

Induction Heating and Annealing

Heat Treatment of Rivets, Fasteners, Nuts, Bolts, and Washers

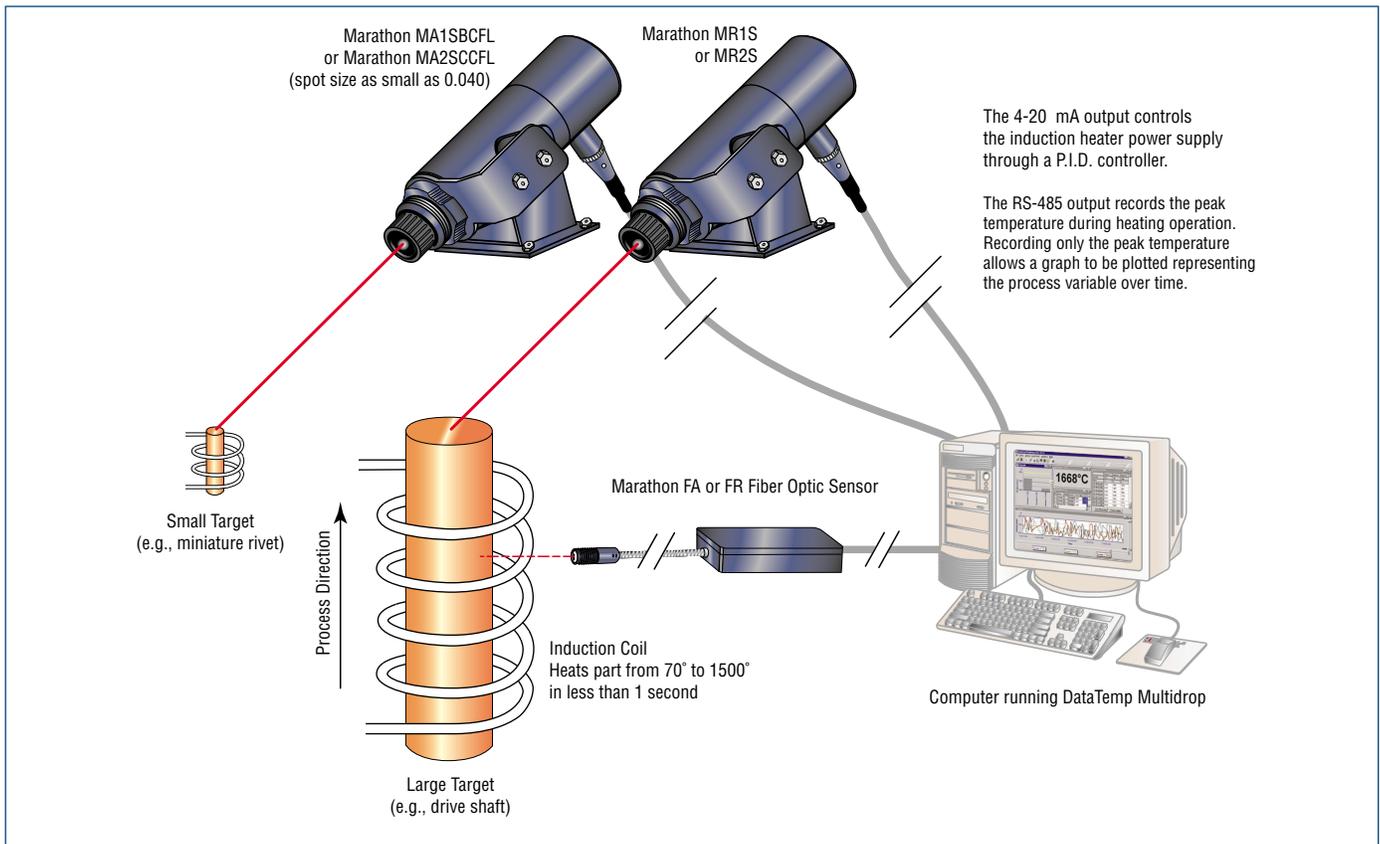
Q

- How can the temperature of each and every part be controlled when the electrical current is constantly changing?
- How can you confirm the correct temperature of each product that is processed?

A

The Marathon Series™ from Raytek

Traditionally, the induction heating process depends on two elements—power and time—to harden, form, or mold metal into high quality products. By adding a crucial third element to control temperature and quality, the Raytek Marathon Series ensures consistent and dependable heat treating production. Combining infrared noncontact temperature measurement and DataTemp software, the Marathon Series creates a setpoint temperature. The temperature of each part is read and recorded by the sensor and software producing an accurate production record. Upon reaching the setpoint temperature, the induction heater is automatically shut off, maintaining the correct temperature.



Induction Heating Overview

The induction heating process is often used to heat metal to a specific temperature for hardening, molding, or forming into high quality products. Temperature consistency is crucial in this method. If the temperature of the metal is out of tolerance, the quality of the product is lost—resulting in scrap.

The induction heating process uses electrical power and time to achieve correct heating for a specific metal or product. The electrical current, flows through the induction coil to create a magnetic charge that heats the metal, while a timer is set to turn off the heater at a specified time. If the electrical current varies even slightly (a common occurrence), the part is overheated or underheated because the timer can't adjust to the variation. With the increase in electrical current fluctuations, production losses are rising and quality control is lost.

Power + Time

- Accurate temperature control is not dependable enough to ensure quality in high-tolerance parts
- High scrap rates and lengthy set-up times
- Incomplete production records

Power + Time + Temp. Control

- Accurate temperature control
- Quality control of high-tolerance parts
- Reduced scrap rate
- Complete production record

Marathon Series Thermometers

The Raytek Marathon Series combines superior performance with *state-of-the-art* digital technology. The result is a family of unique noncontact infrared thermometers designed to operate accurately in induction heating environments. These integrated units offer advanced electro-optics, smart digital electronics, and a built-in user interface in a rugged, compact housing (see chart, next column).

Marathon Series products offer a total solution for all induction heating application problems.

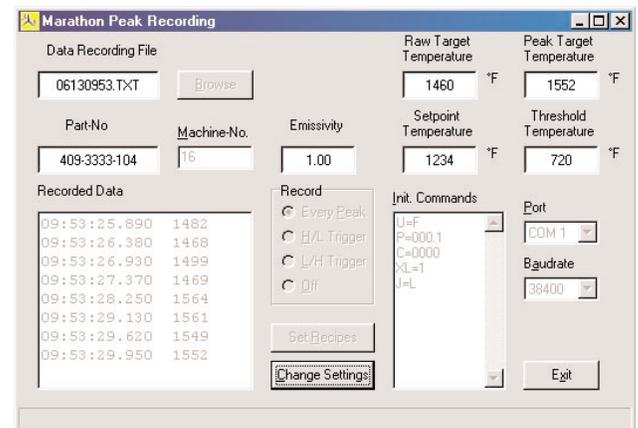
| Marathon Series Product | Temperature Range | Spectral Response | Sighting |
|-----------------------------|--------------------------------|-------------------|---------------------------|
| Integrated Thermometer MA1S | 500 to 3000°C (932 to 5432°F) | 1 Micron | Through-the-lens or Laser |
| Integrated Thermometer MA2S | 250 to 2000°C (482 to 3630°F) | 1.6 Micron | Through-the-lens or Laser |
| Fiber Optic Thermometer FA1 | 475 to 3000°C (887 to 5432°F) | 1 Micron | Aiming Light |
| Fiber Optic Thermometer FA2 | 250 to 1700°C (482 to 3092°F) | 1.6 Micron | Aiming Light |
| Fiber Optic Thermometer MR | 600 to 3000°C (1112 to 5430°F) | 1 Micron | Aiming Light |
| Fiber Optic Thermometer FR | 500 to 2500°C (932 to 4532°F) | 1 Micron | Aiming Light |

Included in the series:

- Marathon integrated thermometers provide fast, real-time monitoring for induction heating applications.
- Ratio thermometers are used where the target is small, moving, or obstructed due to dust, smoke or other particulates in the atmosphere.
- Fiber optic thermometers allow measurement of targets that would otherwise be inaccessible due to space constraints or harsh environments. Connected by a flexible fiber optic cable, the optical head can be positioned near the target while allowing the electrical housing to be protected in a remote location.

DataTemp Software

The DataTemp Software allows you to configure, monitor, and store data from Marathon ratio thermometers. Data on the part heated in the induction heater is recorded and saved for a complete production record.



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Raytek®