

Haley Hensley

Course: Agricultural Mechanics

Unit Title: Introduction to Oxy-Acetylene

Materials: Oxy-Acetylene welding torch, gloves, welding face shield, striker, various metal, spray cheese and crackers

**I. Lesson Title**

- a. Introduction to Oxy-Acetylene

**II. Situation**

- a. This is an Agricultural Mechanics class that has just finished up laboratory safety and is beginning oxy-acetylene welding. These students are 9<sup>th</sup>-12<sup>th</sup> grade and may have little to some knowledge of oxy-acetylene welding.

**III. Teachers Objectives**

- a. Describe and demonstrate the set-up and shut-down process for an oxy-acetylene cutting torch with 95% accuracy.
- b. Demonstrating igniting the acetylene gas and properly adjusting the flame with 90% accuracy.
- c. Demonstrate cutting metal with the oxy-acetylene torch with 90% accuracy.

**IV. Teaching Procedures**

**a. Interest approach**

- i. Teacher will need to set our parts of the oxy-acetylene torch parts for students to ID.
- ii. Students will write down the answers on a sheet of paper and will discuss the correct answers in the lesson when talking about the torch.

**b. Reasons to Learn**

- i. Why is it important to set-up and shut-down the oxy-acetylene welding torch the correct way?
- ii. Why should we make sure the flame is correct before cutting metal?

**c. Questions to Answer**

- i. What is the correct way to set-up and shut-down the oxy-acetylene welding system?
- ii. What should the correct flame look like before welding?

**d. Answers to Questions**

*i. Setting up and shutting down the Oxy-Acetylene System*

1. Turn the valve on the top of the oxygen tank all the way open.
  - a. *Why do we double check to make sure the tanks are secured to the cart? (A) Because we don't want the tanks falling over.*
2. Turn the valve on the acetylene tank  $\frac{1}{4}$  to  $\frac{1}{3}$  of a turn to open.
3. Check to make sure that the oxygen valve on the torch is closed.
4. Fully open the oxygen valve on the torch handle by turning it counterclockwise.
5. Slightly open the cutting torch oxygen valve so that a very slight oxygen flow is started.

6. Light the torch by making a spark lighter at the end of the cutting tip while also opening the acetylene valve slightly.
7. Adjust the two valves (cutting torch oxygen and acetylene) until the strongest flame is obtained. The flame should have a short, bright blue flame at the torch tip and no yellow in the flame.
8. Adjust the acetylene regulator to approximately 10 psi. Turn the screw in to increase the pressure and out to decrease it.
9. Adjust the oxygen regular in the same manner to pressure in the 40 to 60 psi range.
10. Adjust the acetylene and oxygen valves as necessary to maintain the correct flame.

ii. Striking the Cutting Torch

1. Open the acetylene torch valve about one-quarter turn. Light the acetylene with a spark from the “striker”. Do not use matches or a butane lighter.
2. Adjust the flame, using the acetylene torch valve until the flame has just lost its “smoky” quality. If the flame “blows out” or blows away from the tip of the torch, the valve is too far open. If the flame jumps away from the torch, you have it too far open. Close the valve a bit and then slowly reopen.
3. Slowly open up the oxygen torch valve. A small, pointy flame very close to the torch will appear. This is call the “inner cone”. At the same time, a distinct, blue flame will begin to appear at the end of the flame. Continue to slowly open up the oxygen torch valve until the distinct blue flame has just shrunk to the same size of the inner cone. This is the proper welding flame called a neutral flame.



Image found at: <http://www.twi-global.com/resources/assets/inline/full/0/9545.jpg>

iii. Using the oxy-acetylene cutting torch

1. Ensure that the piece to be cut is positioned so that no part of the support is under the cut line. Cutting torches can cut several inches of steel easily, so anything in the path could be damaged.
2. Hold the torch close to the work. The bright blue portion of the flame should just touch the edge of the area to be cut.
3. Heat the work until the edge started to glow. There may be small sparks to start to come off the metal at this point.

4. Press down on the cutting lever and open it fully. Move the torch along the line you want to cut. The speed of your movement will depend on the thickness of the metal and the size of the tip on your torch. The proper speed will result in a continual stream of sparks as the metal is cut. You should go as fast as you can control the torch and get continual cutting. This will reduce the slag on the cut edge.
5. Shut off the torch when done. Close the acetylene valve first, then the cutting tip oxygen.
6. Close the tank valves.
7. Open the acetylene valve on the torch to purge the gas from the hose. Then press the cutting lever to purge the oxygen hose. Finally, close the oxygen valve on the torch handle.

iv. Demonstrating and evaluating oxy-acetylene cutting

1. Using an oxy-acetylene torch, make a straight and clean cut with proper combination of travel speed, flame height, pressures, torch angle, and flame intensity.
  - a. Use proper tip size for the job
  - b. Opens valves slowly on both tanks
  - c. Check the tanks for leaks
  - d. Set the flow gauge regulars to the correct setting for the tasks
  - e. Adjusts the oxygen and acetylene flow to achieve a precise neutral flame
    - i. Bright blue inner cone
    - ii. No plane orange or "feather" presented
    - iii. No shrill sound or sharper, less bright cone (oxidizing flame)
  - f. Perform the cutting task smoothly without excessive "popping" (caused by an oxidizing flame) and "blow back"
  - g. Use appropriate cutting guides when needed
  - h. Finished cut should be straight, smooth, and clean
  - i. Proper cutting technique (little or no slag at the bottom of the cut)
  - j. Proper height of tip above material (no black band on the cut edge)
  - k. Proper travel speed and oxygen pressure (top of cut edge is not rounded)
  - l. Neutral flame is maintained (no splatter buildup on tip)
  - m. Properly shuts down the torch and tanks

**V. Testing Solution Through Application**

- a. Students will practice making a cut with the oxy-acetylene cutting torch. Instructor will monitor the students throughout the start-up and shut-down process as well as the cutting procedures.
- b. Students will then evaluate their peers work. Students will need to correctly explain what caused the mistakes when evaluating.

**VI. Closure**

- a. What are the proper start-up and shut-down procedures for the oxy-acetylene cutting torch?
  - i. See sections above
- b. What should the proper flame look like?
  - i. A small, pointy flame very close to the torch will appear. This is call the “inner cone”. At the same time, a distinct, blue flame will begin to appear at the end of the flame. Continue to slowly open up the oxygen torch valve until the distinct blue flame has just shrunk to the same size of the inner cone. This is the proper welding flame called a neutral flame.

*Allow time for discussion*