Heating fluid passing through an alumina tube

**Objective**  
To heat an alumina tube to heat magnetic particles in order to heat fluid passing through the tube for an oil industry application

**Material**  
- Nanoparticles
- Alumina tube (0.5” / 12.7 mm diameter)
- Thermocouple to measure temperature

**Temperature**  
150 °F (66 °C)

**Frequency**  
295 kHz

**Equipment**  
- Ambrell EASYHEAT 2 kW, 150-400 kHz induction heating power supply with a remote workhead containing one 0.17 μF capacitor
- A single-position, fourteen turn helical induction heating coil designed and developed for this application

**Process**  
The alumina tube was placed in the coil and water was sent through it at a rate of 80 ml per 40 seconds. The energy delivered from the EASYHEAT was sufficient to heat the fluid to temperature at a rate of 120 ml per minute.

**Results/Benefits**  
- Speed: Induction was able to achieve the client’s targeted speed/production rate
- Repeatability: Induction will be able to achieve an identical result consistently
- Energy savings: The speed at which induction heats the fluid to temperature meets/beats the client’s speed objectives which will result in energy savings
The setup during heating