

SUCCESS STORY 64 INVESTMENT CASTING



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How can you improve process control and reduce cost in the investment casting process?

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Situation and background

Investment casting of precision alloy components requires an alloyed metal to melt under vacuum and be held at a stable temperature, prior to casting into the pre-heated mold. Common practice is to fully melt the alloy, then insert a dip probe periodically during the hold stage to confirm temperature. If the temperature migrates from the desired range, the operator adjusts the power to the induction heaters manually to correct. Installing two infrared thermometers that measure the alloy temperature through a sight window at the top of the melt reduces the number of dips required. Control of the induction power can now be automated using outputs from the IR devices. Fears of inaccuracy generated from gases or other ambient conditions are mitigated, as the temperature value from the IR sensors is considered valid only if both readings are the same.

The winning solution

- Measurement is not influenced if window becomes contaminated.
- Ratio sensor does not need a different setting for each alloy.
- Compact fiber-optic sensing heads keep window size small.
- In the event of mechanical damage, the sensing heads and optical fiber cables can be replaced without returning the units to the factory.
- 0-20mA output allows 0-10V output with a shunt resistor for compatibility with existing control system.

Savings made

- Using 2 color avoids the need for the operator to reset the pyrometer for each alloy change, resulting in savings of \$3.2K/year.
- Additional savings from dip thermocouple labor and material expense of \$1.5K/year.

KEY FACTS

Industry

Vacuum precision investment casting

Customer's End Product

Aerospace alloy parts

Process Temperatures

1400-1500°C/2552-2732°F

PRODUCT AND BENEFITS

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- Small window lowers cost and impact on equipment
- Short wave sensor for lowest measurements errors on wide range of different alloys
- 0-20mA output easily adapted to existing control systems
- Field replaceable sensing heads for fast and low cost repair