Technical Instruction: How to Practice MIG Welding Technique

1. **Purpose**

This instruction describes the recommended method for practicing MIG welding technique by focusing on three core elements: **distance**, **angle**, and **movement**. Practicing these elements individually improves weld quality and operator consistency.

2. **Equipment and Setup Requirements**

- MIG welding machine set according to material thickness and wire diameter
- Solid wire with shielding gas (75% argon / 25% CO_2 or straight CO_2)
- Two metal pieces for welding practice
- Properly connected work clamp ensuring solid electrical contact

> **Note:** Machine settings should follow the manufacturer's chart. Technique errors are more likely to affect weld quality than minor setting deviations.

Instructions

3. **Practice Procedure**

3.1. Step 1: Practice Maintaining Correct Welding Distance

Objective: Keep a consistent wire stick-out of approximately **3/8–1/2 inch**.

Procedure:

1. Position yourself so you can comfortably move along the joint.
2. Support your hands if possible (e.g., one hand vertical, the other resting on it) to stabilize the torch.
3. Perform **dry runs without pulling the trigger**, moving along the joint while maintaining constant distance.
4. Repeat until you can maintain the distance smoothly across the entire joint.

> **Common errors:**
>
> - **Too far:** reduced voltage, unstable arc, porosity due to poor gas coverage.
> - **Too close:** wire burns back into the contact tip, causing damage and weld defects.

3.2. Step 2 Practice Controlling Your Welding Angle

Welding angle has two components:

A. Work Angle

- Butt joint: torch perpendicular (90°) to the plate.
- T-joint: torch positioned at approximately **45°** toward the joint.

B. Travel Angle

- Typically **10° push** or **10° drag**.
- Beginners may choose either; pushing is commonly used.

Procedure:

1. Set the torch to the correct work angle for the joint type.
2. Adjust the travel angle to the desired push or drag position.
3. Perform **dry runs** along the joint, maintaining both angles consistently.
4. Continue until you can complete the full length without rocking or drifting.

Common errors:

- Excessive angle causes spatter, unstable arc, and poor penetration.
- Incorrect angle becomes critical in vertical or overhead welding; torch should be angled slightly upward.

3.3. Step 3 Practice Movement Control

Movement consists of **travel speed** and **manipulation pattern**.

A. Travel Speed

- **Too fast:** narrow, underfilled bead.
- **Too slow:** wide bead, risk of burn-through on thin material.

B. Manipulation Techniques

Examples include:

- Straight stringer bead
- Side-to-side weave
- Small circular motions
- Curved weave touching the leading edge of the puddle

Procedure:

1. Select a simple movement pattern (stringer bead recommended for beginners).
2. Practice maintaining steady speed along the joint.
3. If weaving, ensure you briefly touch both sides of the joint.

4. When welding thick to thin material, pause slightly longer on the thicker side.
5. **Evaluation of Practice Welds**

After practicing, inspect the welds for:

- Porosity (indicates excessive distance or poor gas coverage)
- Burn-back (distance too short)
- Excessive spatter (incorrect angle)
- Narrow or overly wide beads (incorrect travel speed)
- Inconsistent bead shape (poor movement control)

Bead shape analysis

- **Recommended Practice Routine**
- Perform dry runs for distance.
- Perform dry runs for angle.
- Perform dry runs for movement.
- Weld short beads focusing on **one variable at a time**.
- Increase bead length as consistency improves.
- Practice on scrap material before working on actual projects.