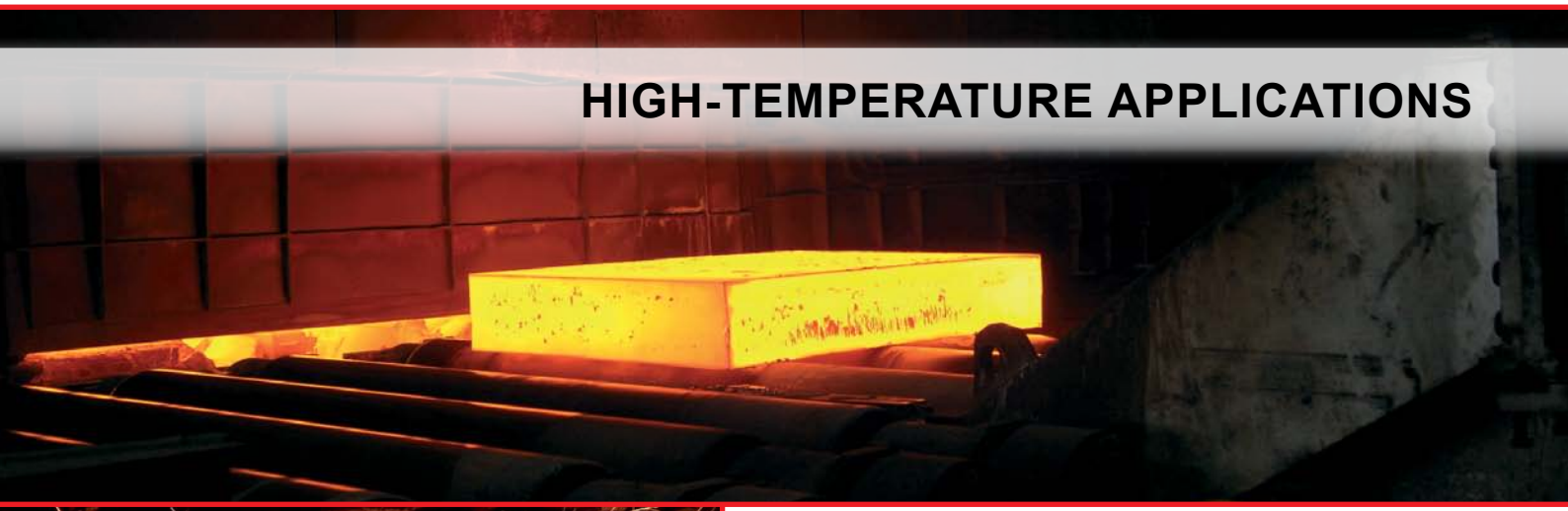
optris
infrared thermometers

HIGH-TEMPERATURE APPLICATIONS



Non-contact temperature measurement from 50°C to 2200°C

Infrared thermometers, infrared cameras and their applications

Innovative Infrared Technology

Optris - Your partner for infrared temperature measurement technology

Best Value Process Monitoring and Quality Control

Infrared sensors supplied by Optris are often implemented in monitoring and control applications for manufacturing processes.
Our **reasonably priced** instruments enable customers to set up multiple measuring points (for example in **OEM solutions**). Innovative ideas such as a comprehensive (analog and digital) interface concept ensure rapid parameter set-up and **easy integration of the temperature measurement devices** with the process.
The use of non-contact temperature measurement offers many advantages:

- Enhanced quality of products
- Optimized processes for increased output
- Process documentation
- Energy savings

The right type of sensor for your measuring application

In almost all industrial production processes the temperature is a critical variable. Compliance with specified process temperatures guarantees, among other things, a high quality of the products.
Non-contact temperature measurement has become the technology of choice. Especially with high-temperature processes it delivers **reliable and repeatable measuring results**.
Infrared temperature sensors (see block diagram in fig. 1) are used in traditional applications in the **metal and glass industries**, but also in new fields such as the **solar and semiconductor industries** and **medical engineering**. With its broad range of products Optris offers the best choice of instruments for most applications.
The surface of the target object determines which sensor and which measuring wavelength are appropriate (see also fig. 2 and 3). For ease of navigation, this brochure is based on following colour scheme:

- 8 - 14 µm mainly for non-metal surfaces (Type of device: LT)
- 7.9; 4.64; 4.24; 3.9 µm for special applications (Type of device: P7; F6; F2; MT)
- 5.0 µm for glass surfaces (Type of device: G5)
- 2.3; 1.6; 1.0 µm mainly for metal surfaces (Type of device: 3M; 2M; 1M)

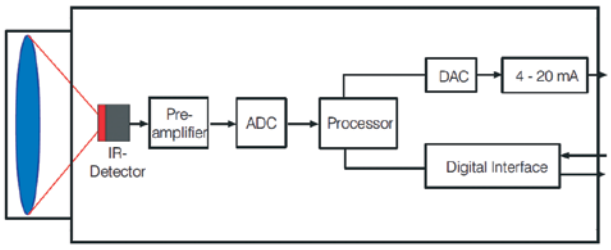


Figure 1: Theoratical set up of an infrared thermometer

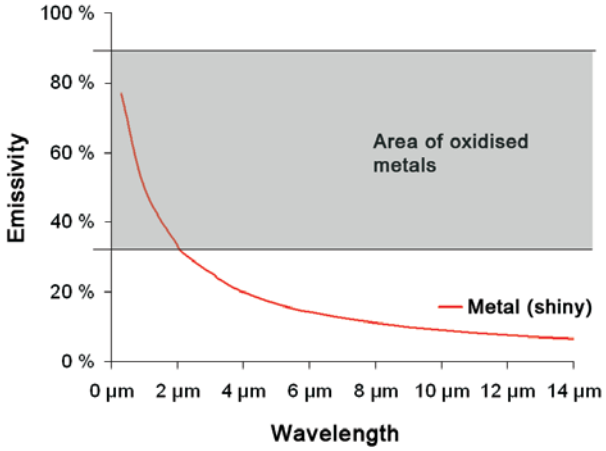


Figure 2: Illustration of adapting emissivities of bright metals and the appropriate metal oxides

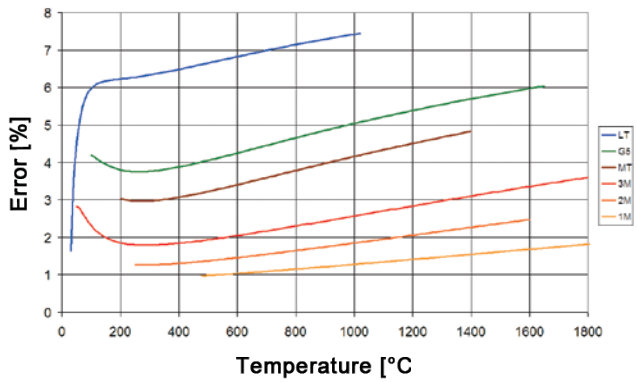
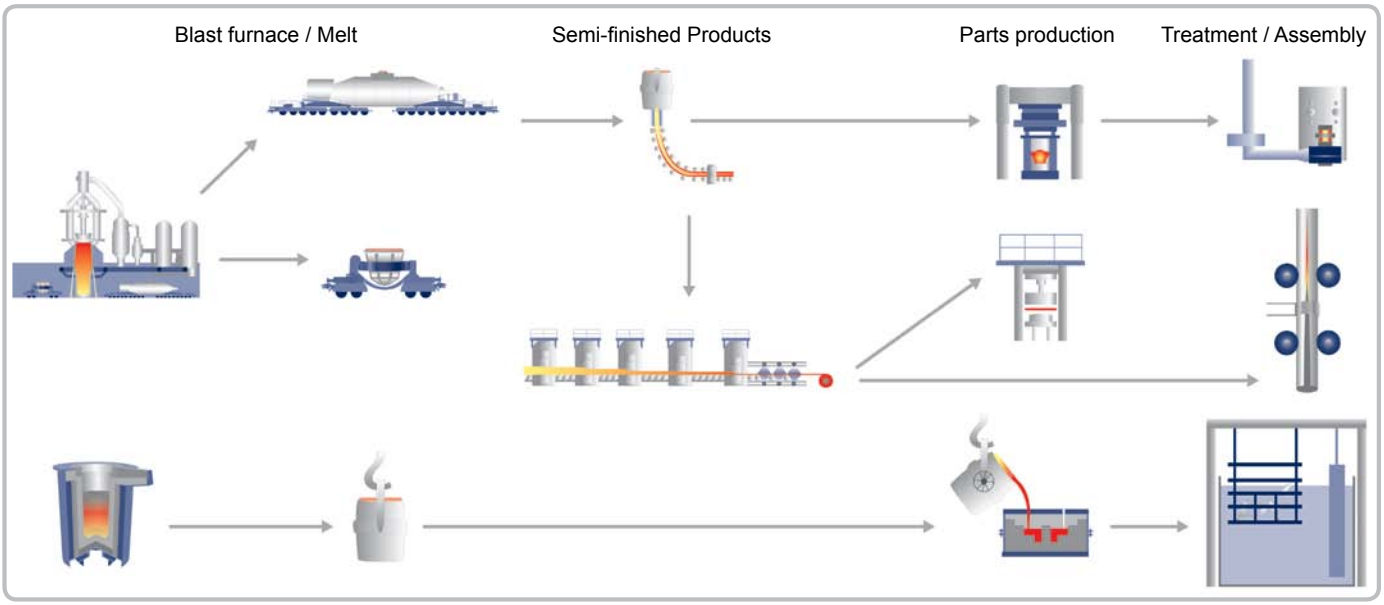


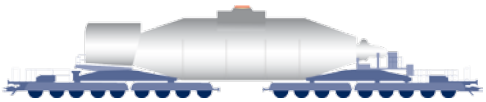
Figure 3: The diagram shows how high the measurement errors are across the wavelength if the emissivity at metals is off by 10% (Key: LT = 8…14 µm; G5 = 5 µm; MT = 3.9 µm; 3M = 2.3 µm; 2M = 1.6 µm; 1M = 1.0 µm)

Metal industry application examples

Overview application examples

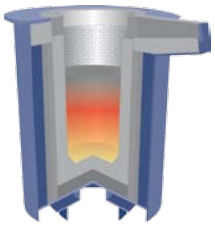


1. Torpedo car



1. Slag car

1. Induction furnace



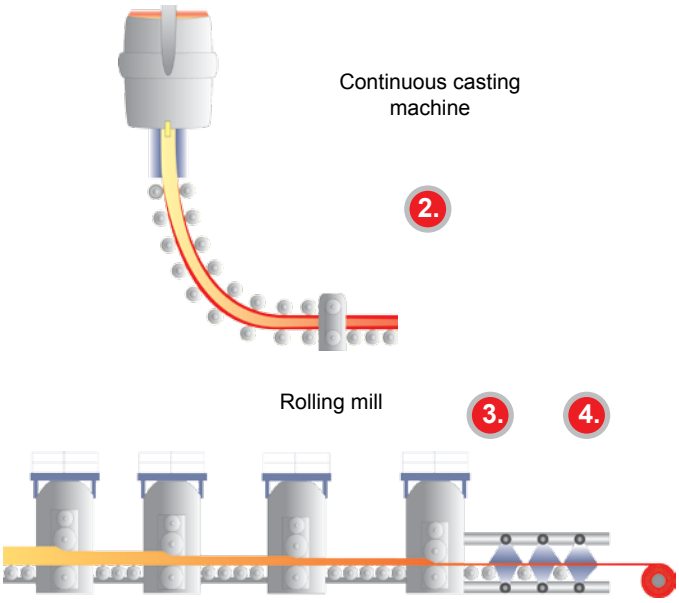
1. Maintenance

Requirement:
Early detection of wear in the refractory lining of torpedo cars, slag cars, and ladles; scheduled maintenance without the risk of metal runouts.

Process temperature:
300°C to 600°C

Recommended sensor:
optris PI160: Thermal imaging camera for permanent monitoring and automatic alarming on detection of hot spots on the outer wall

Inspecting the brick lining of slag cars as they exit the shop



3. Rolling mill

Requirement:
Continuous measurement of forming temperature between individual rolls for optimized process control and quality assurance

Process temperature:
700°C to 1100°C

Recommended sensor:
1. optris CTlaser 1M / 2M: Fast pyrometer for *sheet temperature* measurement
2. optris CTratio 1M: Ratio pyrometer inside the *cooling chamber*, highly insensitive to fumes and dirt, tolerates ambient temperatures up to 250°C without cooling
3. optris CTratio 1M: Ratio pyrometer for *wire temperature measurement*, yielding precise results even when the wire only fills 5% of the spot size

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Hot forming of sheet metal and wire production

2. Continuous casting line

Requirement:
Controlled cooling of the strand in the cooling sections to prevent breakouts through the outer shell and ensure the high quality of the material

Process temperature:
800°C to 1000°C

Recommended sensor:
1. optris CTratio 1M: Ratio pyrometer inside the *cooling chamber*, highly insensitive to fumes and dirt, tolerates ambient temperatures up to 250°C without cooling
2. optris CTlaser 1M: To measure the outer shell in the runout section and correct the closed-loop controlled cooling zone temperature

Runout section of a continuous casting line

4. Hot metal detection

Requirement:
Precise measurement of hot objects, e.g. for material tracking or verification of ejection from the mould

Process temperature:
150°C to 900°C

Recommended sensor:
optris CT 3M: Rapid response time of 1 ms; reliable measurements even with low metal temperatures, large measuring range

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Rapid temperature measurement on a steel slab for material tracking purposes

5. Die forming

Requirement:
Temperature measurement of the blank before hot forming, or of the formed part after forming / before storage

Process temperature:
700°C to 1250°C

Recommended sensor:
1. optris CTlaser 1M: Fixed pyrometer for *permanent* monitoring
2. optris P20 1M: Handheld device for sporadic measurement of the parts; laser or sighting scope for acquisition of target object

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Formed part after die forming

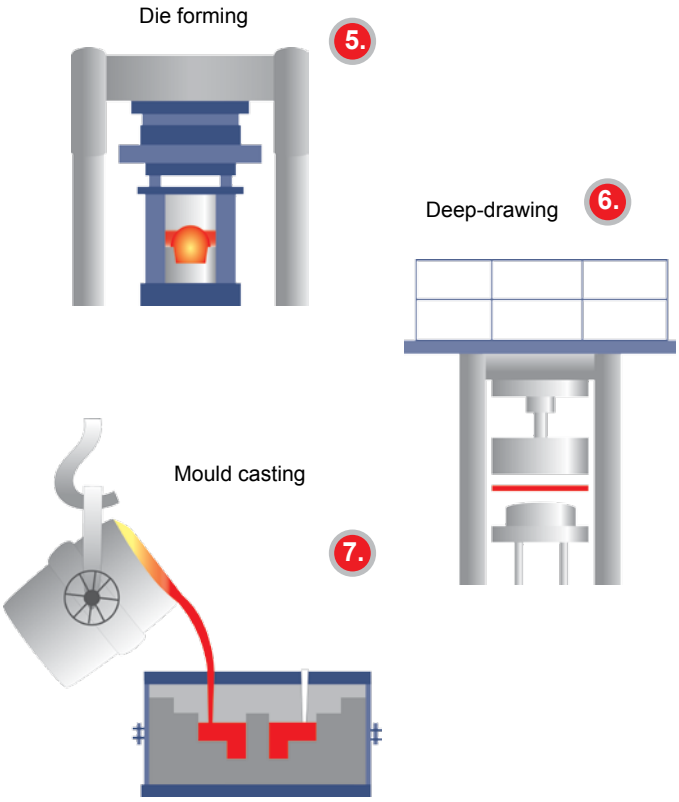
6. Deep-drawing

Requirement:
Permanent tool and blank temperature measurement prior to deep-drawing for stable process control

Process temperature:
200°C to 350°C

Recommended sensor:
optris CTlaser 3M: Reliable measurements even with low metal temperatures, large measuring range

Deep-drawn bath tubs



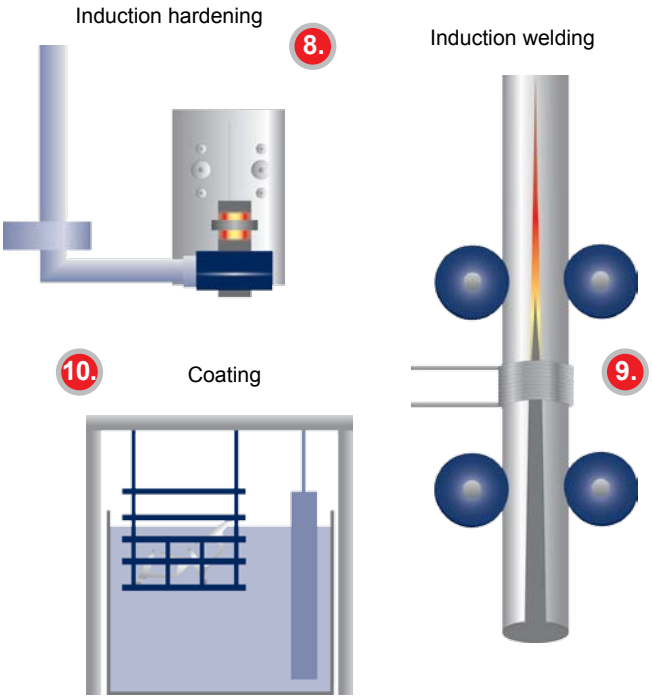
7. Mould casting

Requirement:
Measuring the molten metal stream pouring into the mould

Process temperature:
1250°C to 1600°C

Recommended sensor:
optris CTratio 1M: Ratio pyrometer highly insensitive to fumes and dirt, featuring automatic analysis of measured values by software (Combined evaluation using peak hold, averaging and other features.)

Measuring the molten metal stream pouring into a mould



8. Induction hardening

Requirement:
Adherence to an optimum temperature-time profile so as to achieve the desired microstructure of the metal

Process temperature:
700°C to 1100°C

Recommended sensor:
1. optris CTlaser 1M / 2M: *Permanent* temperature monitoring, laser for precise alignment, remote optical head to protect the electronics package against electromagnetic radiation
2. optris P20 1M / 2M: Handheld device for *sporadic* temperature measurements, laser or sighting scope for target object acquisition

Induction-heated pipe

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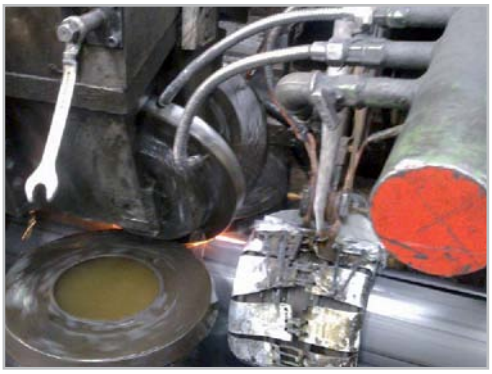
9. Induction welding of pipes

Requirement:
Ensure a high quality of weld seams by measuring the temperature on pipe edges after the induction heater and before the squeeze rolls

Process temperature:
950°C to 1450°C

Recommended sensor:
optris CTratio 1M: Ratio pyrometer for continuous measurement and closed-loop control of the weld seam temperature, highly insensitive to fumes and dirt, tolerates ambient temperatures up to 250°C without cooling



Pipe edge temperature monitoring just before the welding process

10. Coating

Requirement:
Heating the metal workpiece to target temperature before hot-dip galvanizing with a view to optimizing the electrochemical reaction

Process temperature:
150°C

Recommended sensor:
optris CTlaser 3M: Reliable measurements even with low metal temperatures, large measuring range, sighting laser for acquisition of target object

Chromium-plated gear omponent

Overview of measuring devices

Compact Series

Small, compact infrared thermometers, ideal for use in cramped and hot surroundings

Prices start at 145 €

Infrared Cameras

Compact thermal imagers for fast stationary applications, including linescanner functionality

Prices start at 2,950 €

High Performance Series

Infrared thermometers with highest optical performance and double laser

Prices start at 610 €

Portable Thermometers

High-quality infrared thermometers with integrated USB interface

Prices start at 89 €

Accessories for industrial use

Mounting angle, adjustable in one axis

Mounting angle and mounting fork, adjustable in two axes

Massive housing (CSmicro, CT)

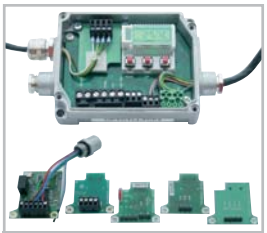
Cooling jacket (CTlaser, CSlaser)

Cooling jacket with high-temperature cable (CTlaser, CSlaser, PI)

Air purge collars

Mounting device for cooling housing (Mounting adapter and protection pipe)

Ancillary lens and exchangeable optics



Digital interface modules for electronics box

Rail-mounting adapter and Closed box cover for electronic box

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