UNIT 14

Running a Bead with Welding Rod

Purpose of Welding Rod

Welding rod (also called filler metal) is used to fill a groove weld or create a fillet weld by melting or fusing additional metal into the weld joint. Welding rod is used in most oxyfuel gas welding work. ***Fusion*** occurs when the metal to be joined is heated and becomes molten (liquid). The molten areas of the weld joint then flow together. Welding rod may be melted and fused into the joint to provide added strength.

This unit will describe the technique for handling the rod and torch in running straight beads, a process similar to creating a continuous weld pool. See **Figure 14-1**. The difference between the two processes is that the addition of welding rod produces a convex weld bead rather than a flat or concave weld pool.

Coordinating and manipulating the welding rod and welding flame requires practice. With experience, you will be able to consistently produce beads with uniform width and height that meet American Welding Society standards.

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Figure 14-1. Mastering the technique of coordinating the welding rod and welding torch to run straight, evenly rippled beads takes much practice.

Preparing the Equipment and Material

Before beginning the process of running a bead with welding rod, the following preparations must be made:

1. Study the practice plan, **Figure 14-2**.
2. Cut several pieces of the required material, and remove any burrs and sharp edges.
3. Clean the surface of the sheet metal with a stainless steel brush.
4. Use soapstone or chalk to draw a straight line down the center of each steel strip, **Figure 14–3**. More than one line can be drawn on each practice piece, depending on the width of the piece.
5. Position the work on a firebrick table so you can comfortably weld using the forehand method.
6. Obtain several lengths of 3/32″ (2.4 mm) diameter mild steel welding rod.
7. Select a tip size based on the thickness of the material you are welding.

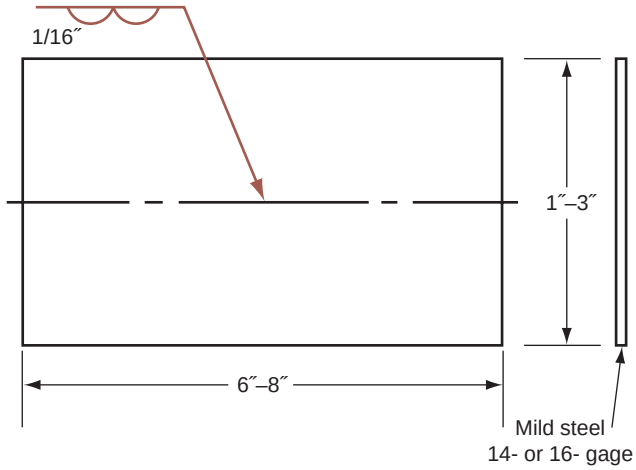

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Figure 14-2. Plan for running a bead with filler metal.

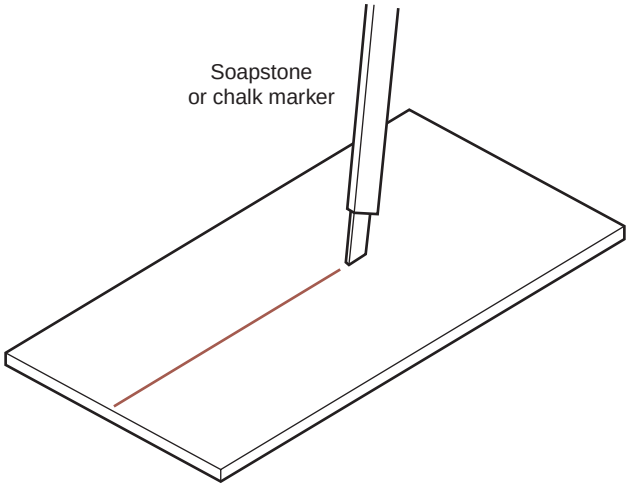

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Figure 14-3. Use a soapstone or chalk marker to draw lines on material for running beads.

Procedures for Running a Bead with Welding Rod

Follow these procedures for running a bead with welding rod:

1. Set the oxygen and acetylene regulators for 6 psig (40 kPa) of pressure. Light the torch and adjust the flame to neutral.
2. Bring the flame down to the metal surface to form a molten pool near the right-hand edge. Use a circular motion to begin the pool. Hold the torch at a 0° work angle and a 35° to 45° travel angle. This is the same torch position used to create a continuous weld pool.
3. After the pool is formed, move the torch in a circular or semicircular pattern. Begin dipping the end of the welding rod into the molten pool. The welding rod should be held at a 0° work angle and 45° travel angle opposite the torch along the weld axis, **Figure 14-4**.
4. Slowly move the molten pool along the chalk line using a continuously circular motion while adding filler metal to the weld pool. Allow the flame to move around the rod to melt both the rod and base metal. A gentle up-and-down motion of the rod along the weld axis at a 45° travel angle will produce a rounded bead with an even ripple and good fusion. (Refer to **Figure 14-4**.) Be sure not to move the rod too far away from the weld pool. It should always remain within 1/4″ (6 mm) of the pool so it does not cool excessively.

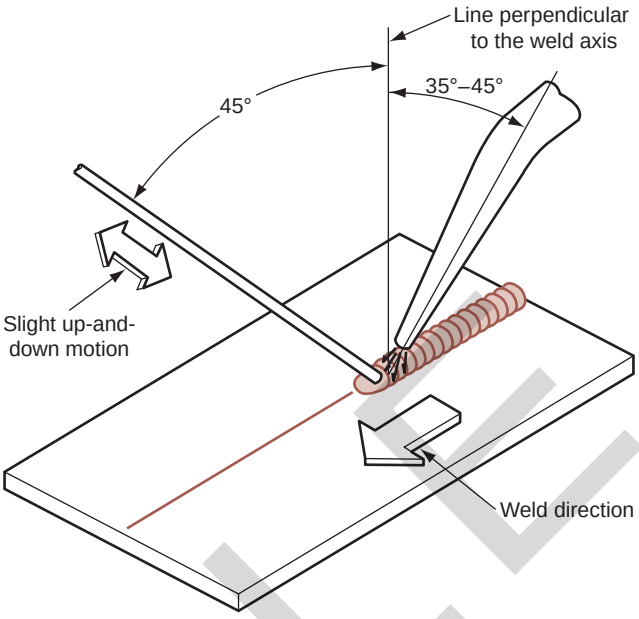

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Figure 14-4. The method for adding filler metal when running a weld bead. The torch motion is the same as for creating a weld pool.

5. Run a continuous bead the full length of the metal. The travel speed should be slow enough to produce a uniform 3/8″ (9.6 mm) wide convex bead. If the rod becomes too short or the flame goes out, start again by forming another molten pool at the last ripple. Continue welding. **Note:** Do not throw away short pieces of welding rod. Place them end to end on the firebrick and fuse them together with the torch. Allow them to cool before using.
6. End the bead by fusing enough rod into the weld pool to keep the same bead height. Maintain a constant travel speed and rod motion to obtain uniform bead width and good fusion. The weld should penetrate approximately 25% of the metal thickness.
7. Continue running practice beads until you can consistently make them to acceptable standards. See **Figure 14-5**.

Running a Bead with Filler Metal on Thick Steel

Welding on heavy steel plate presents some new challenges. Thicker metal requires more heat to produce a quality bead. Also, running beads on

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Figure 14-5. A good example of running a bead with filler metal. Note the straightness, good penetration, and uniform bead size and shape.

thick steel requires more complex torch and rod motions. Practice is needed to properly coordinate the torch and welding rod to form acceptable beads with good penetration.

Since more heat is required, a tip with a larger orifice is needed. Select the correct tip size according to the manufacturer's specifications for the equipment used in your shop.

Procedures for Running a Bead on Thick Material

Follow these procedures for running a bead on thick steel:

1. Repeat the steps described in this unit for preparing the equipment and material. Use 1/4″ (6.4 mm) steel plate and 1/8″ or 3/16″ (3.2 or 4.8 mm) diameter RG45 or RG60 welding rod.
2. Direct the flame on the right-hand edge of the plate and form a molten pool. Add welding rod and begin welding.
3. Hold the torch at a 0° work angle and a 15° travel angle, **Figure 14-6**. Form a bead approximately 1/2″ (13 mm) wide. The 15° angle is used on thick steel to deliver more heat to the welding surface.
4. Because of the width of the weld pool on thick steel, weave the torch and rod as shown in **Figure 14-7**. As the torch is moved to one side of the pool, weave the rod to the opposite side.
5. Complete the weld and examine the finished bead. Check for straightness, even ripple, complete penetration, and fusion at the edge of the bead.
6. Continue running practice beads until you can consistently make them to acceptable standards. To conserve metal, use both sides of the plates for practice welding.

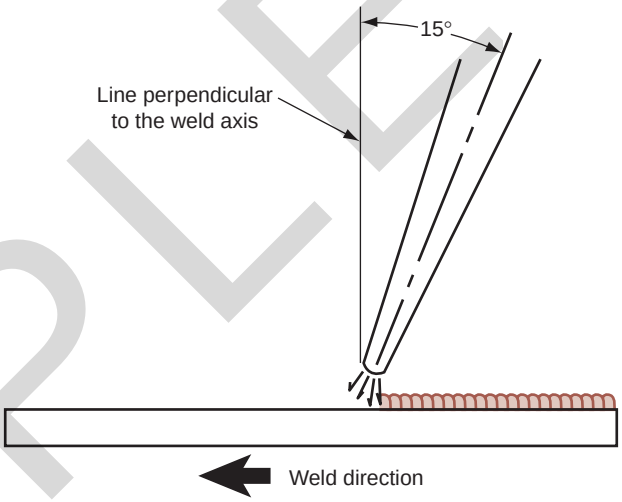

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Figure 14-6. The torch is held at a 15° travel angle when welding on thick steel plate.

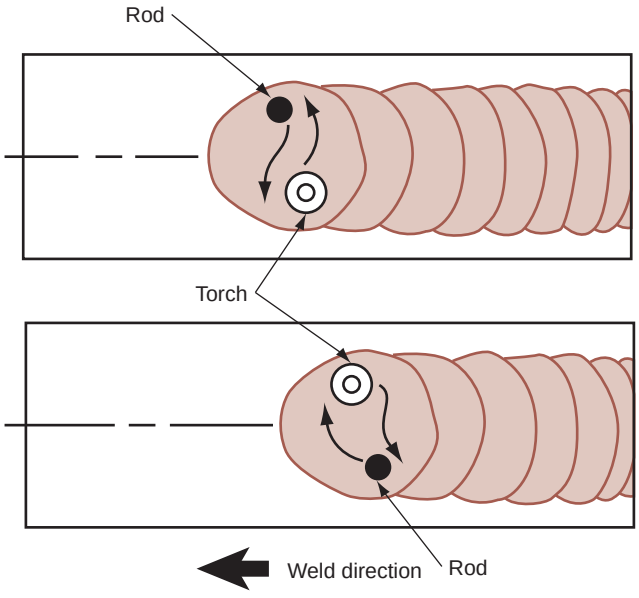

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Figure 14-7. The weaving motion of the torch and rod maintains a wide weld pool and provides deep penetration.

Name _____ **Date** _____ **Class** _____

Check Your Progress

Write your answers in the spaces provided.

1. What is welding rod used for?

   _____

   _____

2. How is the process of running straight beads different from creating a continuous weld pool?

   _____

   _____

3. What is the technique for producing a rounded bead with an even ripple and good fusion?

   _____

   _____

4. What should you do if the welding rod becomes too short or the flame goes out before completing the weld bead?

   _____

   _____

5. Welding rod is expensive. Instead of throwing away short pieces, how can you make use of them?

   _____

   _____

6. Good penetration of the weld bead is approximately _____ percent of the metal thickness.

   _____

7. When welding thick steel plate, hold the torch at a travel angle of _____.
   A. 15°
   B. 45°
   C. 60°
   D. 80°

8. When running a bead on thick material, move the torch to one side of the weld pool and weave the rod to the _____ side.

   _____

9. After completing the weld, examine the finished bead for the following characteristics:
   A. _____
   B. _____
   C. _____
   D. _____

10. Why should you use both sides of the plates when practicing running beads?

    _____

    _____

Name _____ **Date** _____ **Class** _____

Things to Do

Carefully examine the weld beads you made on your practice pieces. When you have completed the practice pieces, list any problems and their causes on the chart provided. Refer to **Figure 14-5** for comparison.

Problems	Causes
Example: Bead not straight.	*Did not follow chalk.*

Notes