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How To Weld

Thermoplastic material that can be softened or shaped by heat with an electric hot air/gas Welder is normally weldable. This lightweight, hand-held equipment makes it easy for even the inexperienced user to develop the "feel" for welding plastic and to do it economically and with speed after only a few hours of study and practice. Whether fabricating thermoplastic stock or repairing various types of plastic parts, hot air/gas welding is usually performed on plastics with a minimum thickness of 1/16" or more. The bond achieved, depending on the type of weld, is generally as strong (90%) as the original material.

When welding thermoplastics, using a rod that is the same material as the base plastic will produce the strongest weld possible.

After following the step-by-step instructions from the manufacturer of the Welder and plastic materials, you will be ready to begin welding. Hot air/gas welding is safe because there is no flame, spark, or smoke involved. Observe these simple precautions:

1. Never attempt to perform hot air/gas welding with a flammable gas. (Inert gas only!)
2. To avoid burning out the Heating Element, always remember **AIRFLOW FIRST AND AIRFLOW LAST!** Start the airflow before the Heating Element. Set the airflow between 3-1/2 to 4 P.S.I. to prolong the life of the Element.
3. Never touch metal parts on the Welding Gun until they have cooled.
4. Always use pliers to change the tip on a Welding Gun. (**DO NOT OVERTIGHTEN!**)
5. Disconnect the electricity to the gun but continue the airflow. The gun will cool faster and the electric Heating Element will last longer.
6. Do not put the Welder in a vise to change Heating Element!

Once you have reviewed all the safety regulations for your Welder, it is time to set up your welding equipment:

1. Connect your Welding Gun to a clean, dry air supply (compressed air) or an inert gas.
2. Most Welders can be plugged into any 115-volt AC outlet. A ground is provided and should be used. Now that you have your air supply flowing, plug into the electrical source and allow the Welder to warm up for several (3-4) minutes before starting to weld.
3. Be sure to select the proper Welding Tip: Tacking Tip - for fitting up the work. No Rod or Strip is required for tacking. Round Tip - for small areas. Automatic Feed Tip - for speed and larger areas.
4. Always use pliers to install and remove Tips. Again, do not overtighten!

While your Welder is heating up, you can take the time to prepare the material you will be welding:

1. Determine whether the type of weld requires a beveled edge.
2. If beveling is required, perform the beveling with a grinder and/or table saw. Bevel a 60 degree angle.
3. Clean dust and dirt from materials to be welded. To remove oily substance, use Methyl Ethyl Ketone (MEK). Be sure materials to be welded are dry before starting to weld.

Once all your materials are prepped, you are ready to begin welding. Most welders begin by tack welding which is a temporary weld:

1. After you have installed the Tacking Tip, allow the hot air/gas to flow through the Tip to heat it up.
2. While the Tip is heating, line up the pieces to be welded.
3. No Rod or Strip is required for tack welding. Apply the hot Tacking Tip to the area or seam where the plastic pieces are to be joined.
4. Do enough tack welds to hold the weight of the pieces together. With large pieces, it may be necessary to draw the Tacking Tip along the entire seam, fusing the work continuously. This will hold the seam together properly for accurate permanent bonding which will be performed during the next phase.
5. Avoid overheating the tack points. This causes the plastic material to discolor, char, or warp. If you are not satisfied with the welds grind the tack points down to smooth the edges.

After tack welding all your material you are ready to begin your permanent welds. Basically the same types of welds are performed in hot air/gas welding as in metal welding. These consist of butt welds, fillet welds, lap joints, edge welds, and corner welds. Whether using a Round Tip or an Automatic Feed Tip, the following procedures should be followed:

1. Before starting the permanent weld, be sure to select the right type of Welding Rod (or Strip). It must be the same type of plastic as the base plastic. Usually the manufacturer of the plastic material will label the plastic type for easy identification. If you do not know what type of plastic you are welding, refer to a burn test chart to identify the material you are going to weld. (Call factory)
2. For maximum welding economy, select a Rod diameter size close to the thickness size of the base material. For base material thickness greater than 3/16", more than one rod will be necessary. Example: In order to weld the beveled area between two base material sheets of 1/4" thickness, three 5/32" Rods will be required.
3. Select the proper welding temperature and air flow setting.
4. Install the proper Round or Automatic Feed Tip for permanent welding. Allow the Tip to heat properly. If you change from the Tacking Tip to the Round or Automatic Feed Tip while the Welding Gun is hot, be sure to unscrew the Tips using pliers. Do not overtighten; it should be snug only!
5. Cut the end of the rod at a 60 degree angle. Hold the cut end of the rod just above the weld starting point. Apply heat to the rod end and the base material seam at the same time until both are tacky. Press the tacky end of the rod down into the tacky starting point of the base materials. Only the surface of the rod and base materials will be tacky, but will bond properly. The rod will continue to hold its basic shape, for the most part, throughout the welding work.
6. Continue the weld, holding the rod at a 90 degree angle directly above the weld seam, pressing firmly and evenly, down into the weld joint as you apply heat in the direction of the weld seam with a short fanning motion. As the rod and base material become tacky, if

- you are welding at the proper temperature, a loop will form where the rod joins the base materials and small beads will form on either side of the complete weld.
7. At the end of the weld, cut the rod with a knife or pliers at a 30 degree angle. Cut the end of the new rod at a 60 degree angle to continue.

There should be no charring, discoloration, or warping if proper heat is applied. There should be no stretching of the Welding Rod. This will weaken the rod bond and can be avoided by taking care to press directly down on the rod rather than pushing the rod along the direction of the weld seam.

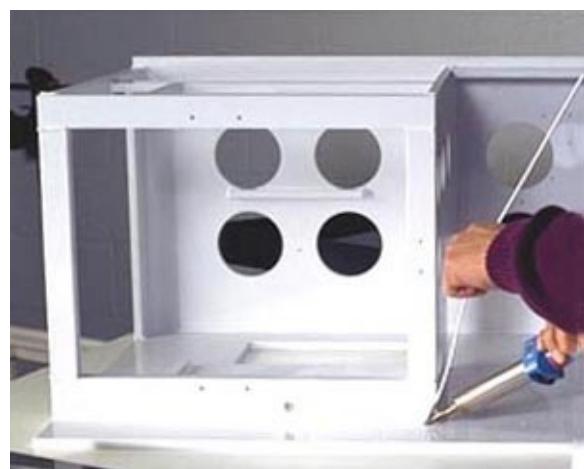
A few hours of practice welding will give the "feel" for maintaining the right even pressure on the rod straight down into the weld area.

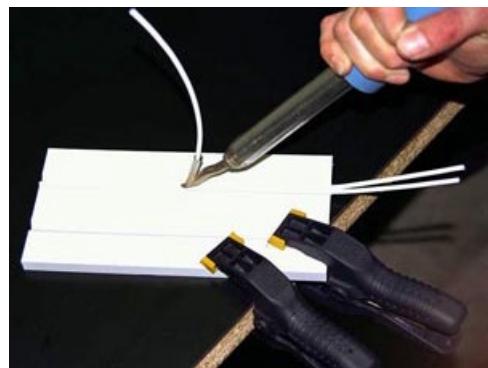
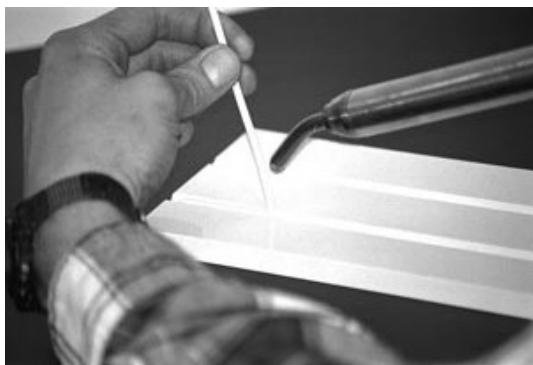
If using an Automatic Feed Tip for high speed welding either the rod or strip is fed through the tip; which makes it unnecessary for the welder to hold the rod or strip in hand while welding is performed. Performing high speed welding, moving the welder at proper speed, can join approximately 2-3 feet per minute. Seams, joints, or repair areas can be as strong or stronger than the original or base material welded (90% or better, depending on the type of weld applied).

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When performing high speed welding, remove Welding Rod from feeder tube immediately when weld is complete. Always clean the rod feeder tube with Feeder Tube Brush before and after completion of weld.

After all the welding has been completed unplug the electricity to the welder, but allow the air to flow through for several minutes (3-5 minutes) to cool the element. Clean your work area up so it will be ready for your next project. After your welds have cooled (5-10 minutes) test your welds by either filling your container with water or testing it with a leak detector. If you have any leaks repeat the above procedures.





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