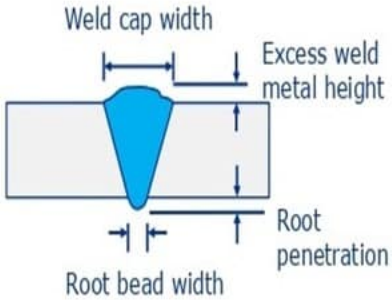
WELD DEFECTS AND CAUSES

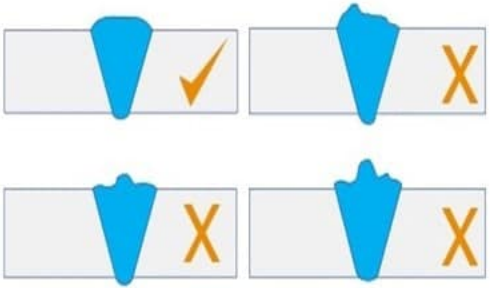
Features to Consider

Butt welds - size



Features to Consider

Butt welds - toe blend



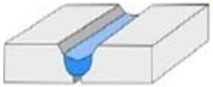
Welding Defects

Incomplete root penetration

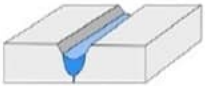
Causes

- Too small a root gap.
- Arc too long.
- Wrong polarity.
- Electrode too large for joint preparation.
- Incorrect electrode angle.
- Too fast a speed of travel for current.

Welding Defects



a. Excessively thick root face.

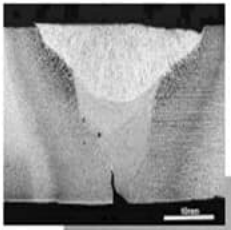


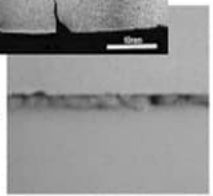
b. Too small a root gap.

c. Misplaced welds.

Welding Defects

Incomplete root fusion



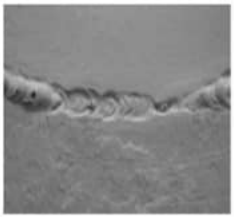


Causes

- Too small a root gap.
- Arc too long.
- Wrong polarity.
- Electrode too large for joint preparation.
- Incorrect electrode angle.
- Too fast a speed of travel for current.

Welding Defects

Root concavity

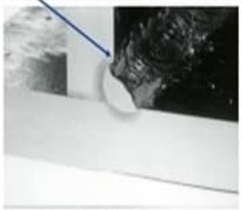


Causes

- Root gap too large.
- Insufficient arc energy.
- Excessive back purge TIG.

Welding Defects

Cap undercut

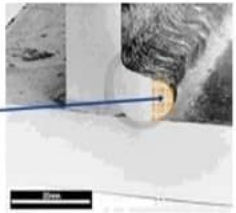


Causes

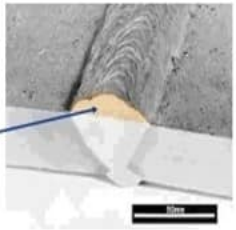
- Excessive welding current.
- Welding speed too high.
- Incorrect electrode angle.
- Excessive weave.
- Electrode too large.

Welding Defects

Overlap



Excess weld metal

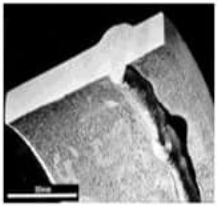


Welding Defects

Excess root penetration

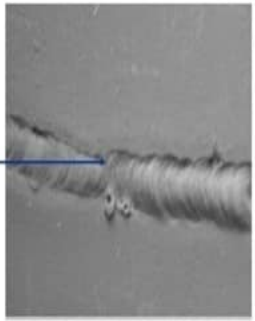
Causes

- Excessive amperage during welding of root.
- Excessive root gap.
- Poor fit up.
- Excessive root grinding.
- Improper welding technique.



Welding Defects

Root undercut

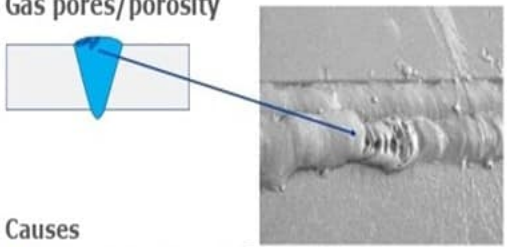


Causes

- Root gap too large.
- Excessive arc energy.
- Small or no root face.

Welding Defects

Gas pores/porosity

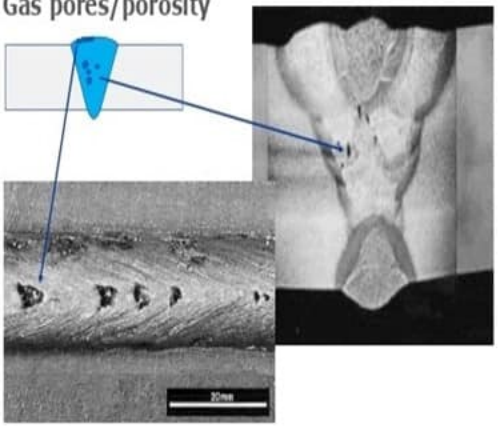


Causes

- Excessive moisture in flux or preparation.
- Contaminated preparation.
- Low welding current.
- Arc length too long.
- Damaged electrode flux.
- Removal of gas shield.

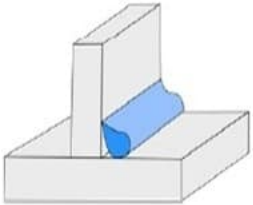
Welding Defects

Gas pores/porosity



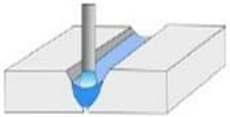
Welding Defects

d. Power input too low.

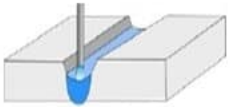


e. Arc (heat) input too low.

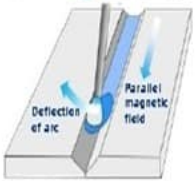
Welding Defects



Too large diameter electrode.



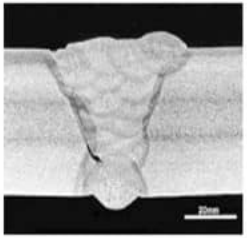
Smaller (correct) diameter electrode.



Lack of sidewall fusion due to arc deflection.

Welding Defects

Lack of fusion

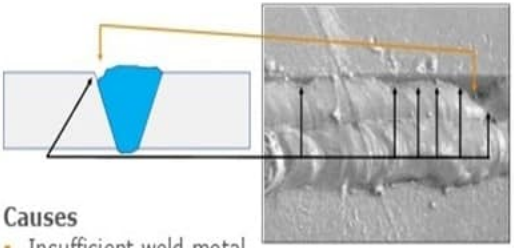


Causes

- Contaminated weld preparation.
- Amperage too low.
- Amperage too high (welder increases speed of travel).

Welding Defects

Incompletely filled groove and lack of side wall fusion



Causes

- Insufficient weld metal deposited.
- Improper welding technique.

Welding Defects

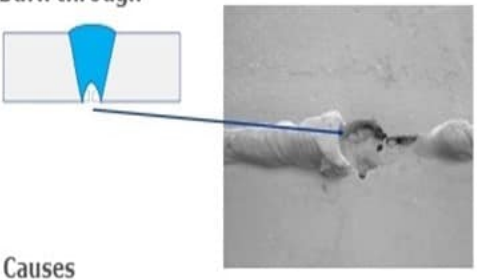
Inclusions - tungsten

Causes

Contamination of weld caused by excessive current through electrode, tungsten touching weld metal or parent metal during welding using the TIG welding process.

Welding Defects

Burn through

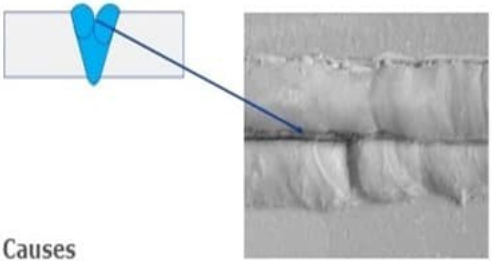


Causes

- Excessive amperage during welding of root.
- Excessive root grinding.
- Improper welding technique.

Welding Defects

Inter run incompletely filled groove

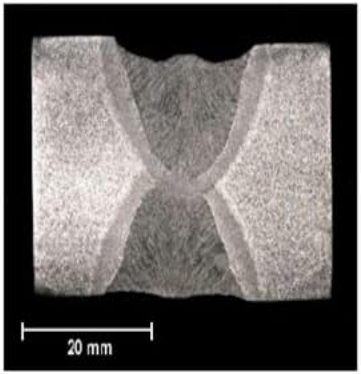


Causes

- Insufficient weld metal deposited.
- Improper welding technique.

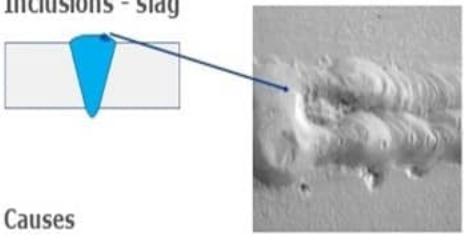
Welding Defects

Incompletely filled groove



Welding Defects

Inclusions - slag

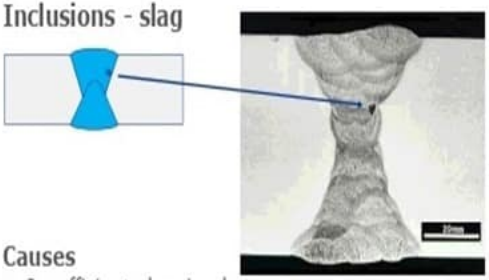


Causes

- Insufficient cleaning between passes.
- Contaminated weld preparation.
- Welding over irregular profile.
- Incorrect welding speed.
- Arc length too long.

Welding Defects

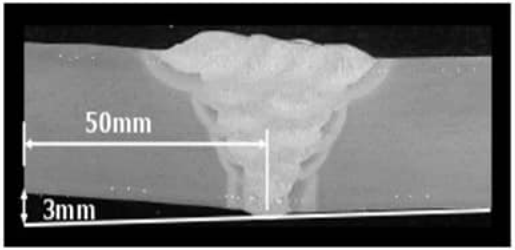
Inclusions - slag



Causes

- Insufficient cleaning between passes.
- Contaminated weld preparation.
- Welding over irregular profile.
- Incorrect welding speed.
- Arc length too long.

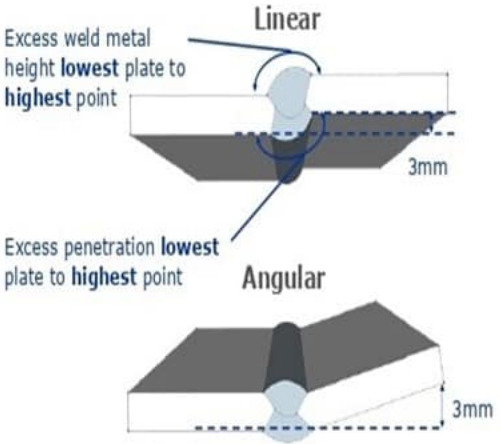
Welding Defects



Angular distortion

- Measure the distance to the edge of the plate (50mm).
- Use a straight edge (rule) to find the amount of distortion then measure the space (3mm).
- This is reported as angular distortion 3mm in 50mm.

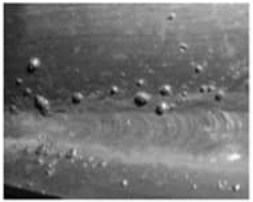
Welding Defects

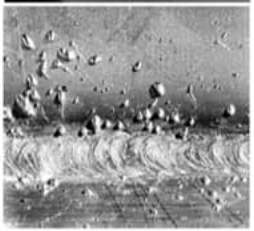


Angular misalignment measured in mm.

Welding Defects

Spatter



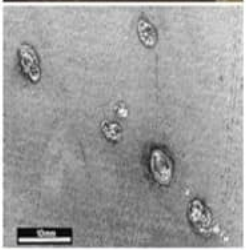


Causes

- Excessive arc energy.
- Excessive arc length.
- Damp electrodes.
- Arc blow.

Welding Defects

Arc strikes

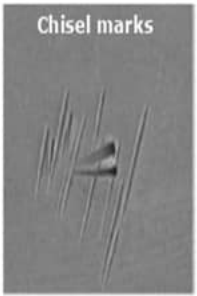


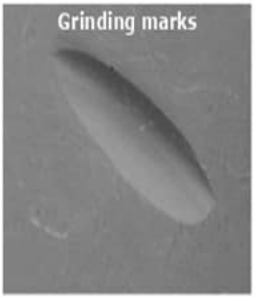
Causes

- Electrode straying onto parent metal.
- Electrode holder with poor insulation.
- Poor contact of earth clamp.

Welding Defects

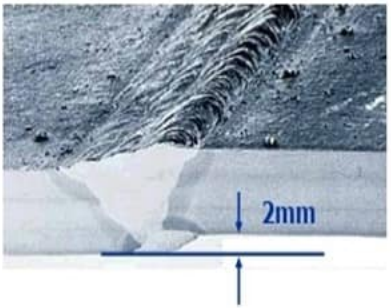
Mechanical damage





Welding Defects

Non-alignment of two abutting edges



Also known as: Hi low, mismatch or misalignment.