



**CENTER FOR MECHANICAL ENGINEERING STUDIES, UNIVERSITI
TEKNOLOGI MARA, PULAU PINANG**

Program : Diploma in Mechanical Engineering
Course : Workshop Practice II
Code : MEM 261

**WORKSHOP PRACTICE II LABORATORY SHEET
(WELDING)**

1.0 OBJECTIVE:

1. Introduction for Arc Welding
2. To set up arc welding station
3. To operate arc welding machine
4. To practice some part of welding joint

2.0 THEORY:

Shielded metal arc welding (SMAW) is a welding process in which coalescence of metals is produced by heat from an electric arc maintained between the tip of a consumable electrode and the surface of the base material in the joint being welded.

3.0 MATERIALS:



Figure1: Mild Steel Plate

4.0 APPARATUS/ EQUIPMENT:

			
i. Welding Machine	ii. Electrode	iii. Apron	iv. Glove
			
v. Hand Shield	vi. Safety Boot	vii. Jacket	Safety Wear

5.0 HAND TOOLS:

			
i. Chipping Hammer	ii. Plier	iii. Wire Brush	iv. Chalk

6.0 SAFETY PRECAUTION

- Please wear all the personal protective equipment recommended by
- OSHA.
- Always protect your eyes from arc rays.
- Protect your face and body from heat radiation and molten metal.

- Move all the flammable material off the working place or cover it up using fireproof material.
- Make sure that the welding machine is earthen.
- Make sure that all line holder, earth clip and connection placed on good place.
- Make sure that your working place is clean and tidy.
- Make sure that all electric connection is tight, clean and dry.
- Avoid pulling the cable on top or near sharp things.
- Do not ever scratch arc on top of gas cylinder.
- Turn off the welding machine when not in use.
- Avoid welding cable from be in contact with hot metal, water, oil and grease.
- Wear all safety clothing when welding.
- All equipment such as hammer, chisel, brush and others must be well maintained.
- A welder should not try to install or repair a welding machine. has distinct properties and corresponding advantages and limitations.

7.0 PROCEDURE:

7.1 Welding Operation Procedure:

No.	Figure	Explanation
1.	 WELDING GOGGLES LEATHER APRON LEATHER GLOVES WELDING / SAFETY SHOES	Use all safety equipment during welding practice such at welding goggles, leather apron dan leather glove. • Wear Approved Eye Protection • Wear Flame Resistant Clothing • Wear Long Sleeves, Pocket Flaps and No Cuffs • Wear Approved safety boot • Wear Approved Hand Protection
2.		Make sure workpieces (metal plate) is cleaned and fix the workpiece with clamp.
3.		The welding machine should be near the work place

4.		Make sure the earth cable are properly clamped.
5.		Use the diameter of electrode and the type of electrode are appropriate for the workpiece. Insert the electrode into the insulated holder and then set amperage at levels that are recommended by the electrode maker.
6.		Set the suitable current for the work piece and type of joint Next, determine the optimize arc length.
7.		Switch on the welding machine and welding process can be initiated. Then, hold the electrode at a 45 degree angle or less to the weld. Lean the electrode 10 degrees to 30 degrees in the direction of the weld. Move at a steady speed and it is advice to use a short arc. Move the electrode using a circular motion. Finally use a chipping hammer to remove any slag.
8.		After complete the welding process or joining, switch off the welding machine. Clean the working areas. Place all tools at designated area after usage

7.0 RESULT AND DISCUSSION:

Perform all the task as an individual and team work.

Students are required to document the working procedure by taking photos during the workshop session (work as an individual and team members).

a. Theoretical Background

- i. Briefly explains the Arc Welding process.

b. Describe material selection-material standards, selecting appropriate tools and sizes, performing machining operations, SOP and adhering to working procedures.

c. Present any measurement/ standard calculations/ measurement data/ result/ graph/ sketching, tolerance, or machining parameter etc.

d. Identifies and corrects any related issues.

Required to analyses and discuss the welding process and techniques involved.

e. Snap, record and describe all the safety procedures, regulations, and personal protective equipment (PPE) relevant to each workshop activities.

based on established standards and codes of practice.

ISO standards or environmental regulations

f. Conclusion and recommendation

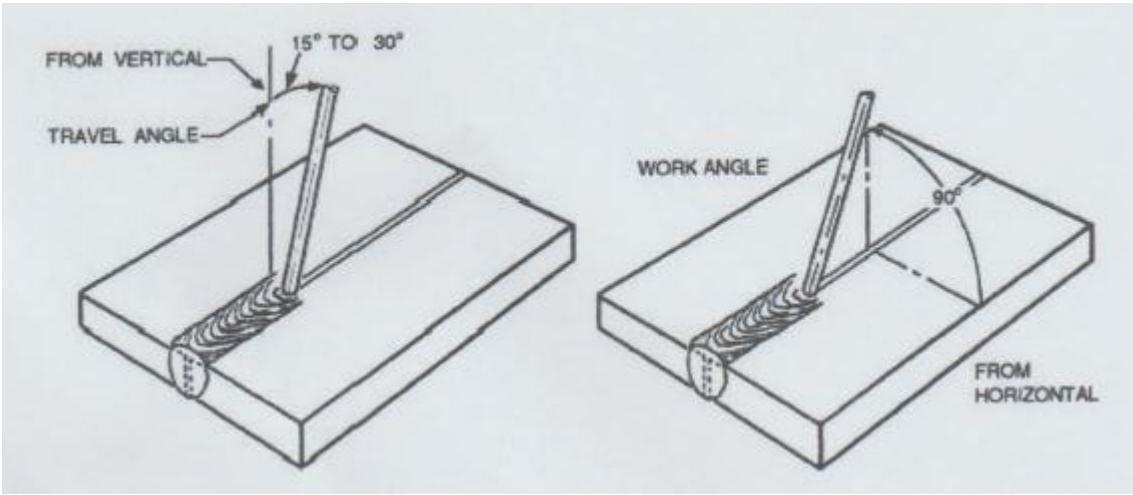
g. References

State all the references that you have been used in order to complete this report.

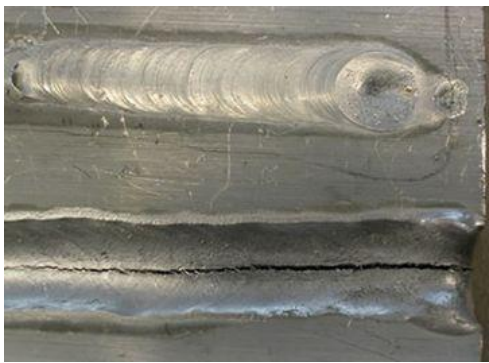
For technical report:

Prepare the report according to the Technical Report & Rubric Requirements

Appendix A: Drawing



Appendix B: Description of complete project/Welding imperfection defect



Welding Imperfection/Defect (refer appendix A)	40	Two (2) defect
		Three (3) defect
		Four (4) defect
		Five (5) defect and above

WELDING IMPERFECTION/DEFECT
1. Uniformity-(linear and angular misalignment)
2. Gas Cavities – (Porosity,blow hole and gas pore)
3. Slag Inclusion
4. Incomplete Penetration & incomplete filled groove
5. Excess Weld Metal
6. Undercut
7. Spatter
8. Poor Stop and Start

Appendix C: Description of complete project



Complete Project	10	Able to complete SMAW and oxy-acetylene welding project.
		Able to complete only SMAW or oxy-acetylene welding project.