

## SUCCESS STORY 66 SWAGING OF ALUMINUM TUBES



### KEY FACTS

**Industry**  
Automotive or construction

**Customer's End Product**  
Swaged tubes

**Process Temperatures**  
275-325°C/527-617°F

### PRODUCT AND BENEFITS

#### MM2ML

- Accurate measurement by viewing target at an angle
- MM2ML temperature range optimized for this application
- Sensor outputs can be used in existing process control apparatus
- More accurate measurement leads to improved quality, reduced scrap and improved energy efficiency



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How do you measure the temperature of the end of an aluminum tube that is induction heated prior to swaging?

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#### Situation and background

Swaging is a forging process in which the dimensions of the aluminum tube are altered using a die. In this process, the tube is induction heated to the correct temperature before the swaging operation can occur. If the tube is too hot or cold, the specified dimensions and material properties will not be achieved. Typically, aluminium is difficult to measure accurately with IR sensors due to its low emissivity. The sensor will pick up energy from the target surface, as well as any reflected surfaces which may be at very different temperatures. The most common practice is to heat the parts using a standard "recipe" of time and current on the induction device. True temperature is not known and quality problems frequently occur.

#### The winning solution

- The Raytek salesman recognized that the emissivity of the material was going to contribute to inaccurate temperature readings. He mounted the infrared thermometer at an angle looking into the tube. At a 45 degree angle, both the target spot and all reflected spots are part of the internal tube wall. Since there are no outside reflections, there is no induced inaccuracy in the reading.
- For multiple induction hardening stations, an alternative solution would be to use one Pi20 fixed thermal imager to monitor all stations.

#### Savings made

- The customer was able to get a temperature measurement he could trust. By obtaining the correct swage temperature, yield was increased by 75%.