

## Brazing a steel and brass immersion heating element

**Objective** To heat a steel and brass assembly to 1450 °F (788 °C) for a brazing application; client was looking at replacing a torch

- Materials**
- 3" (76 mm) OD steel fitting with mating steel tubes
  - 2" (51 mm) OD steel fitting with mating steel tubes
  - 3" (76 mm) OD brass fitting with mating steel tubes
  - Braze alloy pre-forms
  - Lower temperature braze alloy

**Temperature** 1450 °F (788 °C)

**Frequency** 90 kHz

- Equipment**
- Ambrell EKOHEAT 30kW/50-150 kHz induction heating system equipped with a remote heat station containing eight 1.0 µF capacitors
  - A single position three-turn helical coil designed and developed for this application

**Process** Customer supplied braze rings were placed around the outer array of the steel tubes and the assembly was fluxed. Then, the assembly was placed into the helical coil and the power supply was turned on. The heating cycle time was 240 seconds, and the assembly was air cooled.

The center hole of the assembly was countersunk into the steel fitting to allow the braze ring to sit and flow into the fitting. The lower temperature braze pre-form was placed on the opposing side of the first set of braze joints. The assembly was fluxed and then heated for approximately 200 seconds. With this two-step process all of the tubes were brazed to the steel fitting.

The brass fitting was next in process. The braze rings were placed on all of the tubes, the part was fluxed, and then inserted into the coil. The heat cycle time was approximately 300 seconds for the part to reach temperature and for the braze to flow. With these steps, brazing was complete.

- Results/Benefits**
- **Speed:** Induction results in faster heating than a torch
  - **Production rate:** The customer wanted faster, multipart heating to increase output, which induction delivered
  - **Repeatability:** Induction offers precision and repeatable results, which is a weakness of torch heating
  - **Safety:** Thanks to there being no flame, induction enhances worker safety



The assembly inside the helical coil