

## Heating a stainless steel sleeve for shrink fitting on to a shaft for industrial washer

**Objective** Heating a stainless steel sleeve for a shrink fit application

**Material** Stainless steel sleeve 4.33" (109.98mm) OD, 3.58" (90.93mm) ID, 2" (50.8mm) long

**Temperature** 500 °F (260 °C)

**Frequency** 277 kHz

**Equipment**

- Ambrell 4.2 kW induction heating system, equipped with a remote workhead containing two 1.0 $\mu$ F capacitors for a total of 0.5 $\mu$ F
- An induction heating coil designed and developed specifically for this application.

**Process** A three turn helical coil is used to heat the stainless steel sleeve. The part is placed in the coil and power is applied for 110 seconds to reach 500 °F (260 °C) for the shrink fit application. Once the sleeve reaches 500 °F (260 °C), the sleeve is placed on a stainless steel shaft and allowed to cool to shrink fit the sleeve to the shaft.

**Narrative**

- The customer currently uses electric ovens that run 24 hours a day, 5 days per week and their primary concern is to save on the energy cost of heating the parts in the ovens. By switching to induction heat for their shrink fit application the customer can save on electricity by only using power for 110 seconds per part vs. a continuously running electric oven. This worked out to a daily running cost of \$2.16 for the induction system, compared to \$46.08 for the four ovens at a \$0.12/kWh cost for electricity. The customer will save \$11,418 on energy per year with a ROI of 1.75 years for the investment of the induction system. Additional cost savings from improved production efficiency and environmental cooling to counteract the effect of the ovens should also be considered in the overall ROI.

**Results/** Induction heating provides:

**Benefits**

- No preheat cycle, heat is available on demand
- Energy efficient, heats only the part, not the atmosphere around the part
- Ease of integration into existing production lines
- Even distribution of heating



Stainless steel sleeve heating in coil prior to shrink fit application