Technology: Risk Assessment **MIG Welding**  JUNE2016

**This is a generic Risk Assessment that must be modified to suit your place of work**. The Risk Assessment modifications should take into consideration the activity, age/stage/pupil ability, department/working environment and the experience of the teacher in charge. If Control Measures Required as described are implemented the risk is reduced to an acceptable level for mainstream students.

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| **Identify the Hazards** | **Who is at Risk?** | **What is the Harm?** | **Activity Taking Place** | **Control Measures Required** | **Additional Information** |
| **Employees should be made aware of the following hazards.**1. Incorrect Input Current2. Mechanical Damage3. Unsuitable Equipment4. Electric Shock5. Earthing6. Ultra-Violet Radiation7. Skin Burns8. Fumes Hazard9. Reflective Surfaces10. Pacemakers11. Signage12. Finger Trap13. Sharp Materials14. Wire Size15. Gas Nozzle Blockage16. MIG Pliers17. Auto Feed Wire Setting18. Hot Metal Quenching | Technology teachers, technicians and pupilsTechnology teachers, technicians and pupils.Technology teachers, technicians and pupilsTechnology teachers, technicians and pupilsTechnology teachers, technicians and pupilsTechnology teachers, technicians and pupilsTechnology teachers, technicians and pupilsTechnology teachers, technicians and pupilsTechnology teachers, technicians and pupilsTechnology teachers, technicians and pupilsTechnology teachers, technicians and pupilsTechnology teachers, technicians and pupilsTechnology teachers, technicians and pupilsTechnology teachers, technicians and pupilsTechnology teachers, technicians and pupilsTechnology teachers, technicians and pupilsTechnology teachers, technicians and pupilsTechnology teachers, technicians and pupils | **Incorrect input current increases the risk of electrocution or equipment damage.****Work piece earthing conductor can be damaged through misuse or over-tightening of the bolts or screw clamps.****Appropriate welding equipment should be BS or ISO marked.****Welding equipment can present an electric shock hazard and suitable storage should be provided as damp conditions will increase the risk of electric shock.****Incorrect earthing or no earthing can lead to electrocution of the user.** **Sparks or UV radiation can cause burns to skin, eyes and clothes.****Contact with jewellery (especially metallic) increases the risk of skin burns****Hazardous fumes can be produced whilst welding.****Reflective surfaces can reflect the bright lights from welding tasks towards others in the room.****Welding machinery and tasks can affect wearers of pacemakers.****Correct safety signage must be present in the workshop for welding.****The wire holder within the welding equipment casing rotates and poses a finger trap hazard.****The use of 3mm – 6mm thick metals or sheet metal means the presence of sharp corners and can lead to skin cuts on hands and fingers.****MIG welding wire size should be known prior to welding.****The gas nozzle can be blocked by blackened carbon, splatter or residue.****MIG pliers have sharp edges and can cause cuts on hands and fingers.****Selecting the auto feed makes the wire continuously exit the reel.****Quenching hot metal leads to the holding of hot metal and the creation of steam.**  | MIG WeldingMIG WeldingMIG WeldingMIG WeldingMIG WeldingMIG WeldingMIG WeldingMIG WeldingMIG WeldingMIG WeldingMIG WeldingMIG WeldingMIG WeldingMIG WeldingMIG WeldingMIG WeldingMIG WeldingMIG Welding | **Persons supervising work in welding areas should be trained to a standard as specified in the Health and Safety Training Standards in Design and Technology [N1], or should have equivalent recognised qualifications to industry standards.**The mains supply circuit and connections to metal inert gas (MIG) welding equipment, should be able to supply the required input current. Only equipment with open circuit output voltages of less than 50 V a.c. or 120 V d.c. should be used.The work piece earthing conductor should be robust enough to withstand possible mechanical damage, and should be connected to the work piece and a suitable earth terminal by bolted lugs or secure screw clamps.The amount of wire within a MIG system should be checked before starting to weld.Newer welding equipment should have an identification symbol (two circles within a shield) or should be marked with the appropriate standard number.Welding should be carried out in dry workshop surroundings with dry equipment.Welding outdoors must be individually risk assessed and deemed safe by the school. Welding equipment should be stored in a suitable dry department area.Care should be taken when putting down the electrode holder, which might be live; to prevent contact with other earthed objects (especially other earthed electrical equipment).Suitable eye protection, conforming to the appropriate BS EN 175 and 169 standards, should always be worn by anyone involved in any form of welding, and by any other persons nearby who are watching the persons. Where screens are used, or if a separate welding bay is used, there should be adequate supervision of those doing the welding and other learners who might be present in the room.The welding areas used for any form of arc welding should be separated from other work areas by fixed or portable screens, or suitable curtains that protect persons nearby who are not wearing suitable eye protection from the arc glare.The welding helmet should be adjustable ion head size for different pupils. The Auto Adjusting Lenses should be preset before welding begins. Users should remove all personal jewellery (especially rings, bracelets and metallic watchstraps) before carrying out any welding.Long sleeve jacket or overalls should be worn along with gauntlets to cover skin.Welding gloves/gauntlets should conform to BE EN 12477 Welding Standards.LEV should be used where available and required. LEV should be left on after welding until any fumes have been removed from the workshop.Metal-arc welding should be carried out in areas that are non-reflective and are curtained or screened-off.Wearers of vital electronic medical equipment (e.g. pacemakers) should consult their doctor before beginning any arc welding, cutting, gouging or spot welding operations.Signage should be present in a school workshop stating the presence of welding equipment and the mandatory use of PPE.**Compressed gas signage must be present on the main access door of the workshop where welding is taking place to inform emergency services prior to their entry should an incident take place.**The casing door of the MIG welding equipment can be opened to reveal the wire holder. The casing door should be closed whilst in use and the supervising teacher/technician should change wire when required.Wearing of gloves/gauntlets can reduce the risk of skin cuts. Pupils should be made aware of sharp corners during induction and demonstrations and safe moving of metals.Typically the bigger the gap between the two pieces of metal being welded together, the big the size of wire should be used. If the school only has limited wire sizes, then the weld may require more material to successfully weld.The gas nozzle should be checked for any blockage prior to use. If it requires cleaning or maintenance, it should be removed immediately and replaced. Cleaning the gas nozzle should be performed if necessary before welding. If it requires cleaning after welding, then allow the nozzle to cool down first before removal.MIG pliers are commonly used to trim off excess wire which may have become bent or covered by residue. Wearing gloves or gauntlets can reduce the risk of cuts during use. MIG pliers should not be left on the edge of a work surface as the risk of them falling off is increased.Some MIG welders have an auto feed option. The auto feed option should be explained during induction and demonstrations. This feature should only be used when the user has become confident with using the MIG welder.Hot metal should be quenched in water to cool it down. The metal should be held using tongs and the sink/metal bucket should be within reasonable distance from the weld area.Quenching of metal cylinders/tubing increases the risk of directing the steam towards the holder over the metal. | **This document is to be used along with ‘General Welding & Welding Installations’ from the SSERC website.**Reference BS 4163:2014Manufacturer’s instruction guide should be followed and kept within the department for future reference.A suitably qualified electrician should be consulted to ensure that the electrical supply will be able to cope with the current demands of the equipment.New equipment should be trialled to gauge correct (or as close to correct) settings.Best practice is to have a poster display near the welding area with a quick reference guide on V settings and wire speed.Welding equipment should be checked over before use. Keeping the hot welding nozzles and wire away from cables/insulation will reduce the damage risk.Regular maintenance will reduce the risk of electric shock.All welding equipment should be included in a planned annual maintenance programme that should include any appropriate safety tests.Donated equipment or equipment which cannot be originally sourced should not be used for welding in schools.An insulated container or an insulated hook should be provided to support the electrode holder. When welding is finished, the power supply should be switched off and the electrode removed from the holder.SSERC recommends using a welders helmet or shield rather than a hand held welding mask as it allows two hands to be free at all times.A variation is size of PPE clothing may be required to accommodate pupils of various sizes.Free copies of the correct signage are available for downloading from the SSERC website.The casing door to the wire holder should always be closed before welding. **NOTE 1** Older types of welding equipment require the work piece to be earthed as well as the welding return lead. This is to provide protection against internal insulation failure of the welding transformer, by keeping the work piece at or near to earth potential until the protective device (e.g. a fuse) operates to cut off the mains supply. Newer equipment does not require the work piece to be earthed because the internal insulation is reinforced.**NOTE 2** Ultraviolet and infra – red radiation can cause “arc eye”, a painful (but usually temporary) eye condition. The glare from the electric arc has the potential to cause damage to the eyes.**NOTE 3** The electrical currents used in arc welding can induce currents in jewellery high enough to cause partial melting. **NOTE 4** Electromagnetic fields can affect the operation of pacemakers and other electronic medical devices.**NOTE 5** The coating of electrodes will give rise to fumes, as will any paint or surface contaminants on the metal being welded. There is a particular risk of flames if galvanised steel is welded. |

**Safety Signage to be displayed in workshop**

