Pyrometers

Fixed, Non-Contact Temperature Sensing

Principle

Pyrometers work by measuring the infra-red radiation from an object. The more intense the IR, the hotter the object that is emitting it.

Everything emits some level of IR radiation - pyrometers use specialised lenses to view a very small 'spot' and measure the temperature. They are available in both fixed and hand-held versions.

Advantages

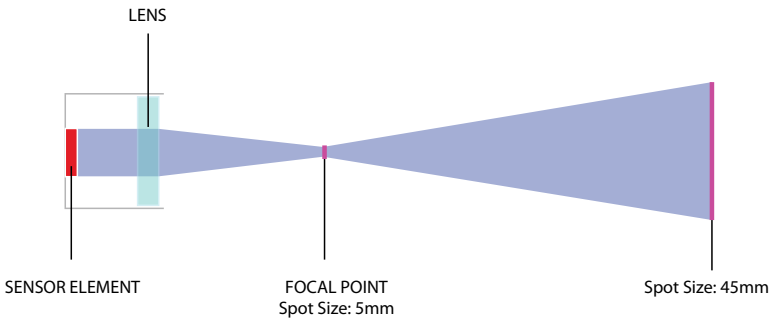
- No contact with your process
- Can average out large areas rather than individual points
- Wide variety of temperature ranges

Disadvantages

- Can be confused by dust, smoke, haze or other optical occlusions
- Expensive when compared to contact sensors

Focus

When choosing a sensor, you need to consider the size of the target you want it to look at. Many sensors have a given 'spot size'. at a particular range This is the size of the area that is being measured by the sensor - this size increases as the distance from the focal point of the pyrometer increases.



In the above diagram, the sensor is focused at a point 100mm away. This is where the spot size is at it's smallest. As you move the target closer to or futher away from the focal point, the spot size becomes larger.

Emissivity

Some products emit and absorb more radiation than others, and some are reflective - meaning that they not only emit their own IR radiation, they reflect the radiation from other sources as well.

For example, a 'perfect black body' has an emissivity of 1 - all of the infra-red emitted from the object is from the object and not from it's surroundings.

Lampblack, heavily rusted iron and other matte, dark surfaces usually have an emissivity of 0.95.

Unpolished copper has an emissivity of 0.22, which means that a large amount of it's IR output will be from reflected sources. Polished copper has an emissivity of 0.03, which means it is difficult to pick up without using a specialised pyrometer that is designed for use on polished metals. These pyrometers operate on wavelengths that are absorbed and reflected differently.

To get the best possible result, you should adjust your emissivty setting to suit your target.

Thermal Imaging

For Much More Than Playing Predator

Principle

Thermal imaging cameras are very similar to normal digital cameras, except that instead of picking up visible light the sensor instead is sensitive to infra-red light. It captures the temperatures of the objects you are looking at.

They are available both in hand-held versions and in fixed mounting.

While in the past many thermal imaging solutions were far too expensive, new low-resolution models are now becoming quite affordable.

Advantages

- No contact with your process
- Can save hours or even days of work by quickly and easily viewing your system from a distance

Uses

There is a wide variety of uses for a thermal imaging camera - many depend on the field you are in.

They are extremely useful to mechanical and electrical engineers when performing fault-finding or preventative maintenance. Rather than having to painstakingly check the temperature of every bearing on a machine or every component in a panel, you simply look through the view-finder. Instantly, every hot or cold spot is instantly visible, saving hours of time.

For builders and building inspectors, they clearly show insect activity, rising damp or water damage, mildew growth and more.

For machine and building security, you can use them to detect people entering low-light environments.

Features

Thermal imaging cameras offer a number of features, displaying the highest, lowest or average temperature across your image, as well as providing detailed reports that can be printed or digitally stored as confirmation of the condition of your equipment.

Fixed units can raise alarms when maximum, minimum or spot temperatures exceed certain limits, which makes them ideal for shutting down machines before they mechanically fail or detecting fires.