

How to Repair a Cracked Rim with TIG Welding

(Aluminum or Alloy Wheel Rim Repair – Step-by-Step Guide)

Disclaimer

Always inspect the rim thoroughly to determine whether it's repairable.

Do not attempt to repair structural cracks (e.g., extending to the hub or bolt holes) unless you're certified and experienced.

Some cracks are too dangerous to repair – when in doubt, replace the rim.

Tools & Equipment Required

TIG Welder (AC capable for aluminum)

Argon gas (100%)

Filler rod (ER4043 or ER5356 for aluminum)

Die grinder or rotary tool

Abrasive wheels (flap disc, grinding wheel)

Wire brush (stainless for aluminum)

Crack detection dye penetrant kit

Angle grinder or aluminum saw (if removal of damaged area is needed)

Safety gear: Welding helmet, gloves, jacket, eye protection, respirator

✔ Step-by-Step TIG Welding Procedure

🔍 Step 1: Inspect the Rim Thoroughly

1. Remove the tire from the rim and clean the surface.
2. Check for multiple cracks, bends, or rim warping.
3. Use a crack detection dye penetrant to locate hairline cracks not visible to the eye.
4. If the crack is in a critical load-bearing area, do not repair – replace instead.

🧼 Step 2: Clean the Crack Area

1. Grind or sand the area around the crack using a die grinder or flap disc.
2. Remove all paint, dirt, oxidation, and clear coat to expose bare aluminum.
3. Use a stainless steel wire brush to further clean the area.
4. Wipe the area with acetone or alcohol to remove grease and contaminants.

✂️ Step 3: Prepare the Crack for Welding

1. V-groove the crack using a carbide burr or angle grinder.

Grind a 45-degree bevel into the crack to create a V-notch, exposing the full depth.

Go deep enough to fully penetrate the crack, but avoid weakening the rim excessively.

2. Drill small stop holes (1/8" or 3mm) at each end of the crack to prevent it from spreading.

Step 4: Setup for TIG Welding

1. Use a TIG welder set to AC polarity (for aluminum).

2. Select an appropriate filler rod:

ER4043 – good for crack resistance and ease of welding.

ER5356 – stronger but slightly harder to weld.

3. Use 100% Argon shielding gas at 15–20 CFH.

4. Use a clean, sharpened tungsten electrode (2% lanthanated or pure tungsten recommended).

Step 5: Weld the Crack

1. Preheat the rim slightly (optional but recommended for thick sections). Aim for around 150–300°F using a torch or oven.

2. Start welding at one end of the V-groove.
3. Tack weld both ends first to stabilize the crack.
4. Proceed with slow, steady passes, ensuring proper fusion.

Use short arc length to minimize porosity.

Don't overheat—pause between sections to let the rim cool slightly.

5. For deeper cracks, make multiple passes, ensuring full penetration.

Step 6: Post-Weld Cooling and Inspection

1. Let the rim cool slowly at room temperature.

Do not quench – it can cause internal stresses.

2. Clean the weld area and inspect for pinholes, porosity, or missed spots.
3. Use dye penetrant again if necessary to confirm crack closure.

Step 7: Grind, Smooth, and Finish

1. Grind down the weld using a flap disc to restore the rim's original shape.

2. Blend the weld smoothly with the surrounding metal.
3. Sand progressively (60 > 120 > 320 > 600 grit) for a polished finish.
4. Optionally, polish or repaint the rim to match the original finish.

Step 8: Rebalance and Test

1. Mount the tire and rebalance the rim to ensure it spins true.
2. If available, test the rim on a wheel balancing machine or spin test.
3. Check for air leaks using soapy water if the crack was near the bead area.

Conclusion: A Professional-Grade Rim Repair

Done right, a TIG-welded rim repair can restore both function and appearance. This process is ideal for minor to moderate cracks in non-critical areas. Always prioritize safety and structural integrity, and when in doubt—consult a professional or replace the rim.