LESSON PLAN

Date_____ Trade:- WELDER

Name_____ Unit/Lesson:- Thirty Two

Subject:- Edge Preparation and fit-up for CO_2 Welding various thickness of metals. GMAW Defects their causes and remedies.

PREPARATION

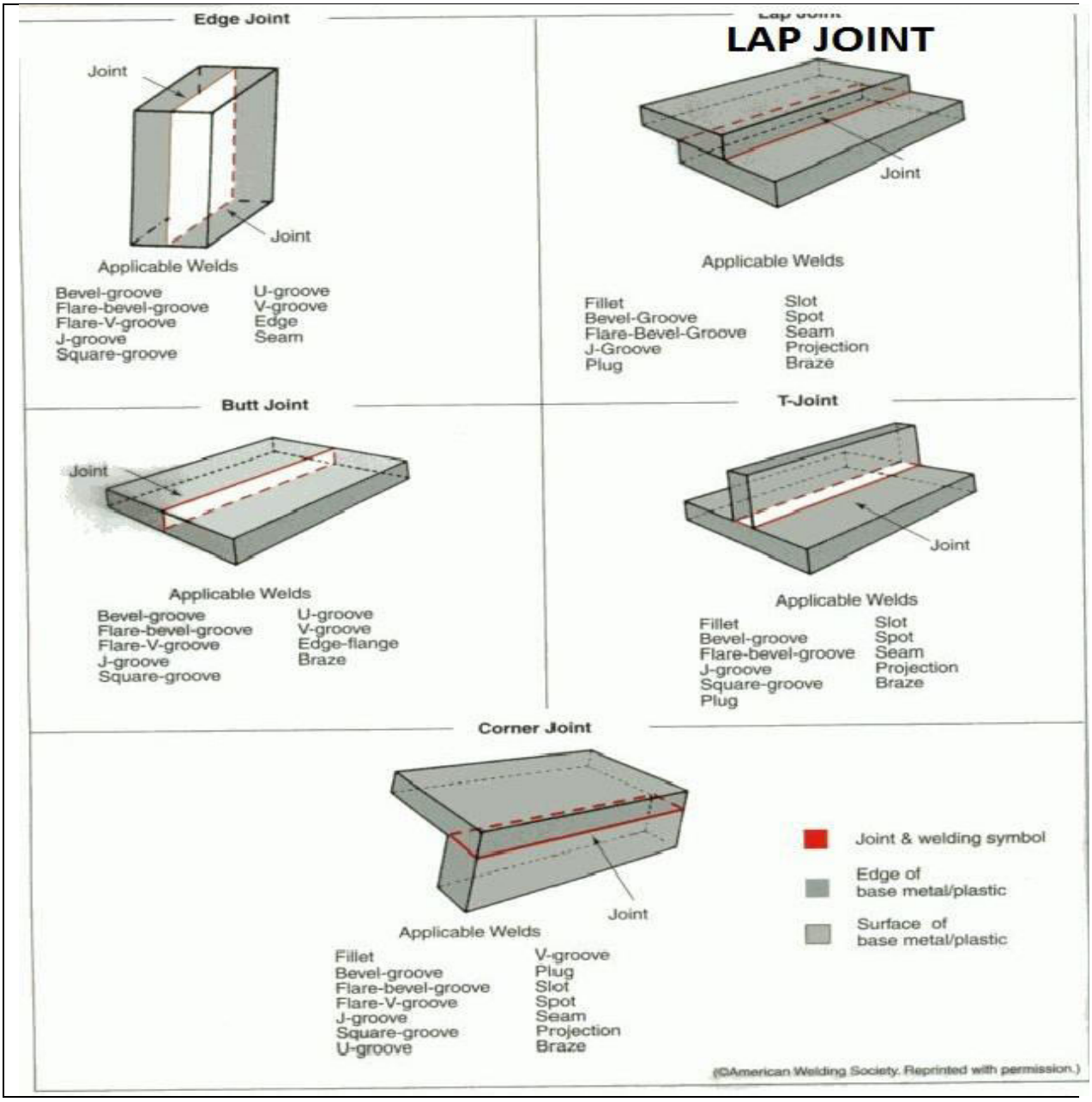
1) (Materials, Tools, Models, Charts and other aids)

Motivation:- In previous lesson we study about Flux Cored welding , uses of flux cored welding and process and parameters .

1) **Introduction:- Today we discuss about importance of edge preparation in MIG welding. Edge preparation is very important in every job. On the behalf of job we select joint type and edge preparation.**

2)

Topic	**Information Point**	**Spot Hint**
Edge Preparation in Base metal	Edge preparation of base metals is very skilled matter and it depend in various point.	
1 According to metal	Edge preparation is mainly depend on types of metal. For example 5mm thick Mild steel and 5mm thick copper required different edge preparation. So this is first and important point.	
2 Thickness of metal	Second important point is thickness of metal. For example5 mm Mild steel no required edge preparation while 8mm or above must required.	
Types of weld or according to weld ability	Type of joints required difference edge preparation. For example 6mm MS flat no edge preparation required in BUTT joint while single bevel required in FILLET joint.	
Some types of edge preparation for all joints shown in fig. below **Butt Joint:-** Single VEE, Double VEE, Single J, Double J, Bevel , Single U, Double U **LAP Joint:-**Fillet lap, Bevel groove, flare bevel groove , J groove and Plug. **Tee Joint:-** Fillet TEE, Bevel groove, flare bevel groove , J groove , square groove and Plug. **Corner Joint:-** Bevel groove, flare bevel groove , J groove , square groove, V groove . **Edge Joint:-** Bevel groove, flare bevel groove , J groove , square groove, V groove .		



GMAW Defects their causes and remedies.

Porosity: There are two types of porosity in welding. Surface and Crater porosity (otherwise known as 'cratering').

Surface porosity happens when you have contamination of the weld resulting from oxygen or other atmospheric contaminants entering the weld.

The reason this happens is usually because your shielding gas is not high enough, or even too high. Or, maybe you decided to MIG weld when it's windy, which is a really bad idea.

Another problem could be that your nozzle is clogged.

The solutions to surface porosity is to clean your nozzle, and make sure you have the right shielding gas settings. And if you decide to work in the wind then get some sort of wind protection.

Cratering: Cratering is a frustrating problem. It happens when you pull from the weld prior to the weld crater becoming solid.

The solution to this mig welding defect is to slow down your rate of travel as when get to the end of your joint.

Another potential solution is to reduce the arc gap.
Cold Lap: A cold lap occurs when when the base metal is not melted well enough. What happens is the weld puddle goes into the base metal that has not been welded yet. Usually this problems occurs when your weld puddle is too big.
A remedy to the cold lap problem is to maintain the arc at the weld puddles leading edge.
You can also make the puddle smaller simply by speeding up your welding travel speed.
Tow other options are to slow the wire feed down a bit, and using a mild whipping technique.
Poor Penetration: Poor penetration is very common in welding. This occurs when you don't have enough heat as you weld. When you don't have enough heat input in the welding zone you can try either a shorter wire stick out, or speed up the wire feed and therefore increase the amperage settings on your MIG welder.
Burn through: This is another very frustrating mig welding defect or problem. It's the opposite of poor penetration. It's when you have too much penetration, or technically it's when you have excessive heat input at the welding zone.
The remedy to this mig welding problem is to slow down the wire feed and therefore reduce your amperage.
Another remedy is to increase your welding travel speed.
Something that some welders do not know is that you can get burn-through when the welds root opening is too large. And the way you fix that is you can lengthen your wire stick out and go back and forth with the torch just a tad.
Weld Whiskers: A whisker is a small bit of electrode that ends up sticking through the weld joint on the root side of it.
This occurs when you get your electrode ahead of the weld puddles leading edge.
You can avoid this issue by snipping off the little nodule or blob on the end of your wire prior to welding. And you can also slow down the travel speed as well use that slight whipping technique we discussed briefly above.
These MIG welding defects are not just associated with MIG welding, they are also common welding problems in most other forms of welding with a few exceptions like whiskers because not all welding is done with an electrode.

Porosity:

Shielding gas protects the molten weld pool from the surrounding atmosphere, which would otherwise contaminate the weld. Figure 1 shows how the lack of shielding gas on steel can cause porosity (pinholes) in the weld bead are formed in the face and weld interior in the absence of shielding gas. Lack of shielding gas can be caused by improper setting on the equipment, a hole in the gun liner or wind blowing the shielding gas away.

FIG. 1. No Shielding Gas on Steel - A lack of or inadequate shielding gas is easily identified by the porosity and (pinholes) in the face and interior of the weld.

FIG. 2

On aluminum, a sooty looking weld (FIG.2) can be caused by using a drag vs. a push technique (FIG. 3, below). The soot can be removed, but cutting the weld open will reveal pinholes where impurities are trapped in the weld. Aluminum builds up an oxide that needs to be removed before welding. Wire brushing is the most common method of cleaning aluminum, but it needs to be done with a stainless steel brush to avoid contaminating the weld with the impurities of a steel brush.

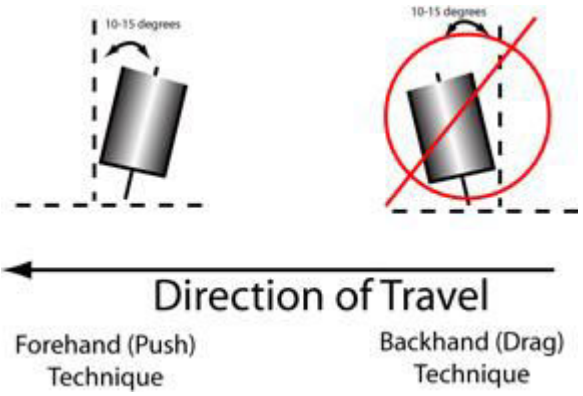


FIG. 3.

Push vs. drag technique. On steel, either pushing or dragging the gun is acceptable, but with aluminum, the drag technique will lead to weld defects.

Lack of Fusion

Lack of fusion can occur when the voltage or wire feed speed is set too low, or when the operator's travel speed is too fast. Because aluminum conducts heat much faster than steel, it is prone to lack of fusion at the start of a weld until enough energy is put into the weld. Some

welding equipment addresses this by automatically ramping up the current at the start of a weld and then decreasing it to avoid too much heat build up.

Craters

With aluminum, craters can form at the end of a weld. If they are not filled in, they create a stress point, which can lead to cracking. This requires the user to quickly trigger the gun again to fill in the crater, although some welding machines offer a crater timer that will fill in the crater when the gun trigger is released.

Burn Through

Too much heat input can be caused by setting voltage or wire feed speed too high or by too slow of a travel speed. This can lead to warping or burn through especially on the thinner materials found in the sign industry, aluminum being more prone to the effects than steel. Generally aluminum requires a faster travel speed than steel to avoid heat build up.

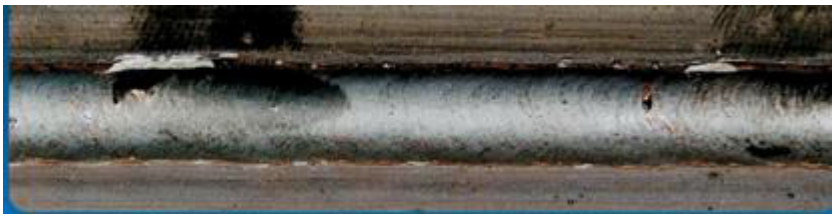
The photo above shows an example of a good weld on steel. Below are photos of a selection of bad welds that can result from a variety of potential problems, including the following:

Voltage Too Low - Too little voltage results in poor arc starts, control and penetration. It also causes excessive spatter, a convex bead profile, and poor tie-in at the toes of the weld.

Wire Feed Speed/Amperage Too High - Setting the wire feed speed or amperage too high (depending on what type of machine you're using) can cause poor arc starts and lead to an excessively wide weld bead, burn-through and distortion.

Wire Feed Speed/Amperage Too Low - A narrow, oftentimes convex bead with poor tie-in at the toes of the weld marks insufficient amperage.

Travel Speed Too Fast - A narrow convex bead with inadequate tie-in at the toes of the weld, insufficient penetration and an inconsistent weld bead are caused by traveling too fast.



Travel Speed Too Slow - Traveling too slowly may produce a large weld with excessive heat input resulting in heat distortion and possible burn through. In most cases, proper travel speed is when the arc is on the leading edge of the puddle.

Voltage Too High: Too much voltage is marked by poor arc control, inconsistent penetration, and a turbulent weld pool that fails to consistently penetrate the base material.

3) Questions

1 Write the two reason of edge preparation?

2 Write the four steps of BUTT joint edge preparation?

3.How differ edge preparation in MS and aluminum?

4. Write two GMAW defects ,causes and remedies ?

4) **Assignment:-** Edge Preparation and fit-up for CO_2 Welding various thickness of metals

Checked By_____ Instructor_____