SAFETY MANUAL

Wenatchee Valley College

WELDING LAB

Welding Safety Manual

INTRODUCTION:

1. The first goal of the WVC Welding Program is to provide and maintain a safe facility for students to work in. Maintaining the lab and repair of all items is to be done only by authorized WVC employees.
2. The second goal is to teach students safety standards to follow while in the lab. These include:
   A. Student responsibilities in personal dress and required personal safety items. (safety glasses, gloves, etc.)
   B. Student responsibilities in housekeeping and preventing safety hazards.
   C. Student responsibilities in proper action around known facility items that have potential to produce serious or fatal injury. These are the oxygen-acetylene supply lines in the gas welding bays, and the high-pressure cylinders located at various places outside and inside the lab.

PRIMARY LAB RULES:

1. The instructor must be present before students can use the equipment in the welding lab.
2. Students may NOT work on any equipment or tool items.
3. Students may NOT change the function on any welder—use ONLY as it is set up.
4. Students may NOT change the function on any metal working tool – dies, punches, or benders.
5. Do NOT change, remove, or alter any safety guard on tools or equipment.
6. Use only the tools and equipment items that you have received training on and have received the instructor's permission to use.
7. Sweep and clean after you finish working in an area.
8. Do NOT create any safety hazards.
9. Keep walking areas and exits clear.
10. Report unsafe situations, damaged equipment, and accidents immediately to the instructor.
11. Do NOT use any damaged equipment/item.

OVERVIEW OF SAFETY AND HEALTH CONCERNS:

1. **Injury from falling:**
   A. By tripping over items laying on the floor—electrical cords, hoses, etc.
   B. By sliding on grinding dust; electrodes, metal pieces, and liquids on the floor.
   C. By attempting to climb or stand on chairs, ladders, or tables.

2. **Injury from electrical shock:**
   A. By touching the activated electrical parts of a welding machine with bare hands. Do NOT open any welding machine doors or covers—FATAL electric shock can occur!
   B. By installing electrodes in the holder without wearing gloves.
   C. By becoming a part of the welding circuit—between the electrode holder and the ground.
   D. By trying to weld while the gloves, clothing electrodes, or floor is wet.

3. **Puncture:**
   A. Sharp metal pieces can puncture hands or body parts.
   B. Airborne projectiles from grinders and other sources can cause punctures.
   C. Compressed air can puncture the skin—causing injury or possible death by air entering an artery.
   D. The plasma steam from a plasma cutter can pierce all the way through a finger, hand, or other body part.
   E. Airborne projectiles from grinders, drills, damaged chop saw blades, broken or mismatched punch dies—these can cause serious and even fatal injuries!

4. **Burn Injuries to the body parts and eyes:**
   A. Slag popping off of finished cooling weld—burning, puncturing eyes or face.
   B. From hot metal or welding electrodes.
   C. From oxy-fuel welding and cutting torches.
   D. From arc welding radiation-burning exposed skin and unprotected eyes.
   E. From the arc of plasma cutters.
   F. Excessive accumulation of acetylene in the air from unskilled torch users or gas leaks in the equipment.

5. **Cuts, abrasions, pinches, crushing amputations:**
   A. From moving machine parts-saws, grinders, drills.
   B. From sharp metal and electrode supply canisters.
   C. Drills, band saws, and similar rotating or turning parts can catch gloves, hands, arms, and pull the person into the machine interior causing severe or FATAL injury.
   D. Fingers, hands, arms can be cut off by metal shears, band saws, punches.

6. **Injury from explosions caused by ruptured supply pipes or high-pressure cylinders:**
   A. Oxygen supply lines and cylinders can explode when heat is applied to them, or they are punctured.
   B. Acetylene lines and cylinders can explode if heated, punctured, dented, or placed on their side instead of standing upright.

C. Acetylene can become unstable and explode in the supply lines and equipment if it is allowed to exceed 15 PSI after it leaves the supply cylinder.
D. The acetylene cylinder can become unstable and explode if the contents withdrawal rates exceed the amount listed in cylinder safety instructions. This is the reason a manifold system is used when multiple torches are in use. CAUTION—all three cylinders must be opened when the WVC gas welding bays are in use!

7. **Injury from cylinders can occur when the top closing attachment is broken off:**
   A. The cylinder can become a rocket and travel at a fast speed and force for long distances. It can cause FATAL injury to anyone in its path.
   B. Cylinder safety use directions must be followed at all times. Securing, transporting, or using on portable welders, must be done within all safety guidelines.

8. **Injury from exploding pressure regulators and oxy-fuel torches:**
   A. Unsafe torch use can allow low pressure acetylene to travel past the flashback arrestors on the oxygen line and enter the oxygen pressure gauge. Heat from the newly installed high pressure oxygen cylinder entering the gauge can cause the regulator to explode.
   B. Torches can have a flame flash back allowing the flame inside the torch which will cause the torch to explode. Never lay the torch down and leave unattended while it is lit.

9. **Ear damage:**
   A. From excessive noise, hot metal sparks, and airborne particles. Ear protection must be used at all times.

10. **Air pollution:**
    A. Welding and cutting fumes, airborne metal particles from grinders.

11. **Injury from high frequency:**
    A. Microwaves and magnetic fields.
    B. Individuals with heart pacemakers must not enter the welding lab.
    C. Signs are posted at all entrances.

****The WVC Welding Safety Manual focuses on these listed hazards and gives safety directions on each one. Students must follow these directions to keep the lab safe, themselves safe, and the others working around them safe.

STUDENT PERSONAL SAFETY:

1. **EYE PROTECTION: (projectiles, heat glare, and arc welding radiation)**
   A. Airborne projectiles: safety glasses must be worn at all times in the weld lab. They must be worn in addition to other gear like face shields and gas-arc welding helmets. Prescription glasses must be SAFETY glasses and have attached side shields.
   B. Face shields used in addition to safety glasses when grinding, chop sawing, and drilling.
   C. Shaded goggles or face shields must be used when oxy-fuel welding and cutting.
   D. Shaded goggles or face shields must be used when plasma cutting.
   E. Shaded arc welding helmets must be worn when arc welding. These protect the eyes and face from arc welding radiation.

2. **EAR PROTCTION: (noise, hot sparks, foreign particles)**
   A. Ear plugs must be worn at all times in the weld lab to protect from noise, hot sparks, and airborne particles.
   B. Students must grind in the grinder rooms to minimize noise in the rest of the facility.

3. **HANDS: (cuts, burns, heat, sparks, and arc radiation)**
   A. Heavy welding gloves that extend up past the wrists must be worn when gas and arc welding, gas welding, and plasma cutting. These protect the hands and fingers from arc welding radiation, heat, and sparks.

4. **FEET: (sparks and slipping)**
   A. Leather shoes that extend up past ankles to protect from sparks.
   B. Non-skid type soles to prevent slipping on floor.
   C. No tennis shoes—cloth can catch fire causing man-made materials to melt and stick to the feet causing intense burns.

5. **HEAD: (sparks and heat)**
   A. Welder's cap should be worn to protect head and hair from heat and sparks. Students with long hair should take measures to cover it before working in the lab. Long hair that is not covered can catch on fire!
   B. Welder's bandanas are ok also. NO baseball caps under arc welding helmets.

6. **FACE: (airborne projectiles and arc welding radiation)**
   A. Clear safety shields must be worn when grinding, punching, chop sawing, drilling. This is to protect the face from airborne projectiles.
   B. Arc welding helmets must be worn to protect the face from arc radiation burn. Small, tinted glasses do NOT protect the face.

7. **THE BODY: (protect from sparks, heat, arc radiation, sharp objects)**
   A. Pants should be full length cotton jean type fabric to protect against arc radiation, heat, and sharp objects. No man-made fabric. Full-length jeans required at all times.
   B. Shirts should be full-length and long sleeve cotton fabric. Cotton clothing that catches fire can be put out. Man-made fabric melts and sticks to the skin causing burns. It can NOT be removed like a cotton shirt.
   C. Clothing that is frayed or has exposed loose threads can easily catch fire by sparks. Do NOT wear this type of clothing.
   D. Short sleeve shirts can be worn when the student is not arc welding, oxy-fuel welding and cutting, and plasma cutting.

8. **THE LUNGS: (smoke, fumes, airborne particles)**
   A. The south wall exhaust fan should always be used when arc welding in the weld lab. The north wall exhaust fan should always be turned on when using the gas area, the two GTAW rooms, and the three grinder rooms. It also pulls in fresh air for the grinder rooms.
   B. The exhaust fans extract smoke and arc welding fumes from the weld lab and from the fabrication room. Doors should be opened in the fabrication room if there seems to be a build-up of smoke and fumes from welding and plasma cutting.
   C. Do NOT position the head over the metal being cut or welded. Stay to one side and let the smoke and fumes rise to the exhaust fan.
   D. Do NOT use the chop saw inside the facilities. It is on a table with wheels—take it outside to use. It fills the air with airborne metal particles.
   E. Do NOT cut or weld on painted or galvanized metal.
   F. Do NOT grind or sand rusty metal inside the lab facilities. Take it outside.
   G. Students should purchase and use particle masks to use when grinding and chop sawing.

9. **THE BACK:**
   A. Students should not lift items over thirty pounds.

**** This manual references the required safety items students must purchase. These are safety glasses, gloves, and welders hat. The college provides arc welding helmets, clear safety face shields, tinted goggles—face shields for gas welding and cutting and plasma cutting. The college also furnishes ear plugs. Please review the course syllabus for a complete list and detailed information about supplies/safety items.

**** Textbooks provide the tinting—shade darkness for all the welding and cutting helmets and goggles.

**** Arc welding helmets that are damaged or have cracked dark lenses should not be used.

**** Auto-darkening arc welding helmets that blink off and on or do not darken must not be used.

**** Students must remember that each activity has required safety training and specific equipment items.

STANDARD PROCEDURES:

1. **Instruction methods to teach knowledge and skill of welding to students:**
   A. Teach lecture.
   B. Textbooks.
   C. Hobart welding videos.
   D. Instructor demonstration.
   E. Written assignments.
   F. Written handouts.
   G. Information on the chalk or eraser board.
   H. Online resources.

2. **Facility safety and housekeeping is taught by:**
   A. Instructor lecture.
   B. Safety manual.
   C. Written cleaning rules.
   D. Written handouts about exits, fire extinguishers, emergency procedures, etc.

3. **Instruction to operate lab tools and equipment items in a correct and safe manner:**
   A. By video.
   B. By written safety and operation written material in this manual.
   C. By personal instruction from the instructor.
   D. This manual includes all tools and equipment, pictures, and information.
   E. This manual is available online at WVC Commons website.

4. **Correct and safe use of all hand tools, clamps, mig tools, squares, tape measures:**
   A. By instructor presentation.
   B. By video.
   C. By written information in this manual.

5. **Reminder:**
   A. The skill of welding is taught in the manner listed in ITEM #1. The safety and operating instructions are different. The safety instructions are how to turn it on and use it.

Scotchman Metal Worker Operation-WVC

Supplement to video Information. Does not void or replace information on the video.

1. Use the Dial Off-On only when running the machine off to lock it out for servicing. Use the Push-Pull switch for normal use.
2. Keep hands free of machine at ALL times. Do **NOT** lean on the machine or sit on it. It can cycle even after it is turned off.
3. Do **NOT** lay metal, tools, or other items on the machine.
4. Do **NOT** change any hole punching dies without the instructor present and giving directions.
5. Do **NOT** change any of the function attachments—like the bender, angle shear, etc. without the instructor present and helping.
6. Do **NOT** remove/change any safety guides.
7. Motor oil is used as a lubricant for the shear and punch mechanisms. Apply a small amount with the paint brush every 5 to 7 cuts.
8. Do **NOT** stack metal to shear, punch, or bend. Do **ONLY** one at a time. However, the machine is capable of shearing more than one metal piece if they are laid side by side and are within the limits of the capability of the machine.
9. Material to be punched must be **LESS in thickness** than the **diameter** of the punch intended to be used. The tonnage of the machine will cause the punch to break and become a projectile causing fatal injuries to the operator and those in the work vicinity.
10. This machine is designed for **"mild steel"**. Metal that is harder will cause machine damage and serious injury to personnel in the work vicinity. Armor plate, T1, Tool Grade Steel, Heat Treated Steel, Tools, Bolts, Cement Nails, Horseshoes, etc., are all harder than **"mild steel"**. Do **NOT** attempt to use any of these items on the machine.
11. Wear gloves, safety glasses, and ear protection at all times when operating this machine.
12. The operator of this machine must be qualified and well trained in the operation of the machine. The operators must be aware of the capacities of the machine and the proper use of the hold down devices, stripper and guards.
13. All of the guards, adjustable restrictors and awareness barriers must be installed on the machine and kept in good working order. Promptly replace worn or damaged parts with authorized parts.
14. Never place any part of your body into or under any of the machine's moving parts, stripper or hold devices.
15. Strictly comply with all warning labels and decals on the machine. Never remove any of the labels. Replace worn or damaged labels promptly.
16. Always disconnect and lock out the power when performing maintenance work or setting up any tooling on the machine. Follow the procedures outlined in the operator's manual for setting up, changing, or aligning any tooling on this machine.
17. Never operate this machine with dull or damaged tooling. Promptly replace worn punches, dies, and blades.

18. Practice good housekeeping. Keep the area around the machine clear and well lit. Do not obstruct the operator's position by placing anything around the machine that would impede the operator's access to the machine.
19. Never modify this machine in any way without the written permission of the manufacturer.
20. Always operate the flat bar shear and tooling station from the operator's side (the side the electrical control is mounted on). Always operate the punch and notching station facing the station.
21. Set up a program of routine inspections and maintenance for this machine. Make all repairs and adjustments in accordance with the manufacturer's instructions.