

Lesson 5: Welding Out of Position

**Welding a Butt Joint in the Horizontal Position**

**Objective:** Students will observe how to weld a butt joint in the horizontal position using a shielded metal arc welder.

**Directions:** Use an arc welder to weld a butt joint in the horizontal position.

**Materials and Equipment:**

SMAW machine and  
accessories  
Chipping hammer  
Wire brush  
Helmet\*

Safety glasses or goggles  
Leather gloves and any other protective clothing  
recommended by instructor  
SMAW electrode(s), selected by instructor  
Mild steel plates, selected by instructor

\* Everyone participating in or observing the demonstration should wear appropriate protective eyewear.

**Procedure:**

1. If needed for review, demonstrate welding in flat position before welding out of position. Possible exercises include striking and maintaining an arc, running beads, and welding butt and fillet joints. (See *Agricultural Mechanics Unit for Agricultural Science I*, Unit V Lesson 3, AS 1 through 5 for these demonstrations.)
2. Inspect equipment, materials, and work area to ensure safe and correct operation.
3. If necessary, bevel plates to be welded and explain the beveling procedure for horizontal welds. For horizontal welds, if most or all of the beveling is done on the top piece, the bottom of the joint can act as a shelf for the weld material.
4. Wear appropriate face and eye protection and protective clothing.
5. Set up and turn on the machine. Explain any differences in setup, such as current setting or electrode diameter, for welding in horizontal position.
6. Cover up and remind those in the area to do so as well.
7. Tack weld the pieces together, leaving approximately a 1/16-in. gap between the pieces.
8. Clean slag from the tack welds.
9. Secure the pieces in the horizontal position. If beveling was necessary, the beveled or more beveled piece should be on top.
10. Strike an arc and demonstrate the correct procedure for welding the joint.

- a. Hold the electrode 5 to 10 degrees below a right angle to the work and tilted approximately 20 degrees in the direction of travel.
  - b. Generally, the arc length used for horizontal welds is shorter than that used for flat welds.
  - c. A stringer bead is generally recommended for the initial (root) pass.
11. Remove the slag from the weld.
  12. Run additional passes if needed to complete the weld, cleaning the weld between each pass. A weaving pattern can be used to distribute heat if needed.
  13. Clean the final pass and inspect the weld. If desired, have students examine the weld when it is safe to do so and remind them that the weld should have the same qualities as those of flat-position welds. The completed weld should blend evenly with the base, should have uniform ripples for the length of the weld, should go through to the bottom of the base, and fill the groove completely from one edge to the other.
  14. Remove the electrode from the holder and observe safety, shutdown, and cleanup procedures.
  15. Assign the student version of AS 1 to be performed by the students.