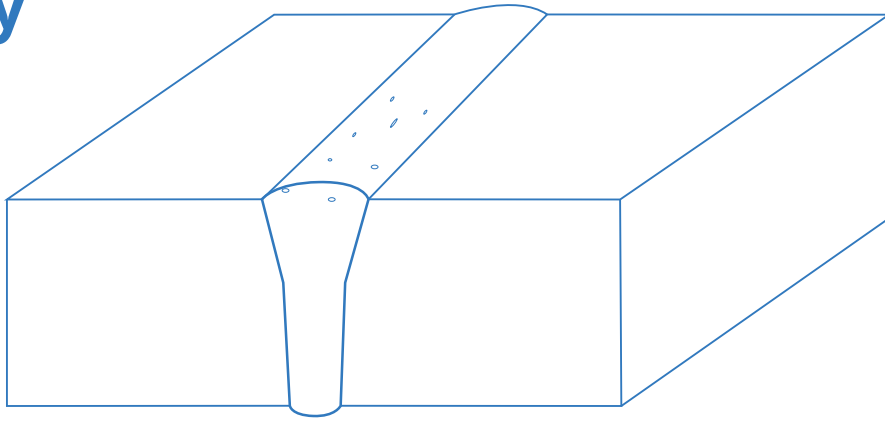


WELDING DISCONTINUITIES

Porosity



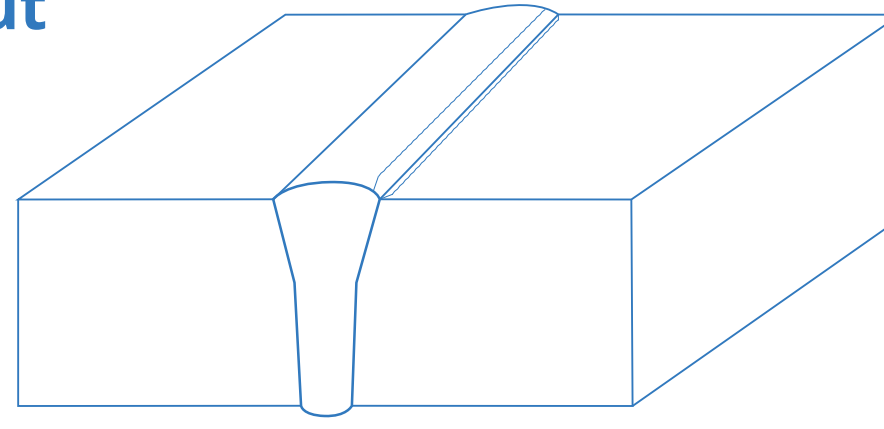
Why it happens

- Arc length too short/too long
- Current too high
- Welding speed too fast
- Dirty base metal surface
- Wet, dirty, or damaged electrode
- Improper gas coverage
- Incorrect electrode angle

How to avoid it:

- Use correct arc length
- Lower welding current
- Use a slower welding speed
- Clean base metal before welding
- Clean & properly store electrodes
- Check for correct gas coverage
- Use correct electrode angle

Undercut



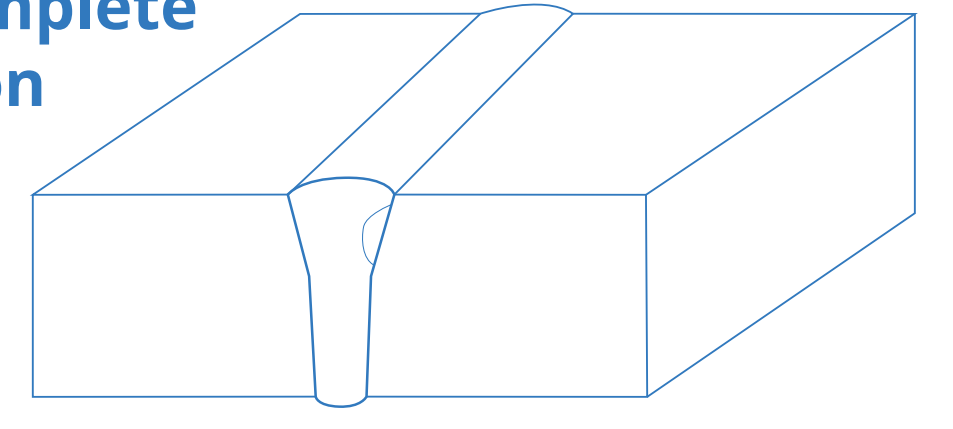
Why it happens

- Poor electrode manipulation
- Current too high
- Welding speed too fast
- Arc blow
- Incorrect electrode angle

How to avoid it:

- Use correct electrode angle
- Lower welding current
- Use a slower welding speed
- Clean base metal before welding
- Reduce arc length & effects of arc blow
- Use correct electrode angle

Incomplete Fusion



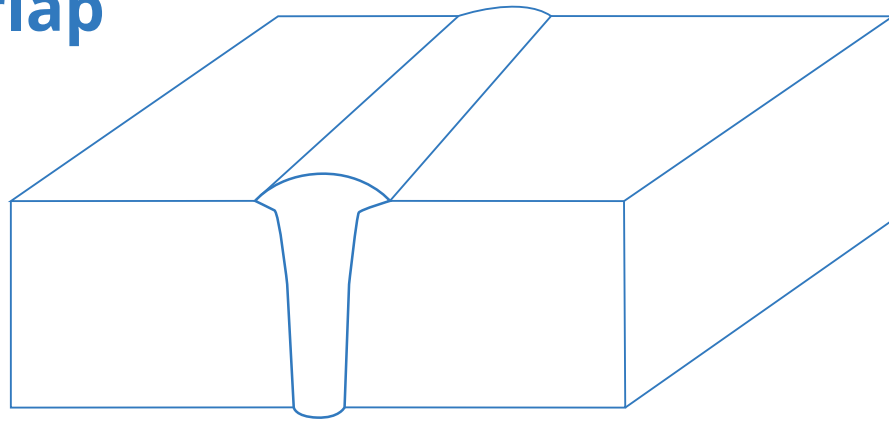
Why it happens

- Welding speed too fast
- Current too low
- Electrode diameter too large
- Incorrect electrode angle
- Magnetic arc blow

How to avoid it:

- Use a slower welding speed
- Increase current
- Use smaller electrode diameter
- Maintain correct electrode angle
- Reduce effects of magnetic arc blow

Overlap



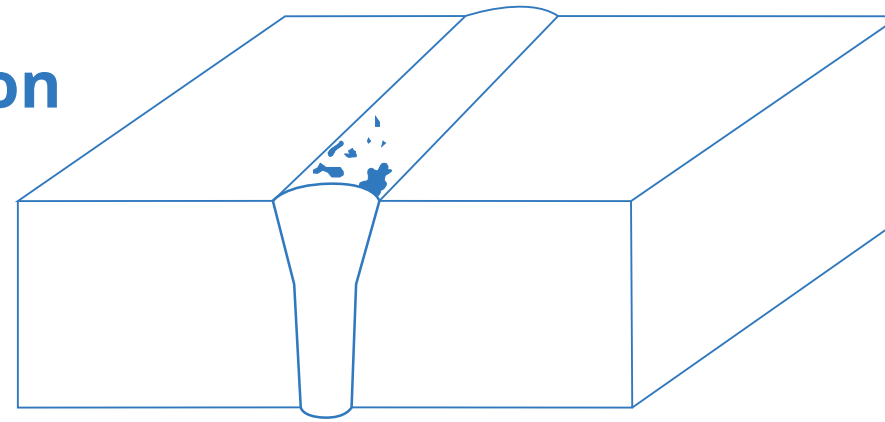
Why it happens

- Welding speed too slow
- Incorrect electrode angle
- Electrode diameter too large
- Improper current

How to avoid it:

- Use a faster welding speed
- Maintain correct electrode angle
- Use smaller electrode diameter
- Use appropriate current

Slag Inclusion



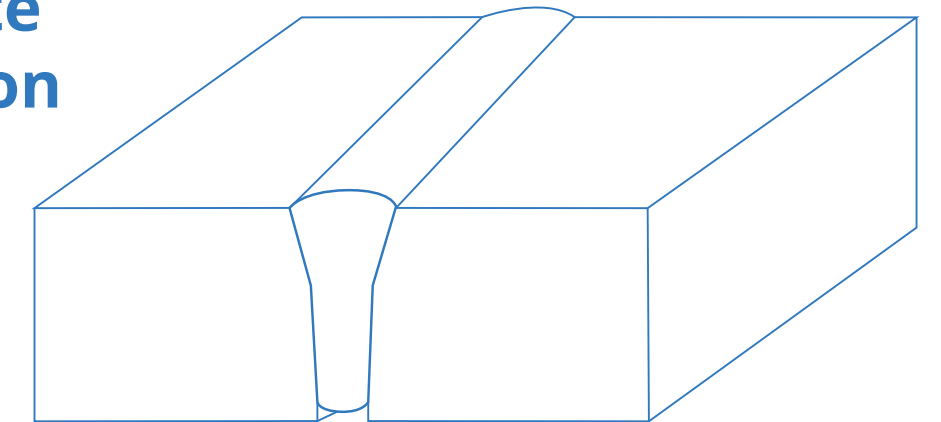
Why it happens

- Incomplete slag removal between passes
- Inconsistent travel speed
- Too wide a weaving motion
- Electrode diameter too large
- Incorrect electrode angle
- Allowing slag to run ahead of arc

How to avoid it:

- Clean weld between passes
- Maintain a constant welding speed
- Reduce width of weaving motions
- Use smaller electrode diameter
- Maintain correct electrode angle
- Use a faster welding speed so slag does not run ahead of arc

Incomplete Penetration



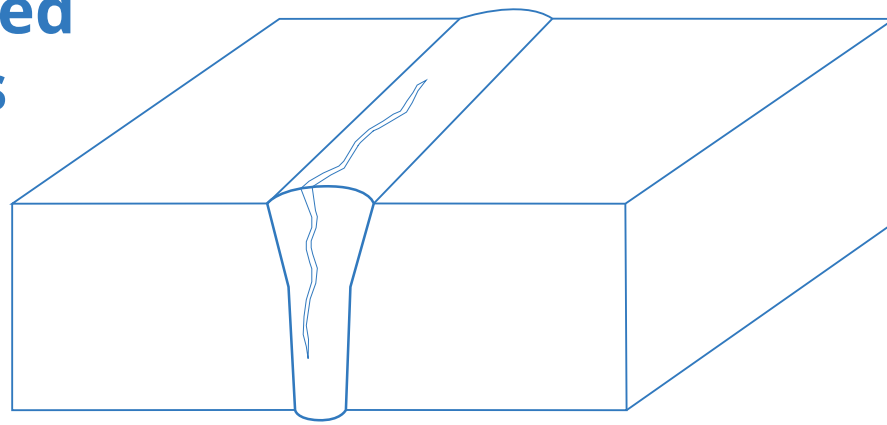
Why it happens

- Welding speed too fast or too slow
- Current too low
- Poor joint design & fit-up
- Electrode diameter too large
- Incorrect type of electrode used
- Overly long arc length

How to avoid it:

- Use correct welding speed
- Increase current
- Increase root opening or decrease root face
- Use smaller electrode diameter, or electrode with deeper penetration capabilities
- Use a smaller arc length

Cracked Welds



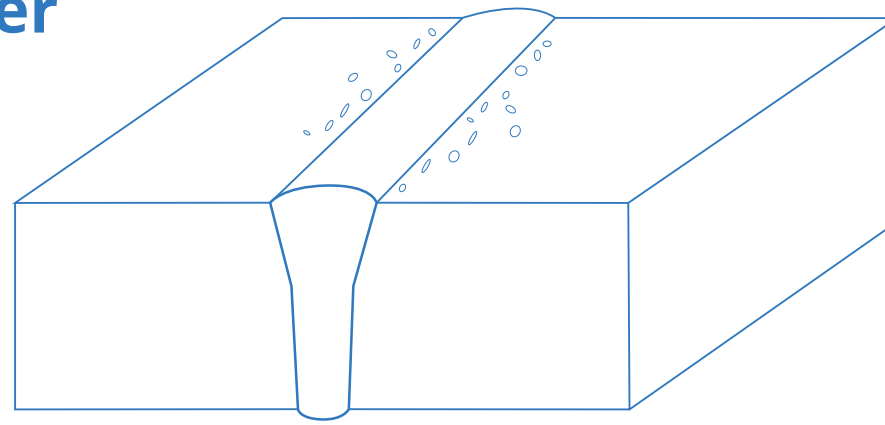
Why it happens

- Insufficient weld size
- Too much joint restraint
- Poor joint design
- Filler metal does not match base metal
- Cooling rate too fast
- Dirty base metal surface

How to avoid it:

- Adjust weld size to part thickness
- Reduce joint restraint via proper joint design
- Use matching filler metal
- Reduce cooling rate via preheat
- Clean base metal before welding

Spatter



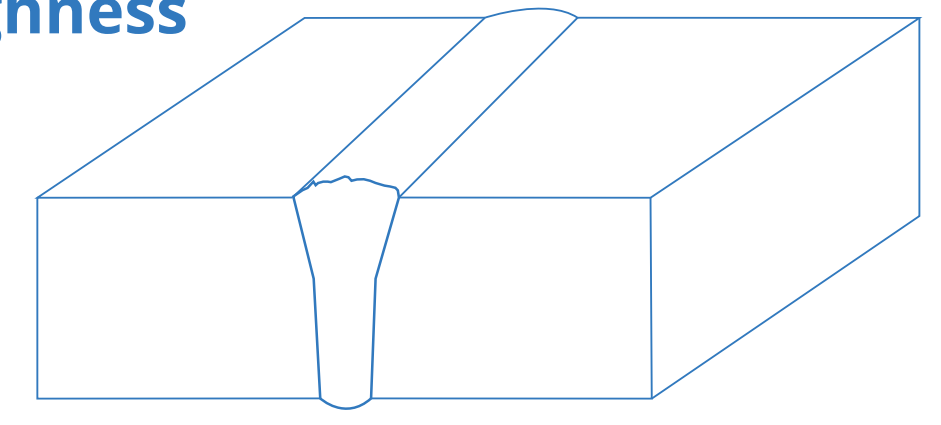
Why it happens

- Arc blow
- Current too high
- Arc length too long
- Wet, dirty, or damaged electrode
- Dirty welding surface
- Incorrect electrode angle

How to avoid it:

- Reduce effects of arc blow
- Decrease current
- Use smaller arc length
- Clean & properly store electrodes
- Keep welding surface clean
- Maintain correct electrode angle

Roughness



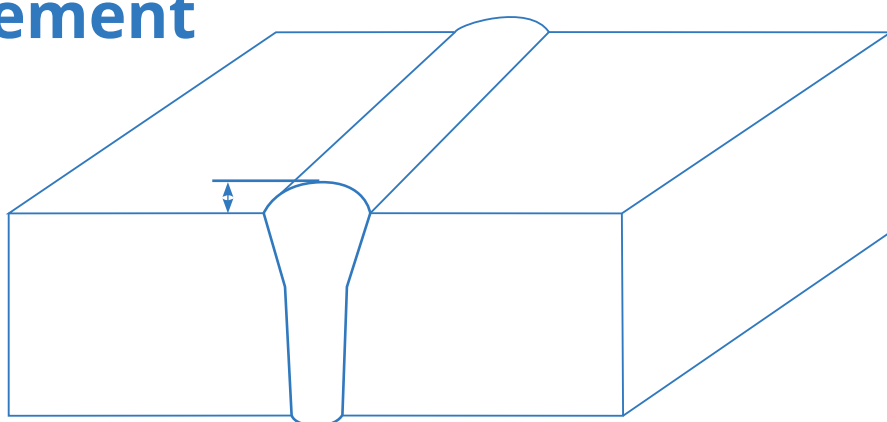
Why it happens

- Inconsistent welding speed
- Incorrect arc length
- Incorrect electrode angle
- Insufficient coverage of valleys during welding
- Improper current

How to avoid it:

- Use a consistent welding speed
- Maintain correct arc length
- Maintain correct electrode angle
- Sequence weld passes for sufficient valley coverage
- Maintain correct current

Reinforcement



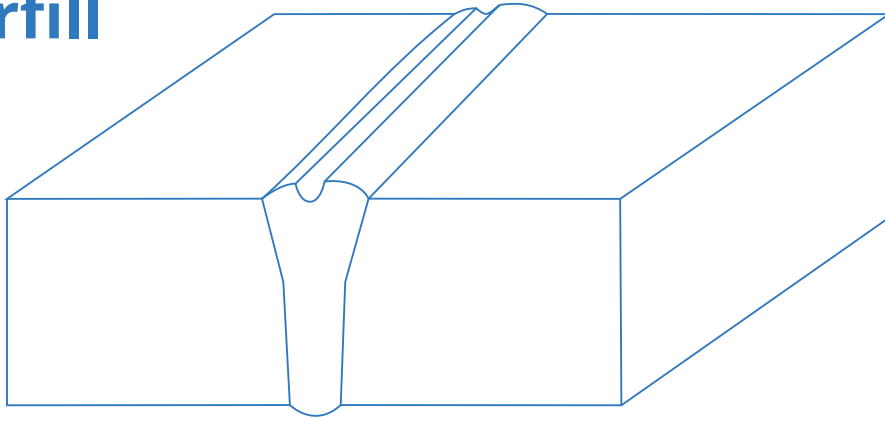
Why it happens

- Welding speed too low
- Improper current used
- Incorrect electrode angle

How to avoid it:

- Use a faster welding speed
- Maintain appropriate current
- Maintain proper wire stickout
- Use correct electrode angle

Underfill



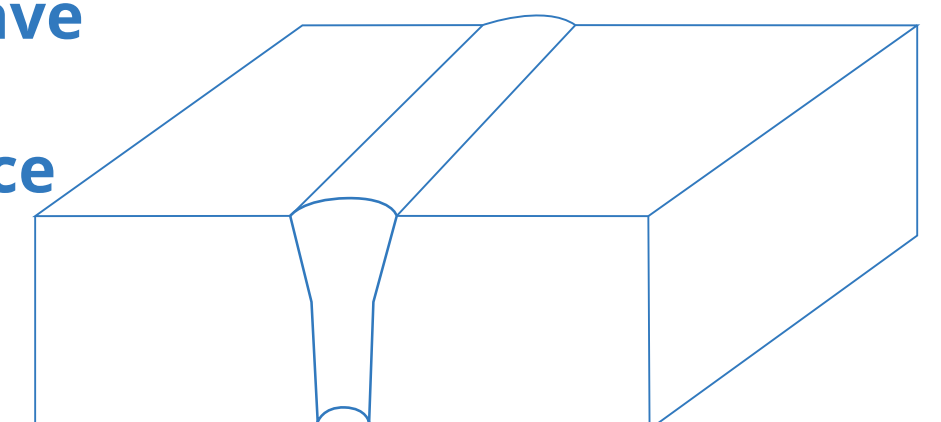
Why it happens

- Not enough metal in weld pool
- Improper current used

How to avoid it:

- Use a slower welding speed to ensure more metal in weld pool
- Maintain correct current

Concave Root Surface



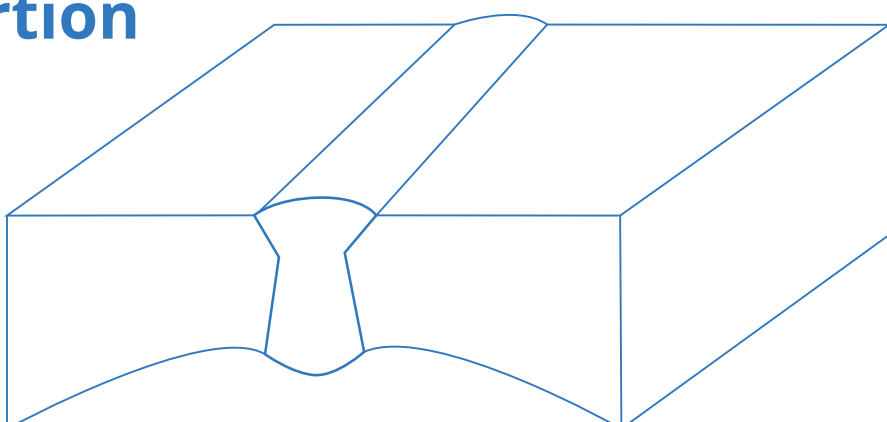
Why it happens

- Too much/too high current
- Arc length too long
- Face of root too small

How to avoid it:

- Reduce current
- Use correct arc length
- Use proper joint fitup

Distortion



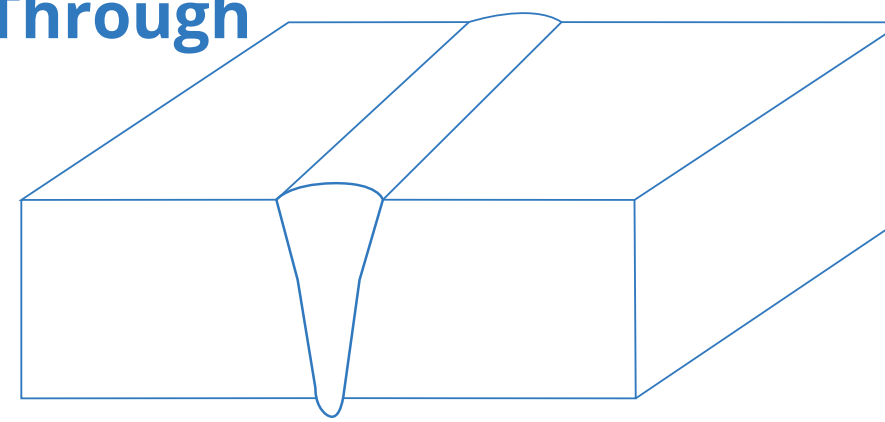
Why it happens

- Poor joint preparation
- Improper tack welding or bead sequencing
- Weld size too large

How to avoid it:

- Use appropriate set-up
- Use correct tack welding & bead sequencing procedures
- Conform welds to specified size

Melt Through



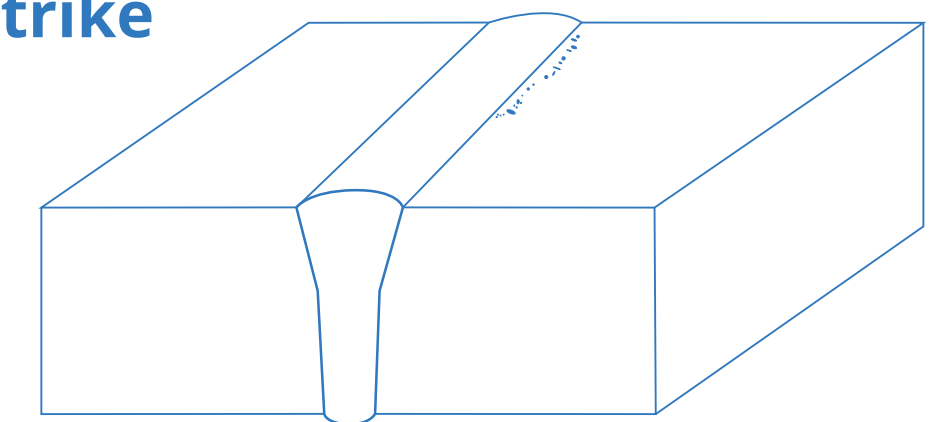
Why it happens

- Current too high
- Welding speed too slow
- Incorrect arc length
- Root gap

How to avoid it:

- Use lower current
- Increase welding speed
- Maintain correct arc length
- Use ceramic tape or appropriate metal backing strap on areas with root gap

Arc Strike



Why it happens

- Improper arc starting
- Damaged welding lines or ground cables
- Sub-arc tips touch the base metal

How to avoid it:

- Start arc inside weld joint
- Replace damaged welding lines & ground cables
- Prevent sub-arc tips from touching the base metal