

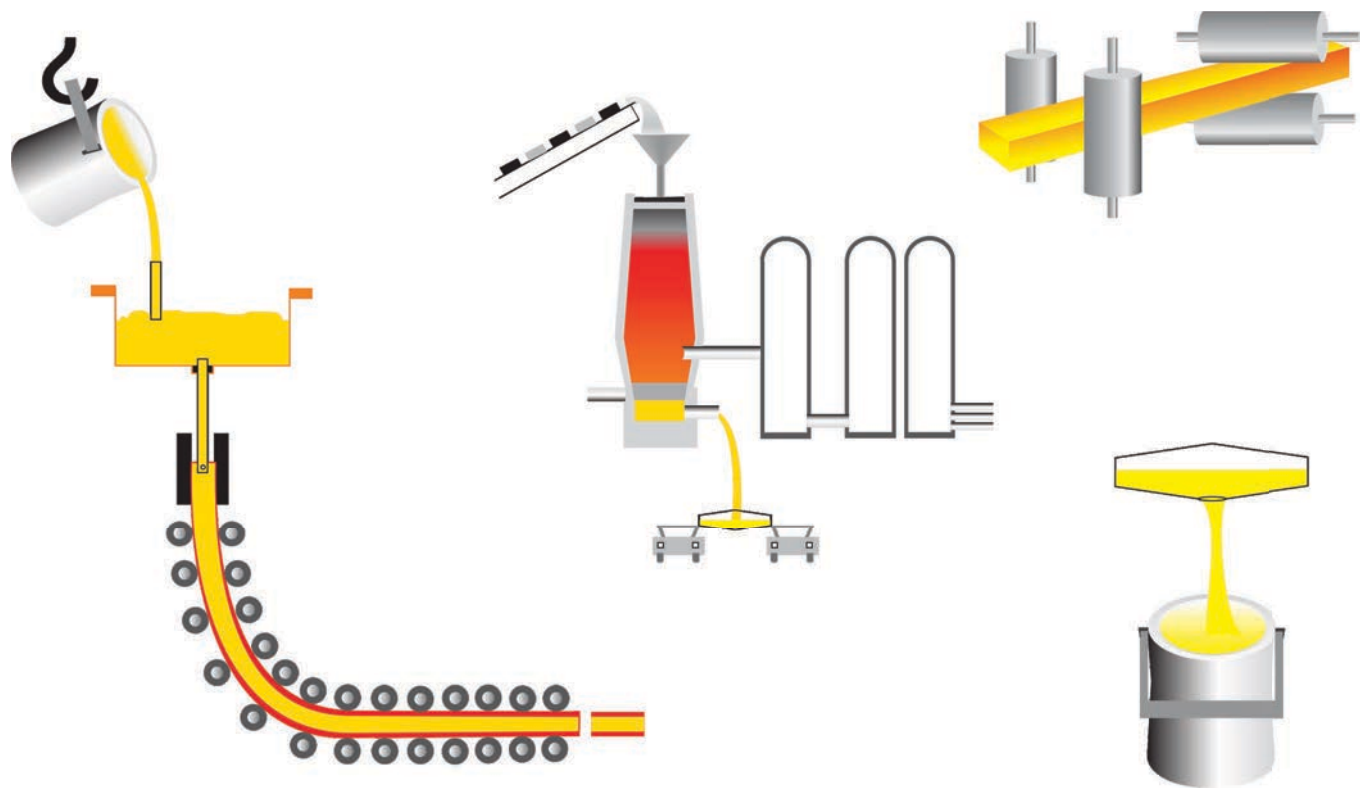


Non-contact temperature measurement in steel industry

infrared pyrometers



High Temperature Steel Applications

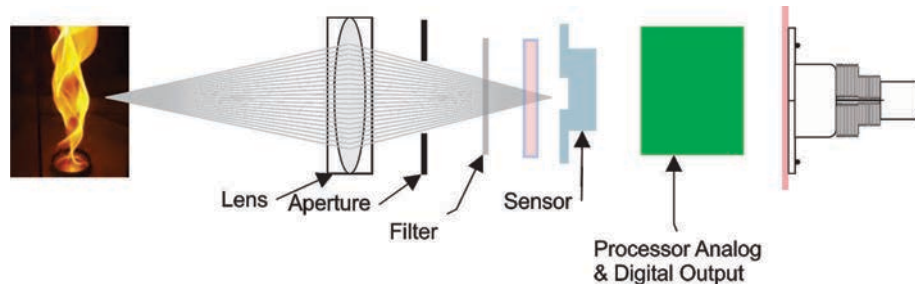


We measure temperature accurately even in extreme conditions

High temperature applications

Basics of infrared Pyrometer and it's usage in Temperature Measurement specially in steel industry

Infrared pyrometers are popular in steel industry because of it's ability to measure temperature from a distance. These sensors are ideal for measuring hot, moving targets, or for measuring in a hostile environment where traditional contact temperature sensors are not appropriate. These devices do not measure temperature directly; instead, they infer a temperature value based upon the infrared energy emitted by the target of interest. The infrared energy is measured and converted into an electrical signal by an internal infrared detector. The infrared pyrometer calculates a temperature value by correlating the measured infrared energy to a calibrated temperature value.



The factors helpful in Selecting the Pyrometer Model

- Material
- Temperature
- Object size and distance from pyrometer
- Surface Condition – Reflective/dull/painted/ oxidized
- Atmospheric condition - clean/dusty/smoke/water vapor etc
- Ambient conditions - temperature / emf

Usefulness of Infrared Pyrometers in Process Monitoring as well as Control

Infrared Pyrometers of Accurate Sensors Technologies is useful for monitoring and control applications in the manufacturing process of Steel. Our economical instruments enable customers to set up multiple measuring points (for example in OEM applications.). Innovative ideas like video display, USB interface bluetooth communication, analog and digital output helps in quick parameter setup which in turn helps in easy integration of the devices with the processes.

The main advantages of non contact temperature measurement are as follows :

- Homogeneous Quality Of Products
- Optimized processes for increased output.
- Process documentation
- Energy Savings

Blast Furnace Applications

Tap Hole Exit Application

1.1

Application : Molten iron stream temperature measurement at the tap hole exit

Process Temperature : 1500°C

Installation of the Pyrometer : At the tap hole exit

Recommended Pyrometer : ASTA450C TL

-Dual-wavelength pyrometer working in near wavelengths between 0.7...1.15 μm compensates for dirty optics and intermittent disturbances like dust and smoke. Due to movement of equipment and working labor, most of the time pyrometer needs to be installed at long distance. Advanced optical scheme and through the lens sighting makes the system perfect to install even in long distances without deviation in accuracy of measurement.

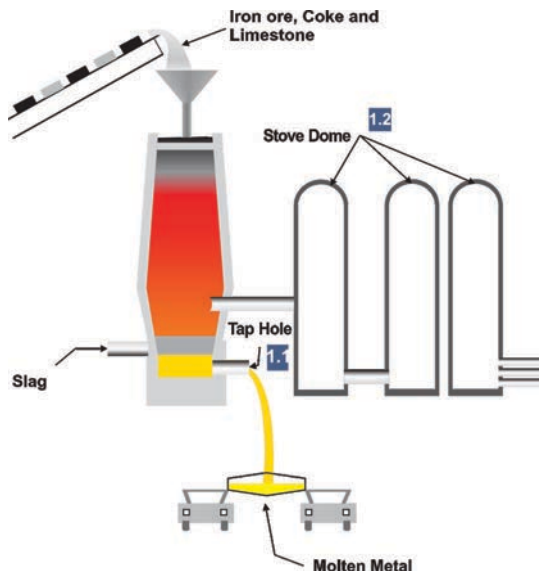
Heavy duty water cooling jacket with integrated air purge unit and quartz protection window to withstand harsh steel industry application



AST A450C TL



Water Cooling Jacket with Adjustable Flange for AST A450C TL



Stove Dome Application

1.2

Application : To measure the temperature of refractory of the stove dome. The Stoves are used to heat the air. The hot blast air is then supplied to the blast furnace to achieve the process temperature which is essential for the production of iron.

Process Temperature : 1400°C

Installation of the Pyrometer : Pyrometer mounted vertically at the top of the stove.

Recommended Pyrometer : ASTA450C FO PL

Dual-wavelength pyrometer with fiber optics is able to look through dirty windows and tolerate the harsh environment to measure the refractory temperature. The electronics of the sensors are safe as they are mounted away from the hot surface.

The conditions are very harsh and it leads to the contamination of the optics but these issues don't affect the infrared pyrometer due to the dual wave length technology.



AST A450C FO PL

Ladle Applications

Preheated Ladle

2.1



Ladle

Application : To measure the temperature of refractory vessels of Ladle.

The Ladle is preheated before pouring of the molten metal into it. Pre heating of the ladle is essential as it helps to withstand thermal shock of molten metal to ladle and prevents the refractory linings of it from getting damaged. Ladle should be preheated to an optimum temperature. If the ladle is cool then the metal will explode from the sides of the vessel which hampers the safety and can be lethal. If the ladle is heated to a lower temperature refractory may crack. Very high temperature heating of the ladle results in the decrease of the insulating properties of the refractories.

Process Temperature : 1500°C

Installation of the Pyrometer : At the top of the Ladle

Recommended Pyrometer : AST A450CFO PL.

The Fibreoptic infrared thermometer is the most suitable product for this application. The pyrometer is able to view through the flames and can measure the temperature of the refractory directly. These sensors need very less maintenance and survive efficiently for many years.



AST 450C FO PL

2.2 Inside the Ladle

Molten Metal transferred into the ladle after pre heating of ladle is done



AST 450C FO PL

Application : To measure the molten steel temperature inside the Ladle.

After the preheating of the ladle the molten metal is transferred to the Ladle. It is essential to know the temperature at this stage also.

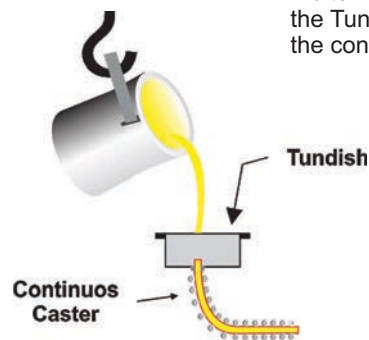
Process Temperature : 1500°C

Recommended Pyrometer : AST A450C FO PL

Ladle Pouring

2.3

Molten Metal is transferred into the Tundish to further proceed into the continuous casting line



AST 450C TL

Application : Molten Metal String Temperature Measurement during Ladle Pouring into Tundish.

Molten metal is poured from Ladle into Tundish to be used for other process such as Casting etc. The temperature measurement is crucial for the homogenous quality to be maintained in the further processes as well.

Process Temperature : 1500°C

Installation of the Pyrometer : 15-20mm from the Ladle

Recommended Pyrometer : AST A450C TL.

Continuous Casting

Continuous Casting

3.1



AST Concast

Application : To measure controlled cooling of the strand in the cooling section within Spray Chamber

Within the spray chamber exist very harsh and unfriendly environment. Some of the common conditions/problems which exist inside the spray chamber are as follows:

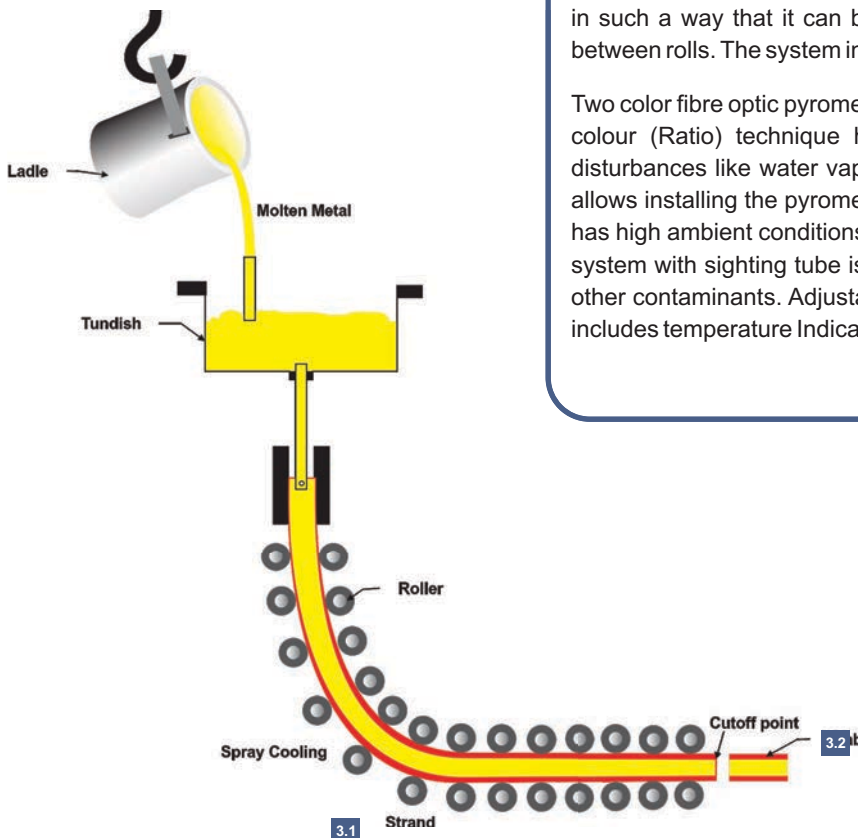
- High temperature within the spray chamber
- High pressure of the water sprays
- High pressure of the steam
- Masking of the surface due to the deposition of water droplets or steam in the field of vision.

Process Temperature : 800-1000°C

Installation of the Pyrometer : Within the Spray Chamber

AST Recommended Pyrometer : AST's pyrometer system "AST Concast" is designed in such a way that it can be easily installed in the spray chamber to view the strand between rolls. The system includes -

Two color fibre optic pyrometer - AST 450- C FO/PL with 10mtr long fibre optic cable. Two colour (Ratio) technique helps to overcome the inaccuracies due to atmospheric disturbances like water vapor, dust and contamination on lens etc. Fibre optic system allows installing the pyrometer securely inside the control box away from the site which has high ambient conditions. Silicon rubber tube for protection of Optical fibre. Air purge system with sighting tube is useful in protecting the optical head from water vapor and other contaminants. Adjustable flange helps in the trouble free installation. Control box includes temperature Indicator with programmer – P 120.



3.2 At the cutoff point of steel slab

Application : Temperature monitoring of Solid Steel Slab after cutting of the billet

Process Temperature : 800°C

Pyrometer Recommended : AST A250 /AST A450



AST A250/A450

Rolling Mill

4.1

Application : Billet temperature measurement before entering the rolling

Process Temperature : 1000°C

Installation of the Pyrometer : Targeted on billet

Recommended Pyrometer : AST A450

4.2

Application : Before Quenching

Process Temperature : 900-950°C

Installation of the Pyrometer : Before quenching

Recommended Pyrometer : AST A450

4.3

Application : After Quenching at the cooling bed.

At the cooling bed, temperature equalizing takes place around 600°C. This makes the surface of the re-bar a hardened structure. The core remains soft. Monitoring and controlling temperature at each stage is important to maintain the quality of Re-Bars.

Cooling is important factor here. To ensure the retention of all the metallurgical properties of the steel the cooling should be fast as well as controlled. Lack of control in the cooling will lead to the formation of scrape/wastage material. This will hamper the quality of the product.

Installation of the pyrometer at this level helps in

- Retention of the metallurgical properties of the steel
- Helps in monitoring a variety of rod/bars with different diameters
- Helps in carrying out continuous measurement

Process Temperature : 450°C-500°C

Installation of the Pyrometer : At the cooling bed

Recommended Pyrometer : AST A250

