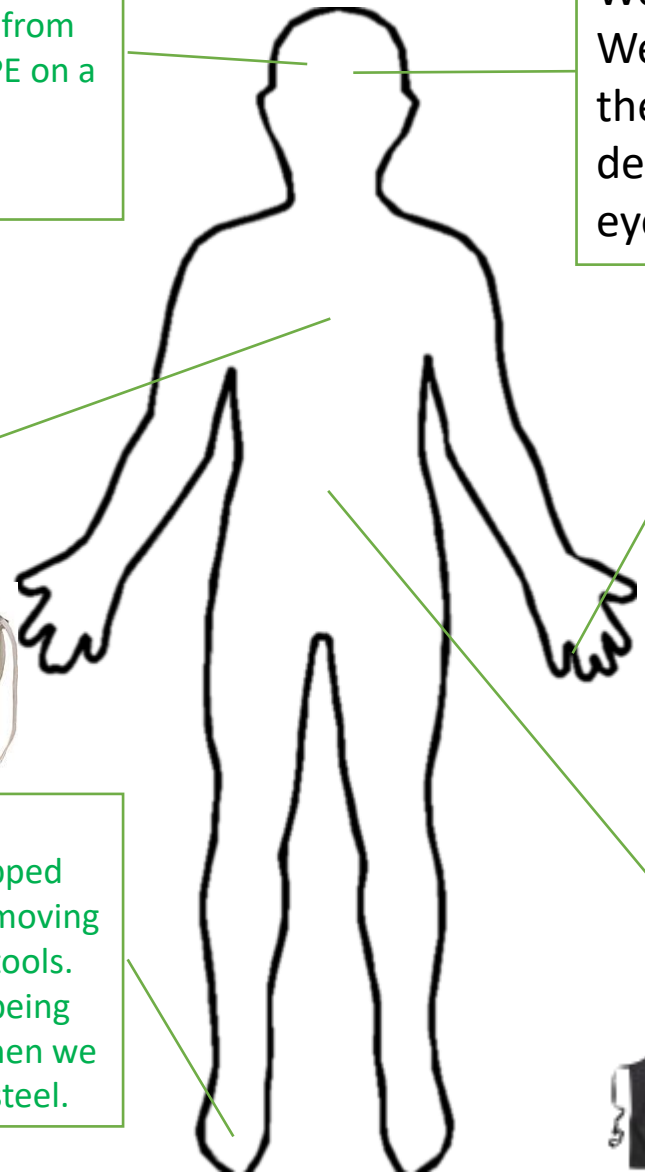
We could wear gloves to protect our hands and arms. We wear leather gloves for heat treatment because they are heat resistant and stop our hands from getting burnt

Legs and Feet

We could wear steel toe capped boots for tasks where we are moving a heavy load or using sharp tools. This will stop our feet from being crushed or cut for example when we are moving large sheets of steel.

Body

We would wear an apron to protect our body. This would stop our clothes from getting damaged, caught in machinery or from being marked.



Personal Protective Equipment Regulations
http://www.hse.gov.uk/pubns/indg174.pdf

Q4

Select one piece of PPE that will be used for more than one activity. Use the internet to research the manufacturer's specification and instructions for the use of the PPE product.

These safety goggles could be used for drilling work safely or when using the heat treatment centre.

Home > Safety & Workwear > Safety and PPE > Safety Goggles & Safety Specs > Safety Goggles > JSP Safety Goggles

Enlarge Image

JSP Safety Goggles

Product Code: 18654

★★★★★ View reviews (11)

Clear polycarbonate wraparound lens with ventilation ports. Lens and body offer protection against medium energy high speed particles at 120m/s (270mph). The optical qualities of the lens comply with the requirements of optical class 1 (highest). The body offers protection against large dust particles, liquid droplets and molten metal. This version of the goggles is available with a lens that offers protection against molten metal and has been treated with an anti-mist coating.

- Anti-Mist
- Adjustable Straps
- Optical Class 2
- Wide Angle
- PVC Body
- Polythene & Steel Vents (Dust & Liquid Droplet Only)
- Polycarbonate Lens
- Polyester Covered Rubber Thread Elastic Headband

Specifications:
EN 166.

trade value

From £0.99 (inc. 20% VAT)

Bulk savings

No. of items	1 - 9	10 - 49	50 +
Price per item	£1.19	£1.09	£0.99

Qty 1

Add for Delivery

Add for Collection

Add to saved list

Next Day Delivery

Store Collection

Check stock in your store

Health and safety policy

This is the statement of general policy and arrangements for:

Overall and final responsibility for health and safety is that of:

Day-to-day responsibility for ensuring this policy is put into practice is delegated to:

Name of organisation *St Wilfrid's Engineering*
Name of employer *St Wilfrid's Ltd.*
Miss Larkworthy

Statement of general policy	Responsibility of *(Name / Title)*	Action / Arrangements *(Customise to meet your own situation)*
To prevent accidents and cases of work-related ill health and provide adequate control of health and safety risks arising from work activities	*Mr Wood – Workshop Technician*	*Mr Wood is responsible for the ensuring that all staff are correctly trained and supervised using machinery in the workshop. Mr Wood will provide and enforce the wearing of correct PPE for all tasks.*
To provide adequate training to ensure employees are competent to do their work	*Mr Wood – Workshop Technician*	*Mr Wood is responsible for ensuring that all staff are correctly trained and supervised using machinery in the workshop.*
To engage and consult with employees on day-to-day health and safety conditions and provide advice and supervision on occupational health	*Miss Larkworthy – Line Manager*	*Miss Larkworthy will consult with all staff to ensure that they are fit for work and either directly supervise, or arrange supervision, for all workshop based tasks.*
To implement emergency procedures - evacuation in case of fire or other significant incident.	*Mr Locklan – Health and Safety coordinator*	*Miss Larkworthy will ensure the correct emergency procedures are followed in the case of a sure or significant incident.*
To maintain safe and healthy working conditions, provide and maintain plant, equipment and machinery, and ensure safe storage / use of substances	*Mr Wood – Workshop Technician*	*Mr Wood is responsible for ensuring that all staff are correctly trained and supervised using machinery in the workshop. Mr Wood will provide and enforce the wearing of correct PPE for all tasks.*

Health and safety law poster is displayed:	*Above the sink in the workshop area.*			
First-aid box and accident book are located: Accidents and ill health at work reported under RIDDOR: (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations) (see note 2 below)	*First Aid box located in the office first aid cupboard which is at the end of the workshop. An additional kit is also available in the medical room in reception* *Accident book located at Mr Locklan's Health and safety co-ordinators office at reception foyer.*			
Signed: (Employer)	*Miss Larkworthy*	Date:	*20.4.14*	
Subject to review, monitoring and revision by:	*YOUR NAME*	Every:	*12*	months or sooner if work activity changes

Note 1: https://www.gov.uk/workplace-fire-safety-your-responsibilities
Note 2: www.hse.gov.uk/riddor

Risk assessment

All employers must conduct a risk assessment. Employers with five or more employees have to record the significant findings of their risk assessment.

We have started off the risk assessment for you by including a sample entry for a common hazard to illustrate what is expected (the sample entry is taken from an office-based business). Look at how this might apply to your business, continue by identifying the hazards that are the real priorities in your case and complete the table to suit.
You can print and save this template so you can easily review and update the information as and when required. You may find our example risk assessments a useful guide (www.hse.gov.uk/risk/casestudies). Simply choose the example closest to your business.

Organisation name: *St Wilfrid's Engineering*

What are the hazards?	Who might be harmed and how?	What are you already doing?	Do you need to do anything else to manage this risk?	Action by whom?	Action by when?	Done
Slips and trips	*Staff , visitors, Apprentices*	*We carry out general good housekeeping. All areas are well lit including stairs. There are no trailing leads or cables. Staff keep work areas clear, e.g. no boxes left in walkways, deliveries stored immediately, offices cleaned each evening*	*Better housekeeping is needed in staff kitchen, e.g. on spills*	*All staff, supervisor to monitor*	26.4.14	26.4.14
Hot objects	*Staff , visitors, Apprentices*	*Staff give instruction on Health and Safety issues, correct operating procedures as part of planning operations/lessons/training. Staff, visitors and apprentices are required to wear correct PPE at all times during machining activities. Gloves or clamps are used to hold work pieces securely and safely and avoid burns from hot work pieces or tools. Tools and materials are not left out after use. Instead they are cooled if necessary and then put away securely to avoid injury. Staff are trained in the use of the pillar drill and competency is assessed prior to undertaking machining tasks.*	*Better housekeeping is required to ensure all tools and work pieces are put away after use.*	*All staff supervisor to monitor*	26.4.14	26.4.14
Noise Levels	*Staff , visitors, Apprentices*	*Staff give instruction on Health and Safety issues, correct operating procedures as part of planning operations/lessons/training. Staff, visitors and apprentices are required to wear correct PPE at all times during machining activities. Noise levels are monitored and, if required, ear plugs are provided to protect staff and visitors from harm. Staff are trained to use the pillar drill correctly and their competency is assessed prior to undertaking machining tasks. Staff are required to wear correct PPE at all times during machining activities.*	*If it becomes apparent that ear plugs are being required for activities on a frequent basis it may be more practical to provide ear plugs to all staff when undertaking work, or to make them readily available in the work shop.*	*All staff supervisor to monitor*	26.4.14	26.4.14
Use of sharps/tools	*Staff , visitors, Apprentices*	*Staff give instruction on Health and Safety issues, correct operating procedures as part of planning*	*Better housekeeping is required to ensure all tools and work pieces are put away after use.*	*All staff supervisor to*	26.4.14	26.4.14

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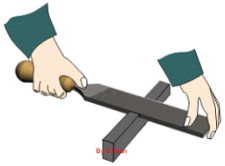
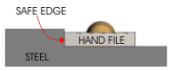
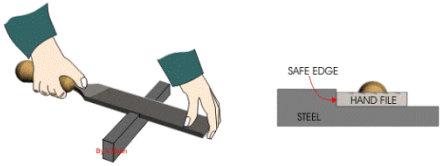
Q7

Using your risk assessment and your choice of PPE, prepare for and complete the machining activity safely (refer to the specification for Unit 3, Topic B3: Engineering work activity)

Include evidence – pictures and a diary of making for your trowel.

STEP	IMAGE	DESCRIPTION
Marking out the steel		*We used a scribe, a template and a steel rule to mark out the steel and show where it needs to be cut.*
Cutting the steel with a hacksaw		*We were trained on how to use a hacksaw safely and then we cut out the shape of the trowel head using the hacksaw.*
Filing the steel	 	*We used a flat file to smooth the sharp edges of the steel and round them to make the trowel safe.*
Heat treating the trowel head		*We heat treated the steel to make it more malleable and then we bent it using an anvil and a hammer to shape it like a trowel head.*

STEP	IMAGE	DESCRIPTION
Filing the handle bar		*We used a flat file to smooth one end of the steel bar and make them round so that they could be assembled with the main handle.*
Grinding the handle bar		*We ground one end of the steel bar into a point so that they could be assembled with the main handle.*
Heat treating the handle		*We heat treated the steel bar and used a hammer and an anvil to flatten the other end of the bar so it could be welded to the trowel head.*
Turning the handle on the lathe.		*We turned a metal handle for the trowel using the lathe. We used the lathe to shape the handle to be comfortable to grip and the correct size.*

Label each image with the correct process:

Skill	H&S considerations	Description	Tools used	Quality checks for process
Spot welding				
Metal bending press				
Turning & Knurling				
Milling				
Press Cast				
Sand Cast				
Forging				

Skill	H&S	Description
Spot welding	Goggle, leather gloves, apron	Join two pieces of steel using spot welding technique.
Metal bending press	Goggles, apron	Mark out and bend a right angle using sheet metal.
Turning & Knurling	Goggles, apron	Create a handle shape and add a textured finish using aluminium.
Milling	Goggles, apron	Face off aluminium bar.
Press Cast	Goggle, leather gloves , apron	Pour molten pewter into a laser cut mould.
Sand Cast	Goggle, leather gloves , apron	Create a sand mould and cast pewter.
Forging	Goggle, leather gloves , apron	Flatten steel bar using the forge.