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# Classroom Examples

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# Three pillars we will walk through

1

## Theory

Laying out the fundamentals, the principle and the physics

2

## Exercise

Working on the fundamentals and principles previously explained

3

## Practical or demonstration

Execute and work on the taught and exercised skills or tools

*For each one: the plan, the materials on the table, and what actually happens in the room.*

# A rhythm that can be used in sessions




**A rule to improve engagement: never more than 50 minutes of talking without an activity.**

A break belongs between blocks, not inside one. The blocks match the 3 basic pillars

# Example 1 — Advanced Welding Processes

| Time | Block | What happens |
|---|---|---|
| **00:00 – 00:10** | Opening | One photograph of a failed weld and two questions. What seems to be the type of failure? What is your estimation about the cause of the faiure |
| **00:10 – 00:50** | Theory | Laser beam welding: beam sources, joint types, parameters. |
| **00:50 – 01:00** | Break | |
| **01:00 – 01:30** | Exercise B1 | Read a WPS for a laser welded joint and find three errors. |
| **01:30 – 02:10** | Theory | Electron beam welding and friction-based welding. |
| **02:10 – 02:40** | Exercise B2 | “Laser or electron beam?” — group decision task. |
| **02:40 – 03:30** | Demonstration C | Automation and monitoring: seam tracking video and equipment. |

# Example 1 — what the teacher needs

## On the table

- Twelve to fifteen slides per block, no more.
- One WPS with three planted errors, printed on paper.
- Four macro photographs of laser and electron beam welds.
- Two sample joints students can hold.
- A one-page process comparison sheet.

## Tips that work

- Start with a failure, not a definition.
- Give the WPS on paper — people read paper more carefully.
- Ask groups to write on the sheet, then collect the sheets.
- Keep every video under four minutes.
- Say the standard number out loud every time.

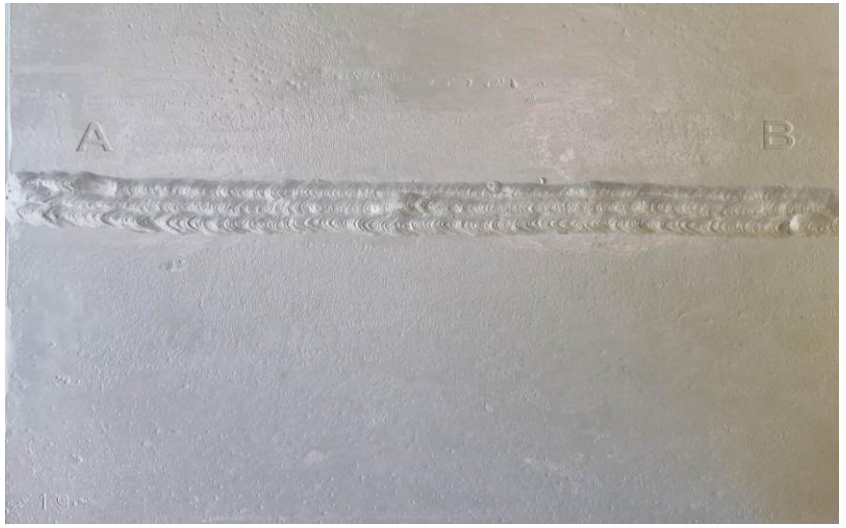
# Example 2 — Seeing and touching the samples

| Steps | Subject |
|---|---|
| 1 | Explaining the different welding positions related to the plate orientation |
| 2 | Examining and touching demo /mock up pieces in the classroom. |
| 3 | Inspection strategies: in-process against post-build |
| 4 | Case studies review. Examination of actual parts |

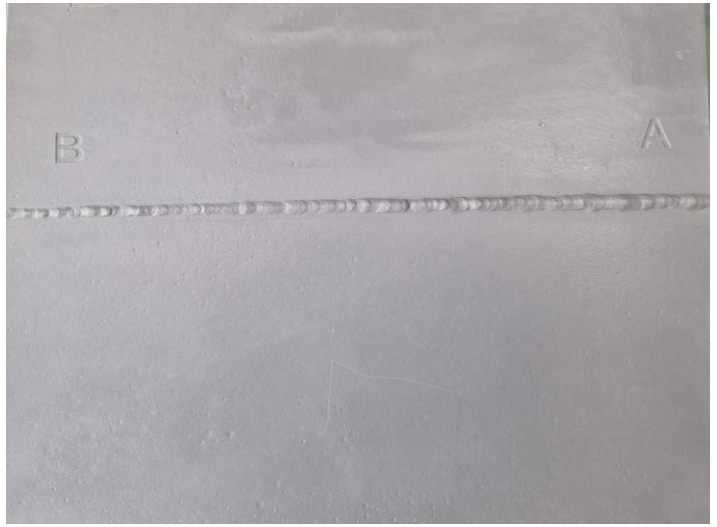
# Example 2 — Seeing and touching the samples




A) *Mock up sample of a fillet weld joint*

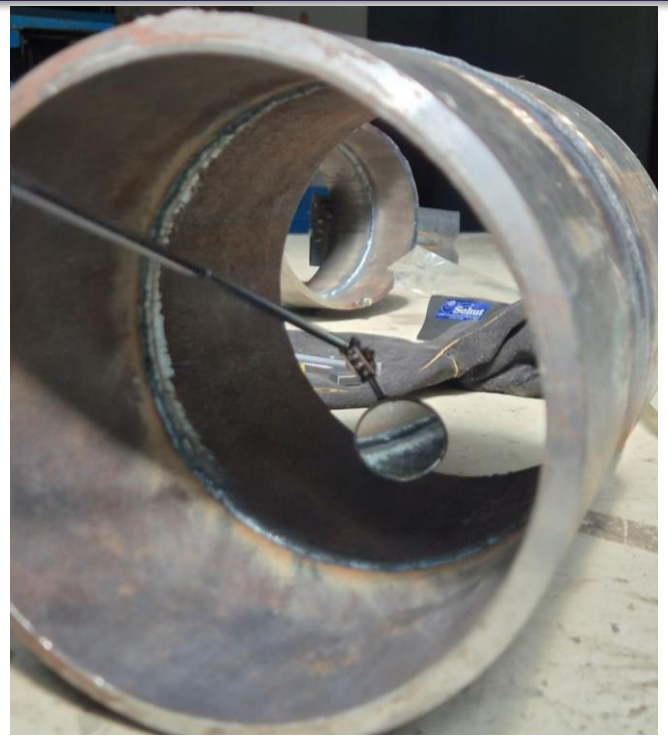



B) *Mock up sample of a butt weld joint - upper side*

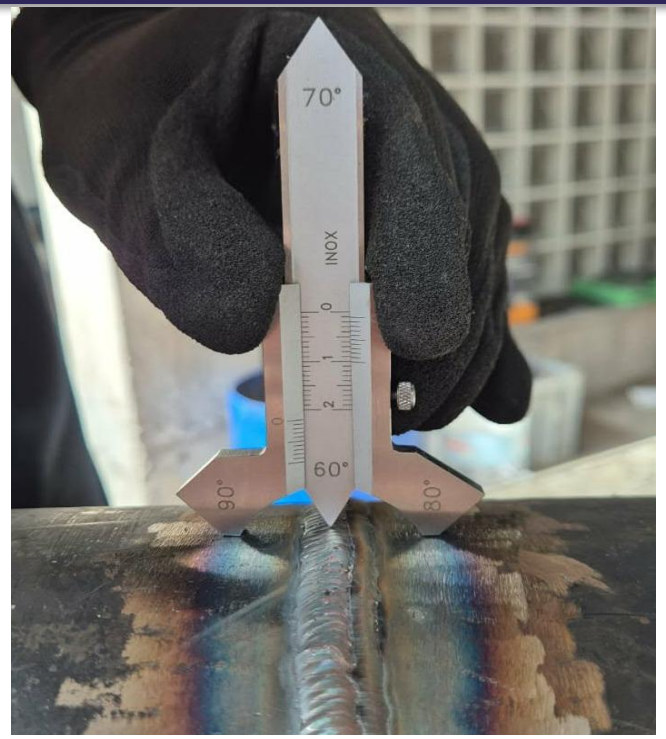



C) *Mock up sample of a fillet weld joint – lower side*

# Example 2 — Inspection strategies / Examination of actual parts



A) *Inspection of the inner weld, using a mirror*




B) *Inspection of the cap pass thickness*




C) *Inspection of the cap pass thickness*

# Example 3 — Hands on augmented reality welding practice

**The activity:**

- Students engage into practicing simulated welding
- They test different techniques
- The rest of the group can see in real-time the welding seam simulation
- Stats and performance can be then collected and evaluated



# Example 3 — Hands on augmented reality welding practice



A) *Simulated welding. TIG method*



A) *Simulated welding. MMA-SMAW method*

# Working in small groups: roles and rules

1. **Groups of three to four. Never more than five.**
2. **Give every group three roles.**
   Writer, timekeeper, speaker — and change roles for each activity.
3. **Leave the question on the screen while they work.**
4. **Announce the time and show a visible timer.**
5. **Mix experience on purpose.**
   One person with shop-floor experience in every group.
6. **Each group reports one point only.**
   No repetition, no long speeches.

# Photographs, samples and videos: simple rules

## Use

- Photographs of your own parts, with a scale in the picture.
- Cross sections and macros — one defect per image.
- Real samples that can be passed around the room.
- Short videos, two to four minutes, sound off, with your own commentary.

## Avoid

- Screenshots of dense text or full pages of a standard.
- Diagrams copied without a source.
- Long process videos with a voice-over in another language.
- Images with no labels and no arrows — students see nothing.

# When you have no workshop

1. **Use a recorded or virtual demonstration — and stop it to ask questions.**
2. **Run a joint session with an industrial partner.**
3. **Use AR/VR tools where you have them.**
4. **Bring samples without the machine.**
   Joints, powder, printed parts, failed parts — people learn by holding things.
5. **Use real documents: a WPS, a drawing, an inspection report.**
   These need no workshop at all.
6. **Tell students what is simulated and what is real.**

# Thank you!

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