Miller
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HOBART
WELDING PRODUCTS

LINCOLN ELECTRIC

Welding Merit Badge

Prerequisites

- 1a. Explain to your counselor the hazards you are most likely to encounter while welding, and what you should do to anticipate, help prevent, mitigate, or lessen these hazards.
- 2b. Describe the appropriate safety gear and clothing that must be worn when welding. Then, present yourself properly dressed for welding—in protective equipment, clothing, and footwear. c. Explain and demonstrate the proper care and storage of welding equipment, tools, and protective clothing and footwear.
- 5a. Research stick welding and TIG welding, and make a list of the different components of the equipment required for each process. Discuss one advantage and one limitation for each process.

Prerequisites

7. Do the following: a. Find out about three career opportunities in the welding industry. Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor, and explain why the profession might interest you. b. Discuss the role of the American Welding Society in the welding profession.

Requirement 1

1. Do the following: a. Explain to your counselor the hazards you are most likely to encounter while welding, and what you should do to anticipate, help prevent, mitigate, or lessen these hazards. b. Show that you know first aid for, and the prevention of, injuries or illnesses that could occur while welding, including electrical shock, eye injuries, burns, fume inhalation, dizziness, skin irritation, and exposure to hazardous chemicals, including filler metals and welding gases.

Requirement 1

Personal Hazards: Fume inhalation (Welding fumes contain a variety of metals, including aluminum, arsenic, beryllium, lead, manganese, argon, nitrogen, carbon dioxide, carbon monoxide, hydrogen fluoride, and hexavalent chromium gases are often are produced during welding. Welding fumes can cause serious health problems for workers if inhaled, according to OSHA), UV radiation, electrical shock, heat issues (the average weld is at 3,000 F - 10,000 F), and fire.

Prevention: Inspect PPE before use to make sure it is up to code (no holes, thinned fabric, FR clothing) and wear it properly.

Requirement 2

2. Do the following: a. With your counselor, discuss general safety precautions and Safety Data Sheets related to welding. Explain the importance of the SDS. b. Describe the appropriate safety gear and clothing that must be worn when welding. Then, present yourself properly dressed for welding—in protective equipment, clothing, and footwear. c. Explain and demonstrate the proper care and storage of welding equipment, tools, and protective clothing and footwear.

Requirement 2

SDS: A safety data sheet is a document that lists information relating to occupational safety and health for the use of various substances and products.

PPE needed: A welding helmet fixed shade or auto-darkening, welding beanie, face shield, safety glasses, and/or safety goggles may all be required throughout the day in order protect a welder's head. FR long pants, closed-toed shoes (preferably work boots), shirt and jacket and gloves (not loose, not synthetic, long sleeve). Eye and face protection provided to employees should comply with ANSI Z87. 1-1989 and head protection must meet ANSI Z89. 1-1986 standards.

Proper care and storage:

Requirement 2

Requirement 3

3. Explain the terms welding, electrode, slag, and oxidation. Describe the welding process, how heat is generated, what kind of filler metal is added (if any), and what protects the molten metal from the atmosphere.

Requirement 3

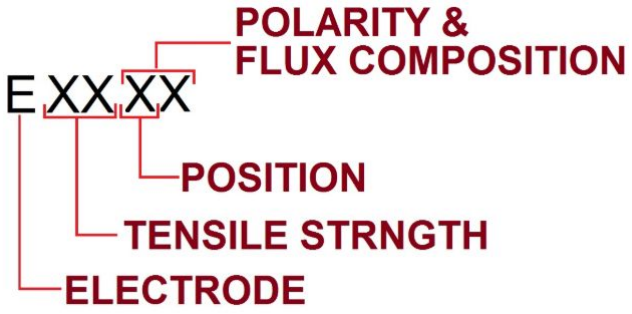
Welding: To join together, usually metal or plastics, by heating the surfaces to the point of melting using a blowtorch, electric arc, or other means, and uniting them by pressing, hammering, etc.

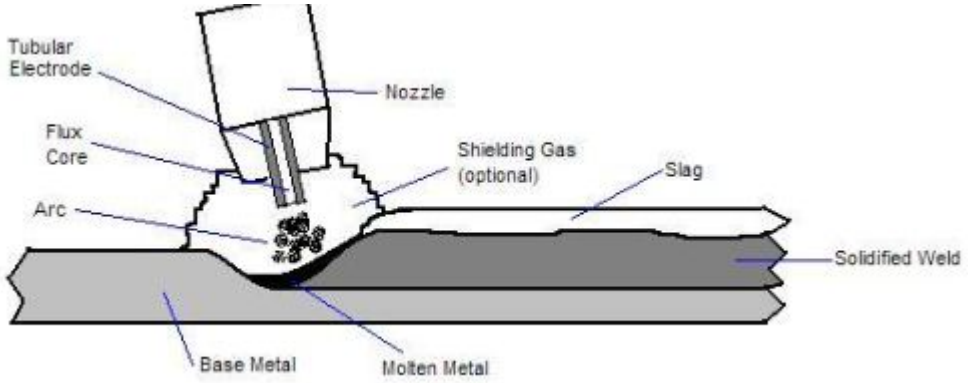
Electrode: A conductor through which electricity enters or leaves an object, substance, or region.

Slag: Welding slag is a form of slag, or vitreous material produced as a byproduct of some arc welding processes, most specifically shielded metal arc welding, submerged arc welding, and flux-cored arc welding.

Oxidation: the reaction of metal and oxygen

Requirement 3





Requirement 4

4. Name the different mechanical and thermal cutting methods. Choose one method and describe how to use the process. Discuss one advantage and one limitation of this process.

Oxy-Acetylene: **How To Set Up and Operate a Cutting Torch (link)**

Angle grinder**:** **How to use an angle grinder (link)**

Requirement 5

5. Do the following: a. Research stick welding and TIG welding, and make a list of the different components of the equipment required for each process. Discuss one advantage and one limitation for each process. b. Set up the MIG welding process, including gas regulators, work clamps, cables, filler materials, and equipment settings. Have your counselor inspect and approve the area for the welding process you have chosen.

Requirement 5

Stick Welding

Pros:

- Stick welding is effective even when it's windy or raining
- The equipment required is not very expensive
- It needs no external shielding gas; money saver
- It's less sensitive to paint, corrosion, and dirt
- It's easy to change rods for different metals
- The ground clamp can be attached far from the welding point

Cons:

- Compared to other methods of welding, stick welding is slow
- It is time-consuming to chip away the slag that formed during the weld
- It can be difficult to weld thinner metals
- The welding rods must be replaced more frequently than in other types of welding
- There can be excessive spatter, rough surfaces, and porosity with stick welding

Requirement 5

MIG Welding

- Versatility
- Fast production speed
- High quality welds
- Lower amounts of weld spatter
- Works on a wide variety of metals
- Easy to learn

- Challenge with thick materials – MIG welding can lead to incomplete fusion if the proper procedure is not used for the thickness of a metal that you are welding
- Contaminants
- Best used inside
- Limited positions
- Complex equipment

Requirement 5

TIG Welding

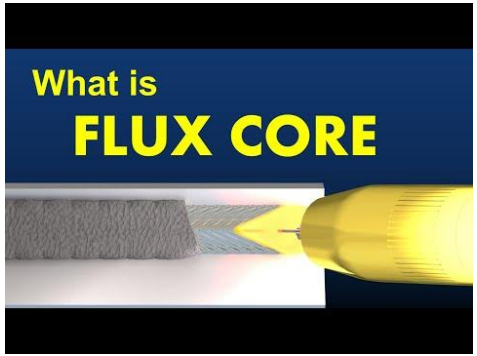
- Non-consumable electrodes
- No flux is required because inert gas shields molten metal.
- High quality
- Cleaner and more appealing joints.
- They are suitable for welding of very thin sections.
- A wide range of metal can be welded. Nonferrous metals like aluminium, copper and dissimilar metal can be welded without any challenge.
- Non-corrosive and ductile joints.
- Less distortion due to small heat zone.

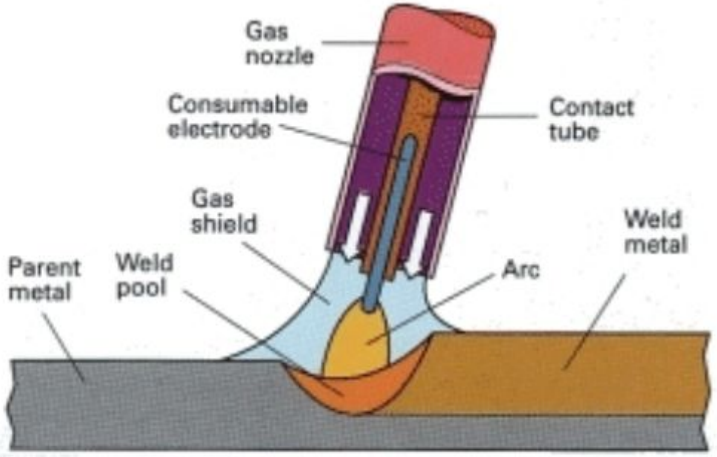
- TIG is a time-consuming process
- More complicated
- Safety issue - Welders, are exposed to high intensity of light which can cause eye damage.
- High initial cost.
- It cannot use in thicker sheets of metal.

Requirement 5

MIG and Stick welding

Requirement 5





Requirement 5

Requirement 7

7. Do the following: a. Find out about three career opportunities in the welding industry. Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor, and explain why the profession might interest you. b. Discuss the role of the American Welding Society in the welding profession.

The American Welding Society (AWS) plays a vital role in advancing the welding industry by fostering knowledge, setting standards, and providing professional development opportunities. It serves as a central hub for welding professionals, educators, and students, offering resources and support for career advancement and industry growth.

Requirement 6

6. After successfully completing requirements 1 through 5, use the equipment you prepared for the welding process in 5b to do the following: a. Tack two plates together in a square groove butt joint. b. Cover the two plates (approximately 3" x 3" x ¼") with weld beads side by side. c. Tack two plates together in a lap joint, have your counselor inspect it, then weld a lap joint with fillet weld on both sides. d. Tack two plates together in a T joint, have your counselor inspect it, then weld a T joint with fillet weld on both sides. e. Using a metal scribe or soapstone, sketch your initial onto a metal plate, and weld a bead on the plate following the pattern of your initial.