Dissecting 9 common stick welding problems

1. **Spatter**

   Two of the most common causes of weld spatter are welding with an arc length that is too long and welding on a dirty surface. An arc length that is too long can cause a ball to form on the end of the electrode. Spatter happens when that ball detaches and drops into the puddle. Also, failing to clean the base material can result in weld contamination that also leads to spatter.

   Spatter also can result from a welding current that is set too high; arc blow; or if you weld with a wet, unclean, or damaged electrode.

   If you're frequently dealing with spatter, try adjusting your weld current and maintaining the correct arc length. Be sure to clean the base material before you weld and follow the filler metal manufacturer's recommended oven storage and reconditioning to prevent the electrode from picking up moisture.

2. **Porosity**

   Starting the weld with unclean base material is also a common cause of porosity. Oil, grease, moisture, rust, or mill scale on the metal can contaminate the weld with impurities. Properly cleaning the base material before welding and storing welding electrodes properly can help prevent this.

   Porosity also can be caused by excessively long or short arc lengths, so it's important to maintain the proper arc length. An arc that's too long means you're not getting to a point where the shielding atmosphere is protecting the weld. The recommended arc length varies by electrode diameter. Weld data sheets often note the recommended lengths — typically no more than the diameter of the core wire.

   In addition, a welding current that is too high causes the weld pool to freeze before the gas can escape, resulting in porosity. Using a travel speed that's too fast can cause similar problems because you're essentially outrunning your gas coverage. Adjust your speed accordingly.

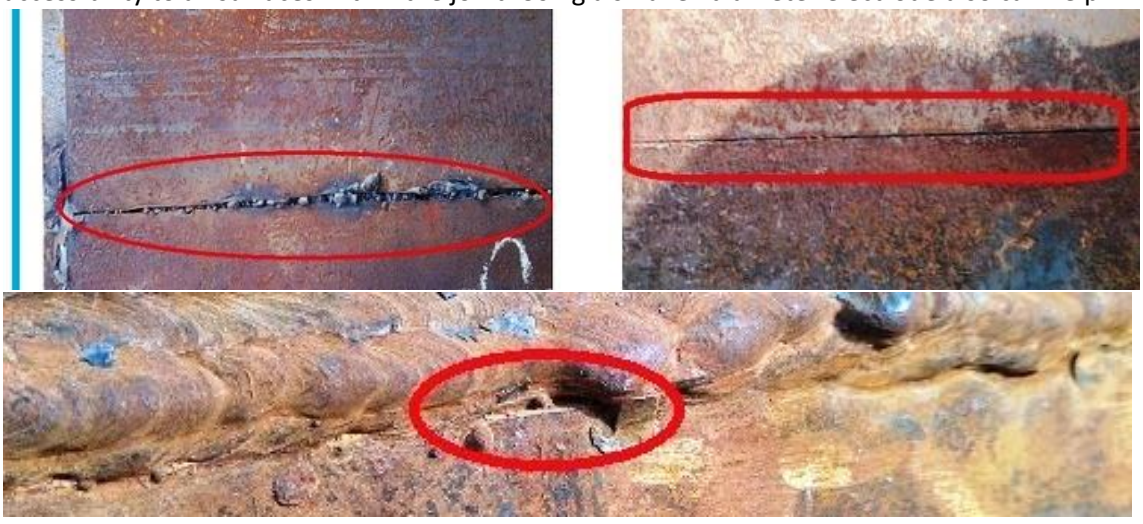
3. **Lack of fusion or Poor Penetration**

Lack of fusion occurs when there is no fusion between the weld metal and the base material surface. Poor penetration is similar in that the weld bead doesn't fully penetrate the entire thickness of the base material or fully penetrate the weld toe.

Both can occur when the welding current is set too low and doesn't provide enough amperage to penetrate the joint, or when the joint is designed poorly or when the joint preparation is faulty.

Lack of fusion or poor penetration happens when your travel speed is too fast, if your electrode is too large for the joint, if you aren't using the correct electrode type, or if your electrode angle is incorrect.

To remedy challenges with both lack of fusion and poor penetration, reduce your travel speed and increase the welding current. Also, be sure that the weld design allows electrode accessibility to all surfaces within the joint. Using a smaller-diameter electrode also can help.



4. **Undercut**

Undercut—when the joint is not properly filled in—results in a groove or eroded section. Using a welding current that's too high or travel speed that is too fast is a common cause of undercut. A too-fast travel speed means you're not staying in position long enough to properly fill the joint. Arc blow and faulty electrode manipulation also can result in undercut.

To avoid this, be sure to pause at each side of the weld bead when using a weaving technique. Also, use correct electrode angles, reduce travel speed, and use the proper welding current for the electrode size and welding position.

5. **Overlapping or Over welding**

Overlap occurs when the molten weld metal runs over the surface of the base material and cools without fusing. This typically is caused by slow travel speeds and staying too long in the puddle, resulting in more weld metal than necessary filling the joint. An incorrect electrode angle or using an electrode that is too large can cause overlapping too.

To prevent this, increase your travel speed and use proper work angles as recommended by the filler metal manufacturer. Also, use a small electrode to prevent adding too much molten metal into the joint.

6. **ARC Blow**

Magnetic arc blow happens when there is an unbalanced magnetic field during welding or there is an excessive magnetism in either the part or the fixture. This can happen in an electric system when it magnetizes itself.

Arc blow can happen when welding toward or away from the ground clamp. The closer you get to the ground, the more the arc will wander. This is called backward arc blow. Forward arc blow occurs in the presence of the unbalanced magnetic field when welding away from the ground.

To prevent arc blow, change the location of the ground connection on the workpiece. It also helps to reduce the welding current and arc length and use alternating current.

7. **Trouble Striking ARC**

   If you are just learning SMAW, it can be common to face problems with the electrode sticking to the workpiece. When striking the arc, be sure to strike the workpiece and lift the electrode at the same time.

   Certain electrodes may seem easier to strike than others. For example, E7018 electrodes seem to stick more than other types, while deeper-penetrating electrodes such as E6010 and E6013 typically don't stick as much because they have more drive to their arc.

   Take care when using low-hydrogen E7018 electrodes. They should be oven-stored to prevent moisture pickup. Moisture absorbed in these electrodes will increase hydrogen in the weld and result in cracking.

8. **Burn Through**

   Burn through is, literally, burning through your metal so that filler protrudes out the other side, or in more extreme cases, where you're left with a hole.

   What causes it?

   Too much heat in one concentrated area
   Too high an amperage
   Too slow a travel speed

   How can you prevent or fix it?

   Turn your amps down
   Increase your travel speed
   If you've put a hole in your metal, there are two things you can do
   you're going to need to start again from scratch and grab some new metal, or
   you can adjust your settings, fill the hole in, grind it down and then weld over it as if it was never there

9. **Convex or Concave Weld Bead**

   A convex or concave weld bead is generally a sign that something is not quite right with your weld. If the correct settings and technique have been used, the weld should lay flat (mitre) against the parent metal.

   What causes it?

   A convex (or ropey) bead is caused by
   Not having enough heat to properly flatten the weld at the same time as,
   Travelling too fast

A concave bead is caused by
Too much heat
Travelling too slow

How can you prevent or fix it?

Adjust your settings and travel speed to suit your parent metal (UNIMIG machines all come with a settings guide)
Make sure you're using the proper welding technique: push for gas and pull for gasless