LESSON PLAN

Date_____ Trade:- Welder

Name_____ Week No:- Eight

Subject :- Arc length-types-effects. Polarity –types and applications. Weld quality inspection, common welding mistakes and appearance of good and defective welds. Weld gauges and its uses.

Motivations:- in previous week we learned about Welding position as per EN and ASME :flat, horizontal, vertical and over head. Weld slop and rotations. Welding symbols as per BIS, AWS and BS.

PREPARATION: - Teaching Aids:-Chalk, Charts,

INTRODUCTION: - Arc length have play a main role in welding. Wrong arc length effected the job and output a weak weld joint.

PRESENTATION:-

Topic	Information Point	Spot Hint
Arc Length	**Distance between electrode tip and job surface called arc length.**	
Types	**Arc length are three types.** **1. Short arc length –under 2 mm** **2. Medium arc length 1.8-2.8 mm** **3. Long arc length above 3.5 mm**	
Detail	**The choice of arc length depend on job and welding position, for example in overhead position we choose short arc length. Arc length should not be more then electrode diameter , if more called long arc and if less called short arc.**	

Arc Length Effects

- Longer arc lengths = increased puddle heat, flatter welds, deeper penetration
- Shorter arc lengths = less puddle heat, flatter welds, less penetration
- Use arc length to control puddle size, penetration, and burn through.
- Normal arc length is 1/16” - 1/8”
- Use a slightly longer arc length during a start or restart.

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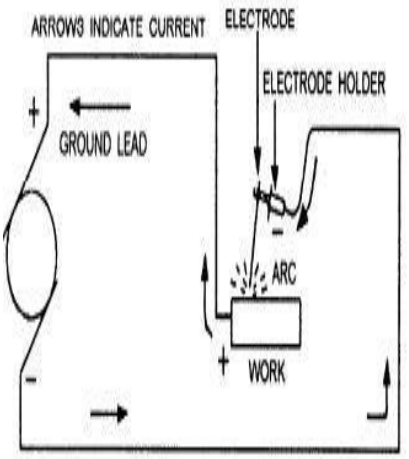
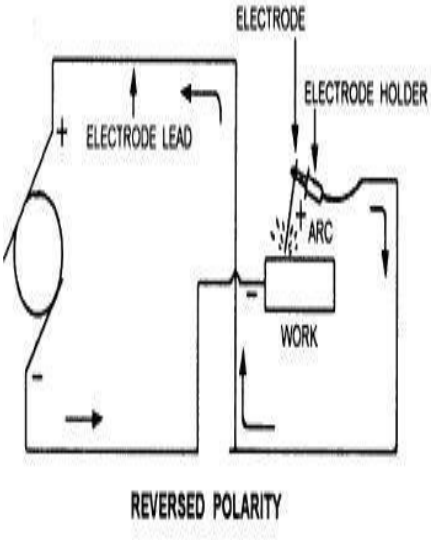
Polarity	In DC welding two polls working negative and positive. Use of these poll called polarity.





CURRENT TYPE	DCEN	DCEP	AC (BALANCED)
ELECTRODE POLARITY	NEGATIVE	POSITIVE	
ELECTRON AND ION FLOW			
PENETRATION CHARACTERISTICS			
OXIDE CLEANING ACTION	NO	YES	YES-ONCE EVERY HALF CYCLE
HEAT BALANCE IN THE ARC (APPROX.)	70% AT WORK END 30% AT ELECTRODE END	30% AT WORK END 70% AT ELECTRODE END	50% AT WORK END 50% AT ELECTRODE END
PENETRATION	DEEP; NARROW	SHALLOW; WIDE	MEDIUM
ELECTRODE CAPACITY	EXCELLENT e.g., 1/8 in. (3.2 mm) 400 A	POOR e.g., 1/4 in. (6.4 mm) 120 A	GOOD e.g., 1/8 in. (3.2 mm) 225 A

Questions:-

1. What is arc length?
2. What is use of short arc?
3. What is polarity?

Weld Quality Inspection:-

Pre-Weld Inspection

This inspection is conducted prior to the start of the welding operation. This type of inspection is typically associated with checking the preparation of the welding joint and verification of parameters that would be difficult or impossible to confirm during or after welding. This is the area of inspection where we can best introduce controls that may prevent defective welding. Some areas of pre-weld inspection are joint preparation inspection/pre-weld setup. This may involve the dimensional inspection of root openings. Root openings that are too tight can cause inadequate root penetration. Root openings that are too large can cause over- penetration. Groove weld bevel angles, if too small, may cause lack of fusion, and if too large, can result in distortion of the weld joint from overheating and excessive shrinkage

stress. Joint alignment (misalignment of the weld joint) can result in difficulty in producing a sound weld and stress concentration at its location, resulting in a reduction of fatigue life. Plate surface condition and cleanliness, pre-cleaning prior to welding, can often be of extreme importance. Improper or inadequate cleaning can result in unacceptable levels of porosity in the completed weld. Other pre-weld inspections may include preheat verification, temperature and heating method, presence and location of heat treatment monitoring devices, and type and efficacy of gas purging, if applicable.

Pre-weld inspection may also include evaluation and verification of documentation, material certification, filler alloy certification, welder performance qualification, welding procedure qualification, and welder and weld identification, for traceability, if applicable.

Inspection During Welding

This is the inspection that is carried out during the welding operation and is concerned mainly with the requirements of the welding procedure specification (WPS). This inspection includes such items as interpass cleaning methods, interpass temperature control, welding current settings, welding travel speed, shielding gas type, gas flow rate, and welding sequence, if applicable. Also, any environmental conditions that may affect the quality of the weld such as, rain, wind, and extreme temperatures.

Post-Weld Inspection

This inspection typically conducted to verify the integrity of the completed weld. Many non-destructive testing (NDT) methods are used for post-weld inspection. However, even if the weld is to be subjected to NDT, it is normally wise to conduct visual inspection first. One reason for this is that surface discontinuities, which may be detected by visual inspection, can sometimes cause misinterpretation of NDT results or disguise other discontinuities within the body of the weld. The most common welding discontinuities found during visual inspection are conditions such as undersized welds, undercut, overlap, surface cracking, surface porosity, under fill, incomplete root penetration, excessive root penetration, burn through, and excessive reinforcement.

Common Welding Mistakes:-

1. Poor preparation. Welder too often fail to adequately prepare the metal before welding," and fail to properly clean the material to be welded, you will end up with a contaminated and weakened weld.

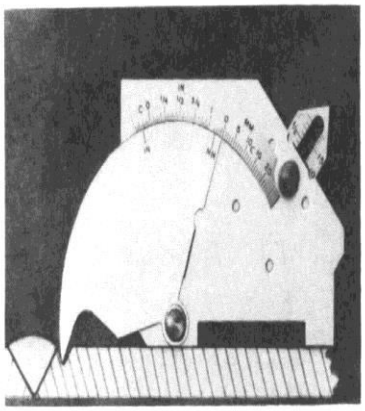
2. Thick materials. "Material over ¼ inch should usually be welded in multiple passes," "Trying to get it all welded in one pass by cranking up the current and moving slowly over the piece will result in the filler metal not properly bonding to the base metal (cold lap)."

3. Worn-out metal. "Sometimes a piece of metal gets weakened to the point that welding it isn't going to solve the problem,"

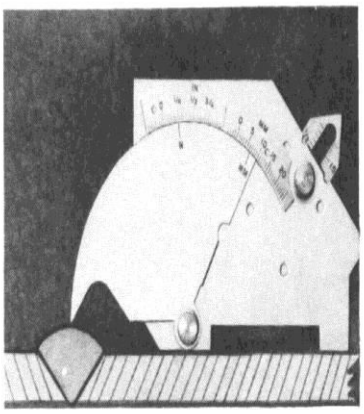
4. Electrode and wire selection "Different stick electrodes are suited to different applications, and using one in place of another can result in poor welding results,"

5. Wrong technique. "Push vs. pull, gun/electrode angle, travel speed, and arc length can all lead to problems," For example, if the rate of travel is too slow, the pool of weld metal will deposit an excess of weld metal.

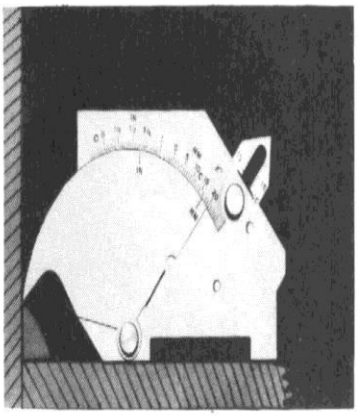
Weld Gauges and Its Use:- It measures angle of preparation, 0 to 60 º, excess weld metal (capping size), depth of undercut, depth of pitting, fillet weld throat size, fillet leg length, misalignment (high-low), and linear measurements up to 60mm or 2 inches. It measures in both inch or millimeters. It is easy to use. It comprising of one rotating dial and one sliding pointer. Move the dial or pointer until it makes the appropriate contact and then read the result.



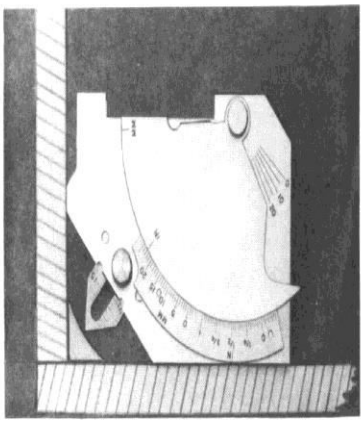
UNDERCUT



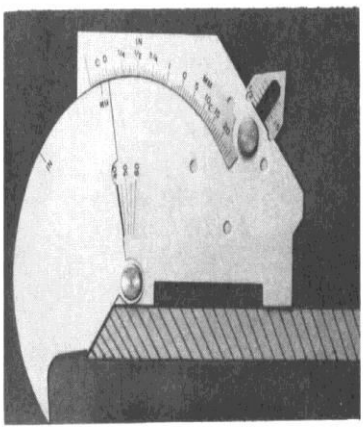
EXCESS WELD METAL



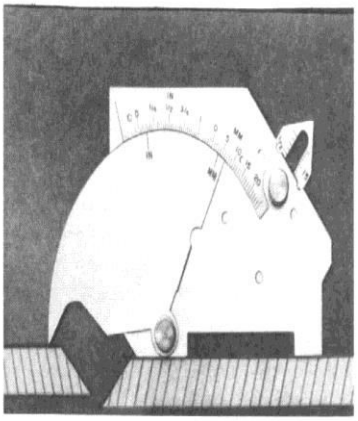
FILLET LEG LENGTH



FILLET WELD THROAT



ANGLE OF PREPARATION



MISALIGNMENT

Next week:-
Calcium carbide-property and uses. Acetylene gas properties and generating methods. Acetylene gas purifier, hydraulic back pressure valve and flash back arrestor.

Assignment:- Arc length-types-effects. Polarity –types and applications.

Checked by…….. Instructor……

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