

APPLICATION NOTE



Metal-industry

TEMPERATURE MONITORING DURING INDUCTION HARDENING

Process control by the compact optris PI 1M IR camera

Application request

In (partial) induction hardening, the metal is heated to the required hardening temperature and then quenched. For this purpose, an optimum temperature-time curve must be maintained so that the desired microstructures of the metal can be achieved. If this is not done, deformation, cracking and other deficiencies may occur.

Complex geometries (e.g. gears) in particular make uniform heating and quenching difficult. For the benefit of quality assurance, temperature monitoring of the hardening process is therefore essential.

Solution from Optris - Infrared temperature monitoring

With the help of Optris infrared cameras, the temperature of the metals can be monitored during the hardening process. This type of quality assurance increases the reliability of the process. The thermal image of the infrared camera shows whether a uniform hardening (structural change) is to be expected.

For this purpose, the compact and short-wave thermal imaging camera optris PI 1M is primarily used, which is particularly suitable for temperature measurements on metals.

Details:

- Resolution:
 - 764 × 480 pixels @ 32 Hz
 - 382 × 288 pixels @ 80 Hz
 - 72 × 56 pixels @ 1 kHz
- Temperature range: 450–1800 °C
- Thermal sensitivity:
 - <2 K (<900 °C)
 - <4 K (<1400 °C)
- Spectral range: 0.85-1.1 µm
- Ambient temperature: 5-50 °C
- System accuracy:
 - (at ambient temperature 23 ±5 °C):
 - ±1 % of measured value for 27/32/80 Hz/for object temperature < 2000 °C
- Degree of protection: IP67

Further advantages

The compact Optris PI 05M and PI 1M infrared cameras have been specifically designed for metal industry applications. The short wavelength PI 05M is ideal for measuring molten metals in the casting process, as the new spectral range of 500 nm provides more accurate measurement with changing emissivities and is less sensitive to atmospheric influences.

The optris PI 1M is mainly used in metal processing. Here it is used e.g. for temperature monitoring during hardening, forming and welding of metals.

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Hardening process



Temperature monitoring



Quality control



Hardening process in the metal industry

(Image: adobe-stock | sorapolujjin)



The installed PI 1M monitors the consistent hardening

(Image: adobe-stock | sorapolujjin)



Optimal for applications in the metal industry

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