

## Brazing tubes and fittings (air conditioning unit, off-road market)

**Objective** To heat steel tubes and fittings to 1400 °F (760 °C) for a brazing application; client was looking to replace an oven

- Materials**
- Steel tubes
  - Steel fittings
  - Copper braze
  - Flux

**Temperature** 1400 °F (760 °C)

**Frequency** 150 kHz

- Equipment**
- Ambrell EASYHEAT LI 7590 10kW, 150-400 kHz induction heating system equipped with a remote heat station containing two 1.0 µF capacitors
  - A multiple position two-turn helical coil designed and developed for this application

**Process** While initially inspecting the parts, the Applications Lab noticed that the steel tube and larger fitting had an interference fit and did not have the recommended clearance for the silver braze joint. Consequently, the tube was sanded to increase the clearance and therefore allow the braze alloy to flow into the joint.

At that point, the parts were fluxed and loaded into the coil. A braze preform was placed at the top of the fitting and the power was turned on. After 35 seconds, the part reached temperature and the assembly had a nice fillet.

With the 10kW Ambrell EASYHEAT power supply, the part can be heated to temperature in 35 seconds. With a four-position coil, the per-part process time is just nine seconds.

- Results/Benefits**
- Precision: They were using an oven, and because the whole part was being heated and essentially annealed, it created problems with the part. Induction only heats the braze area, and resolves that issue.
  - Speed: Induction heats the assemblies more quickly than an oven.
  - Production rate: Faster heating increases the production rate – particularly with a four-position coil.
  - Efficiency: Induction is more energy efficient than an oven.



The steel tube and fitting after brazing.